

In this idea bank, you can find themes and issues for different projects. Methods for field and laboratory work are given under the section 'Demonstration experiments and laboratory work'.

Is your forest a carbon sink?

How much carbon dioxide can a forest assimilate during one year? How much carbon dioxide is emitted from the soil? The trees bind carbon dioxide into their biomass. How much they bind can be determined by measuring tree growth. Carbon dioxide from the soil can be measured with a soil respiration chamber and a gas analyser.



Pupils from Platengymnasiet in Motala measures soil respiration in the School forest. Photo: Lennart Wallstedt

The forest in the year 2100

In what state will the forest in your county or region be in the year 2010? How is the climate expected to change this? How would this change affect the living organisms in the forest, such as berry bushes, trees, animals, growth rate or the carbon balance? The project can be carried out as a literature survey, or experimentally, whereby the impact of temperature and water availability on photosynthesis and respiration is studied.

What is 'climate-smart' forest management?

A forest takes up and emits carbon dioxide continuously in a balance that depends on weather and light conditions. How is this balance affected by management measures (scarification, water regulation, choice of tree species, etc.)? Should the forest be managed, or should it be left untouched for free growth? Is it advisable to maintain big carbon stocks in forests? For these questions it is possible to arrange projects where comparisons are made between deciduous and coniferous forests, drained and undrained.

Carbon stock in agricultural soils

How is the stock of carbon/humus in farmland affected by different management measures? For example, tilled arable land for cereal production could be compared with pasture that is only occasionally tilled, or a non tillage system.

To estimate carbon stock in living biomass and soil

How large is the carbon stock in the soil and in living biomass? In the laboratory guidelines (only in Swedish), advice is given on how the carbon stock in trees, ground vegetation and soil can be assessed. One can compare different ecosystems and land that is managed in various ways.

Carbon dioxide flux from soil

Is there any difference in microbial activity (respiration) between different ecosystems or management measures (fertilization, ploughing, liming and ash application)? How does soil respiration vary (roots—soil) during a growing season? How do temperature and moisture affect this? Are there differences between management strategies? How can differences be explained (length of growing season, amount of roots, humus content, temperature, moisture)?

Carbon dioxide measurement in air

How does the CO₂ concentration vary in the air at your school? Set up a climate station and let your CO₂ sensor work continuously. Then analyze and interpret the results. Is there an impact from traffic or from plant photosynthesis during days with good light conditions? Through the School CO₂ web (http://www.carboeurope.org/education/schoolweb.php), comparisons can be made with results from other schools in Europe. Data can also be downloaded from experiments in Europe, if you don't want to make your own measurements.

SoilInfo — a web-based resource

Information on forest soil conditions in Sweden is available in the Forest Soil Inventory database (