Luonto-Liitto

Guidebook for Baltic Sea Lecturers

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1. The Baltic Sea is unique and under threat

Give a brief introduction to the lecture:
The Baltic Sea is unique and under threat. After this lecture you will know:

- **What goes on under the sea.**
- **How human activity affects the Baltic Sea.**
- **What you can do to save the Baltic Sea.**

This lecture is also an an opportunity to discuss issues. I hope that you will all take part in the discussion, as everyone's opinion is important.

2. The sea in our lives

A brief discussion in pairs or groups of three:

- **How do you interact with the Baltic Sea?**
- **What does the Baltic Sea mean to you?**
  - **When did you last travel by ship or go to the seaside?**
  - **If you have never seen the sea, then think more generally: how do people interact with the sea? What does it mean to live in a coastal city?**

You may organise the responses into a mind map on a chalkboard or white-board. Remember to give positive feedback on each viewpoint.

Summarise the main points of how we benefit from the Baltic Sea.

- We utilize Baltic Sea for:
  - transporting people and cargo by ship
  - underwater cables and gas pipes
  - dredging sand from the seabed
  - cooling factories with seawater
  - discharging wastewater from cities and industry
  - fishing and hunting sea birds
  - forms of recreation, such as sunbathing, swimming, canoeing and sailing.

The aim of the group discussion is to illustrate the many ways in which we use the sea in our daily lives. This is only a warm up task: it should get the group talking make the session more informal so that the lecturer is not viewed as a controller or absolute authority.

3. Our activities in the catchment areas matter

The Baltic Sea catchment area is the area from which all surface and ground water flows into the Baltic Sea.

➨ A raindrop that falls in the catchment area and flows freely will eventually end up in the Baltic Sea.

85 million people live in the Baltic Sea catchment area, which also has a lot of industry, agriculture and traffic in the area.

► **all activities in the catchment area affect the state of the Baltic Sea**

The Baltic Sea has many features that make it especially sensitive to human activities:

➨ It is very shallow, with very little water to dissolve and disperse toxic chemicals and waste.

➨ As a brackish water sea, the Baltic Seas salinity level is lower than in the oceans and dependent on location, which means the Baltic Sea is not an easy habitat for existing species to adapt to.

➨ The waters of the Baltic Sea is stratified (layered) with differing properties at various depths, and parts of it are covered with ice during winter. This reduces water circulation and the amount of oxygen received from the atmosphere.

➨ The Baltic Sea is not like any other sea. Can we measure the value of such a unique resource? What happens if we pollute it unrecoverably?

4. Common observations of blue-green algae

BLUE-GREEN ALGAE! No swimming!

- Have you ever wanted to go swimming but couldn't because of blue-green algae? Where and why? How did it feel?
- If you haven't seen blue-green algae, have you read or heard anything about this problem?

Ask a couple of students to share their thoughts with the whole group:

- How do you know you can swim safely in water with algae?
    - If there is little algae in the water: small flakes or streaks, then you can still swim in it. However, people with sensitive skin may suffer some discomfort and irritation afterwards.
    - Swimming is not recommended, if an algal mass covers the entire water surface or the shoreline has a thick coating of algae that looks like pea soup or paint.
    - You can identify blue-green algae washed up on the shore by prodding it with a stick. If algae do not hang from the stick but fall into tiny pieces, they are most probably blue-green algae. Another identification method is to pour the algae-contaminated water in it to a glass and wait a moment. Blue-green algae tend to float to the surface.
    - Some blue-green algae are poisonous, but this feature cannot be detected by eyes alone.
    - Pets should not be allowed to swim in water with blue-green algae, because of the danger of poisoning when they clean themselves by licking their coats afterwards.

- Most common symptom caused by blue-green algae is skin irritation, burning lips and skin rashes and symptoms resembling the common cold (runny nose, headache and upset stomach generally beginning about 3–5 hours after exposure).
- These symptoms may continue for up to a couple of days. Cleaning the skin with fresh water and taking painkillers/cold remedies for other symptoms is usually enough to alleviate the symptoms.

The aim of this activity is to help the students to appreciate the problems caused by blue-green algae and to link their personal experiences attach to the information provided in the lecture.

5. How do you recognize eutrophication?

One way to work with this slide is to let each student give an example.

You can also ask students to raise their hands if they have noticed any of the following:

- **slippery rocks on shore covered with filamentous algae or other seaweed:**
  - These are caused by filamentous green alga, or other thread algae.
- **slimy fishing tackle**
- **widespread reed beds:**
  - Reed spreads to shore areas and formerly open beach areas become overgrown.
  - Especially people with shoreline summer villas have noticed this change.
- **cloudy water:**
  - Algae make water cloudy although in some places like river estuaries this can also be due to suspended silt.
  - Water used to be clearer: you could see 3–4 meters further through Baltic seawater 50 years ago. Divers have noticed this change, and they now practice diving in the cloudy waters of the Baltic Sea by painting their diving masks green.

Suggestion: We can all see what a clearer Baltic Sea looks like. There are virtually no algae in the water in late autumn, winter and early spring, and the water is much clearer. What if the conditions were like this in summer as well?

6. Algae are the foundation of life

- Algae occur naturally in the sea.
- The sea is home to a very wide variety of algae, some of which also grow on the shore (on tree trunks, for example).
- Filamentous algae or seaweed growing near the shoreline are large, such as bladder wrack, and grow attached to the seabed.
- Phytoplankton, on the other hand are microscopic, floating algae, such as blue-green algae and diatoms.
- In order to grow, algae need:
    - sunlight
    - carbon dioxide (CO_2)
    - nutrients: nitrogen (N) and phosphorus (P).
    - By combining these in photosynthesis, algae and other plants trap the energy of sunlight in substances that other life forms can use (this process can be compared to cooking).
    - Phytoplankton are food for tiny animals called zooplankton:
        - the small fish that feed on zooplankton in turn become food for predatory fish.
    - In this way energy from the Sun flows through plants and animals to form a food chain.
    - Algae and various animals eventually die and sink to the bottom, where seabed animals and bacteria decompose them and break up the remaining nutrients, and return them to the food chain.
    - Photosynthesis converts carbon dioxide into the oxygen that all animals require in breathing.
    - The oxygen we are breathing right now has passed through many varieties of algae before reaching us.
    - Marine ecosystems are important to Earth both as sources of oxygen and carbon dioxide sinks. This is why it is important to keep the oceans alive.

Nutrients from dead organisms decompose and re-enter the food cycle.

7. Eutrophication – the amount of nutrients is increasing

High nutrient flows increases biomass in water ecosystems

- ► **many species become extinct**
- ► **increased biomass decomposition consumes all oxygen**

- ➨ more nutrients enter the sea
- ➨ more algae and plants grow
- ➨ this provides more food for more crustaceans, fish, and predatory fish
- ➨ changing habitat favours some species over others
- ➨ later the number of species drops, although number of individuals in a given species and the amount of biomass in the sea continue to grow
- ➨ salmon populations suffer, while roach populations thrive
- ➨ bladder wrack becomes less common due to murky water and filamentous algal growth
- ➨ species that depend on bladder wrack also grow scarce
- ➨ the already narrow ecosystem of the Baltic Sea, with its few key species, loses even more diversity
- ➨ decomposing biomass on the seabed consumes all available oxygen, suffocating all oxygen-dependent life on or near the seabed
- ➨ living conditions for seabed animals deteriorate and internal loading increases as nutrients are released from seabed sediment due to changes in acidity
- ➨ decomposition releases more nutrients into the water, causing a vicious cycle of internal loading.

8. The Baltic Sea ecosystem suffers: too little bladder wrack

- **Bladder wrack is an important seaweed for the marine ecosystem:**
  - Its prevalency tells us how the sea is doing.
- Bladder wrack is like a nursery for the sea animals, providing nutrients and protection for several invertebrates and fish.
- **Eutrophication prevents bladder wrack growth**
- **Animals that depend on bladder wrack disappear:**
  - these include young fish, marine gastropods (e.g. snails), and several types of crustaceans, such as amphipods and isopods.

9. Our activities pollute the sea

The Baltic Sea now receives eight times the amount of phosphorus and four times the amount of nitrogen that it received 100 years ago from human sources.

- The source of these nutrients can be divided into two groups:

Discharges from large individual nutrient sources are called **point source loading**.

- These include wastewaters from cities and towns and waste waters produced by industry.
- Wastewater from Finland and other EU countries is processed at biological treatment plants before it is released to the Baltic Sea.
- The treatment plants remove 60–90% of the nutrients but some nutrient discharges still remain.
- Feed used in fish and fur farming leaks into waterways, causing serious local eutrophication.

Discharges from several small nutrient sources are called **scattered loading**.

- Both figuratively and literally, these are small streams that combine into large rivers.
- Fertilisers used in agriculture leach into waterways.
- Discharges from sparsely-populated areas, summer villas and yachts.
- Emissions caused by sea and road transport and energy generation.
- Burning oil, natural gas and coal releases nitrogen compounds to the atmosphere, which:
    - ends up in the waterways through atmospheric nitrogen deposition, and
    - gaseous nitrogen is absorbed directly from the air by blue-green algae which are actually a form of bacteria.

10. What you can do to cut nutrient discharges?

Finland

- Environmental laws require point sources, such as factories and cities, to clean their wastewater effectively. This has helped to cut discharges from these sources. Only about 20 % of nutrients produced by industry and 10 % of nutrients released by community waste water treatment plants of cities end up in wastewater discharges.
- Fish farming releases significant quantities of nutrients locally in South-West Finland, but these are not significant for the Gulf of Finland as a whole.
- Even so, it's better to eat wild fish instead of farmed rainbow trout.
- More nutrients are now discharged by scattered loading than point source loading.
- Atmospheric deposition come from the nitrogen compounds that are released in energy generating and traffic. They are washed out of the atmosphere and end up in the sea when it rains. This is the source of about one third of Finnish nutrient emissions.
    - There is something we can do about this!
- Dead and decomposing animals and plants release more nutrients into the sea, thus causing a vicious circle of internal loading.
- Agriculture and forestry cause half of all nutrient runoffs in Finland:
    - these are caused by fertilisers spread on fields, some of which wash out into waterways when it rains.
- Discharges from scattered settlements, summer cottages and also contribute to scattered loading.

What can we do about this?

- We can increase ecological farming, establish protective zones between fields and water, use less fertilisers and stop using hillside fields near rivers or other waterways for farming.
- We can eat more vegetables and ecologically farmed food and less meat. This

means we make an impact, as less fertilisers are needed to produce our food (growing feed for dairy and meat farming takes up more fertilisers).

- We can stop releasing washing and sanitation water to the sea.
- Discharges in Russia are much larger than in Finland, but Finnish discharges have the most impact on algal blooms near the Finnish coast.
- Save energy by using your muscles: walk, cycle, row, paddle, sail.

Russia

- The main impact of discharges is on the blue-green algal blooms in open sea areas of the Gulf of Finland. Most of these discharges are in wastewater from St. Petersburg and the Leningrad area.
- The new wastewater treatment plant in St. Petersburg reduces the city's wastewater discharges by one third, removing 2200 tonnes of nitrogen and 360 tonnes of phosphorus every year.
- A lot of work must still be done to reduce point source loading in Russia by cleaning wastewater from homes and industry in St. Petersburg.

Estonia

- Scattered loading caused by agriculture is the most important cause of eutrophication.

Group activity with the Kiroileva Siili (Cursing Hedgehog) cards.

Show the students three different Cursing Hedgehog cards. Tell them:

> - lI have three cards here. Each card explains how our various choices affect the Baltic Sea. Look at the cards and think about the possible solutions given in them: what would be easy for you to do, what would be difficult? Try to explain your opinions. Please take one of each card to discuss with a partner.

After a brief discussion in pairs, sum up what was discussed. What were the most popular and the least popular solutions. Why?

Nutrient discharge facts provided by Pekka Kotilainen, Finnish Environment Institute.

11. Eutrophication is a problem for the entire Baltic Sea

- The red color in the satellite image show the highest algae levels. The image is from summer 2005, when the algae situation was at its worst.
- The photograph next to the satellite image shows what blue-green algal blooms look like from the air.

The satellite image was taken using NASA Modis/Terra satellite on 10.7.2005 and post-edited at the Finnish Institute of Marine Research. Good satellite imaging requires cloudless skies. Storms can also break up an algal mass, so that it no longer apperas in the image.

Source: http://www.fimr.fi/en/itamerikanta/bsds/2825.html

12. Fish stocks threatened by overfishing

- Overfishing: **catching fish faster than fish stocks can regenerate** which leads fish stocks to collapse.
    - cod is overfished in the Baltic Sea
    - the situation of Baltic herring has improved in recent years
    - the situation of salmon has also improved, but the stocks are still not yet sustainable

- **Rivers where salmon rise to spawn** have been dammed by hydroelectric power plants.
    - Migratory fish such as salmon, sea trout and migratory whitefish cannot reach their river spawning areas.

- **Excessive trawling** reduces fish stocks.
- Salmon stocks now depend on regular stocking.
- **Loss of bladder wrack** has an adverse impact on fish stocks.
- Toxins from blue-green algae disturb fish reproduction.
- **We have** overfished, constructed and discharged nutrients to the Baltic Sea and thus **severely weakened the situation of fish stocks in the sea**.

► **Fish are disappearing**

What can we do about this?

- **Fishing must be reduced** until fish stocks have recovered.
- lIn the longer term fishing restrictions would also result in larger catch sizes and in larger individual fish sizes, with larger fish also having time to spawn.

- **Don't fish and don't buy undersized fish!** Let them spawn instead.
- Prefer pike, bass, flounder, whitefish and small herrings, because these fish contain less environmental toxins. We should also alternate our food choices between various sizes and species of fish. **Eat various species of non-farmed fish.**

Minimum catch size for fish:
Atlantic salmon 60 cm (50 cm when caught in coastal waters of northern Finland)
Sea trout, Brown trout, lake trout 40 cm
Zander 37 cm
Grayling 30 cm

Source: http://www.ahven.net/suomi/alamitat.php (in Finnish only)

13. People and nature must be protected from environmental toxins

- **Industry releases toxic compounds to the sea (DDT, PCB, dioxins).**
    - Environmental toxins (PCB, DDT, dioxines) are compounds that do not dissolve in water. However, they dissolve readily in fat and therefore easily accumulate in organisms.
    - They decompose slowly, which means they remain in the environment for a long time.
    - Heavy metals such as lead, zinc, cadmium, chrome, copper and mercury are also toxic and cumulative.
    - These subtances reach the environment from industrial production and burning of waste.

- **Harmful substances in household** use: washing powders or liquids containing e.g. synthetic musk fragrances, flame retardants in furniture and clothing:
    - Accumulate in carnivores at the top of the food chains, such as seals and human beings.
    - Disturb hormonal activities and cause problems, for example in reproduction.
    - Baltic Sea seals and herring have reproductive difficulties because of these toxins, populations have been declining.
    - Herring contain dioxin and other environmental toxins.
    - You should still eat fish, you should prefer small herring (under 17 cm) and eat other fish as well.
    - The effects of these toxins are not all known.

► chemicalisation threatens the health and reproduction of both human beings and animals.

What can we do?

- As opposing points of principle: Are we entitled to use any chemical we wish? Should we have a basic right to live in a safe environment? (You may put these questions to the group)
- The manufacture and spreading of environmentally dangerous substances should be restricted.
- European Union has a new chemicals control regulation (REACH), that aims to reduce the risks caused by environmentally harmful substances.
- Legal control of chemicals must be improved still further – both legislation and implementation.
- Avoid all unnecessary use of chemicals!
- Always choose biodegradeable detergents, cosmetics and other home chemicals. These quickly decompose into substances that do not harm the environment.
- Buy organic food to reduce the use of pesticides and herbicides.
- Always take hazardous waste to a proper collection point.
- Reduce the use of chemicals and choose environmentally friendly products.

14. Invaders!

- The Baltic Sea is a young sea and often receives new inhabitants called invasive species.
- **These include animals, plants, bacteria and viruses.**
- They either make their own way or are transported by human activities.
- Often they **arrive as stowaways, carried in the ballast water of ships.**
- **The Baltic Sea currently has over 70 newcomers of this kind that have been established,** and because of increasing human activity this number is still increasing.
- **Newcomers may replace species native to an area.**
- **They may change the food web or nutrient circulation patterns in the Baltic Sea**, or to form toxic blooms. There is no way to predict the precise impact.
- Chemical toxins degrade over time, but there is no way to remove a species that has become established in an area.

Examples of invasive species:

North American polychaet

- This arrived in the Baltic Sea sometime between 1985 and 1990.
- It reproduces rapidly and displaces other seabed animals.
- This is a relatively large creature that can reach lengths of up to 12 cm.

Predatory water flea

- This was first observed in the early 1990's.
- It feeds on other microscopic animals.
- It may change the food web formed by small Baltic Sea animals and fish.
- It causes damage to fishing nets by sticking to them in very large quantities.
- A fully-grown predatory water flea is up to a centimetre long.

15. Catastrophe: oil spill at sea!

☛ **Increasing traffic in the Baltic sea includes much oil shipments, which means an increased risk of catastrophic oil spills.**

► transportation of oil by sea has tripled in the last decade.

☛ **Oil is slow to disperse and decompose in the Baltic Sea**, where the process is slower than in other seas.

☛ The winter cold and irregular coastline slow the process of dispersal and collection.

☛ Oil is harder to collect from an irregular coastline with many islands or ice floes than from the open sea.

☛ The impact of a large-scale oil spill on the Baltic Sea would be devastating: the shore is shallow and oil would quickly stain and collect on plants and animals.

☛ With relatively few species living in the Baltic Sea, an oil disaster would **endanger food chains**.

☛Plankton, seabed animals and shoreline plants would die, affecting the entire food chain.

What can we do?

☛**We can influence scattered loading**. Although most oil spills to the Baltic Sea are small, together, they make a large stream ► take special care when refuelling.

☛ By using less oil, we reduce the need for transporting it via the Baltic Sea.

☛ Because of campaigns by non-governmental civic organisation, and especially the efforts of WWF, the Baltic Sea is now classified as an especially sensitive sea area. This means that stricter transport regulations apply in this area.

☛ The European Union is pushing for faster introduction of double hulls in all tankers sailing the Baltic Sea. This does not, however, apply to Russian ships ► **all tankers should have double hulls.**

☛ NGO campaigns can make a difference. Get involved!

16. Climate change

- Increased energy production and traffic accelerate climate change.
- Heat increasingly reflects back to the ground from the atmosphere (the greenhouse effect) and the climate warms up.
- This climate change will **increase temperatures** in the Baltic Sea area by an estimated three degrees Celsius by the year 2080.
- The change will have various **far-reaching consequences**:
    - **sea levels rise, with more floods**
    - we can expect **more wind, rain and storms**
    - **ship traffic and sea transport will become more difficult**
    - **there will be more** nutrient runoff from land into waters, results in more **eutrophication**
    - **the species distribution will change as the water gets warmer**, unless the North Atlantic Drift of the Gulf Stream changes direction
    - **the area of ice coverage will fall** substantially
    - ringed seals give birth to their pups on the ice in the late winter
    - the decreasing ice coverage may cause extinction of Baltic ringed seals ► **threat to ringed seal reproduction**.

What can we do?

- **Reduce consumption and save energy.**
- **Cycle, walk, use public transportat, avoid driving by car and flying** ► traffic causes 20% of Finland's greenhouse gas emissions.
- **Recycle materials and sort solid waste** to reduce emissions from landfills.

You can find more information at:
http://www.ilmasto.org/ilmastonmuutos/seuraukset/suomessa/vesistot.html (in Finnish only)

17. Clean and available shoreline needed

➨ Do you know any places where people spend time near the seashore? What condition are those places in?

➨ There is very little natural, non-built and undeveloped seashore left nowadays

➨ **Sea shores are important recreational areas**, as not everyone has a summer villa.

➨ Ideally these areas should remain clean and free from rubbish, but all too often the seashore is **spoiled by rubbish**.

➨ The sea is not a rubbish dump.

➨ **Rubbish can seriously endanger, even kill sealife**, for example when birds or fish become entangled in it or choke on it.

➨ Seashore animals need their own space.

➨ Seals, for example, need islets on which they may live undisturbed by human beings

➨ We need more protected areas near seal islets.

What can we do?

➨ Don't drop litter to the ground.

➨ Organize a litter collection to clean up your local seashore.

18. What is the ideal state of the Baltic Sea?

Divide into six small groups. Each group selects its a character and answers the questions from that character's point of view:

- What would the Baltic Sea ideally look like to your character/organism? **What would this mean for people and for other creatures in the Baltic Sea?**
- What could people do to improve the condition of the Baltic Sea?

Let the conversation go on for at least 10 minutes.
Each group then has a chance to present its opinion. Prepare to summarise the various opinions of a good Baltic Sea and show how they differ.

19. Protecting the Baltic Sea demands willpower and action

- **The sea is protected by agreements, national laws and international treaties**
- these rules have many effects: they include recommendations and requirements for reducing nutrient, toxin and heavy metal discharges, safe processing of solid waste, protection of marine wildlife and regulation of navigation.
- **The results take a long time to show** and we can now see progress in programmes that began 10 or 20 years ago

Some results have been achieved:
- Nutrient discharges from point sources such as cities and industrial plants have fallen substantially as these sources **have come under control.**
- **The level of heavy metal discharges and environmental toxins has fallen** – although some new dangerous compounds have replaced them.
- For example seals suffered from environmental toxicity in the 1980s, but the situation has now improved considerably and **the seal population has recovered**.

See the table on the following page for some achievements of local environmental protection work

- Evidently the present agreements and actions are not enough.
- Policymakers must be pressured to take more effective action and make stricter agreements.
- We need cleaner technology and the will to use it

► **We need more protective legislation, stricter agreements, cleaner technology and the will to use it!**

Local efforts

Often, people do not want to recognize environmental problems that surround them. They tend to look away or point to somewhere else: the worst problems are always far away, not in your immediate vicinity. This is why we encourage our Baltic Sea -lecturers to examine their local situation and briefly sum it up in their own lecture.
http://www.ymparisto.fi/default.asp?node=6084&lan=en

A link to changes in emissions, Helsinki:
http://www.valt.helsinki.fi/projects/enviro/ ► Helsinki ► Environment

More information on agreements:
http://www.fimr.fi/en/tietoa/suojelu/en_GB/suojelu/

20. How can I make a difference?

➨ Our actions caused the present deterioration in the state of the Baltic Sea, but fortunately our own actions can also improve its condition.

➨ **Take the initiative, be active and set an example!**

Here is a good point to review what you have discussed, ask the students what **they** think they could do, and summarise their answers as a mind map on a chalk board or whiteboard.

➨ Use less energy, eat organic food, stop waste and chemicals from reaching natural waterways.

➨ Consume less, even if this begins in small stages and gradually.

➨ **Join the Finnish Nature League (Luonto-Liitto) Baltic Sea Group** – there is strength in numbers, and together we can make a difference.

➨ **Spend time on the sea.** Show you care about it. At the same time you will learn to know it and learn to cherish it.

➨ **How are the environmental issues managed in your school?**

Discuss briefly with a partner: what can you do to protect the Baltic Sea?

➨ There is no need to summarise this discussion. Instead you can encourage the students to promise to do something for the Baltic Sea:
For more information on promises made, see:
http://www.luontoliitto.fi/itameri

We agreed not to pee into the Baltic Sea…

How eutrophication occurs in the Baltic Sea when you "take a leak"?
Normal urine is 2.5 % urea and the average amount urinated on any occasion is about 4 decilitres. These figures are enough to calculate the amount of nitrogen made available to algae by first finding the amount of urea (400 g × 2.5/100 = 10 g) and multiplying this amount by 60. This means that "taking a leak" into the sea provides enough nitrogen to grow a biomass of 600 grams of algae!

21. We Would Like to Thank...

22. Feedback

We are eager to improve our material and welcome your comments. Please tell us if anything seems difficult or unclear, or if something was especially easy for you to understand.

Giving a Baltic Sea lecture

The lecture contains 22 slides and conversations with students. You should take 2x45 minutes for the lecture. You do not have to present all the slides, and you may adjust the content from one session to the next depending on the needs of the group.

Preparing the lecture: If possible, get the group to move their desks and chairs and arrange them in a U-shape. This makes it easier for the students to talk with one another, as they get to sit face-to-face. You can also use the space in the middle of the U for demonstrations and it enables you to approach all members of the group equally.

If conversations are free flowing, then you may choose to encourage them more and to activate students to find answers to the problems presented during the lecture. It is usually easier to start a conversation in pairs or groups of three. This conversation can then be summarised with the entire group. Lively conversations can continue at length, so it is important to keep track of time.

If the group members are not eager to talk, then you may find yourself lecturing for two hours using the slides. We are currently working on some interactive games to go with the slides. These will be made available on the FNL Baltic Sea Group website when they are ready.

This guidebook covers the entire lecture. The slides only contain an outline, as everything cannot be included in them. This arrangement also gives the ambassador the freedom to choose which areas to emphasise or leave out as necessary.

Issues to discuss are printed in bold. The indented elements are additional information that may be used with more demanding groups or if there is extra time.

The **goal** of this lecture is to make the group members appreciate the importance of protecting the Baltic Sea, to let them learn ways to improve its condition, and hopefully also to activate them and make them take initiatives in this field. We are not trying to teach all of the material for some future examination, but to foster the will and ability to work for the environment.

Slides 1, 2 and 3

These are introductory slides. The second slide is meant for interaction and introspection, and to stimulate interest in the subject. These slides are also meant as a warm-up for later discussions.

Slides 4–11

These slides provide necessary background on marine ecology before discussing the subject of eutrophication. They try to bring out the personal observations of group members, which will help to make the issue concrete and link the theory provided here with earlier, familiar experiences.

Some students may, for example, confuse reed growth caused by ingrowth of sea bays with eutrophication. You can then explain that the phenomenon is complex and we cannot always trace the cause accurately. You should, however, never trivialise the personal observations of a student.

12. Fish stocks threatened by overfishing
13. Protecting people and wildlife from environmental toxins
14. Invaders!
15. Catastrophe: oil spill at sea!
16. Climate change
17. We need clean, open shorelines

If time is short, then you may easily skip one or more of these topics. Slide 13 is the most time-consuming, while the others are relatively quick.

18. What is the ideal state of the Baltic Sea?

This discussion tries to summarise everything discussed so far and provide an opportunity to link the information to action. You are free to develop this aspect towards a drama or simulation, but this would take more than two lessons.

19. Protecting the Baltic Sea demands willpower and action

Environmental progress is a slow change that is seldom front page news. This is why it is important to tell the group that results can be achieved. This is also a good place to add some local colour giving extra emphasis to the message that positive action has an impact.

20. How can I make a difference?

This is meant to motivate the students to take the initiative and protect the Baltic Sea. It includes some suggestions on how to act, such as joining the FNL Baltic Sea Group.

21. We Would Like to Thank...
22. Feedback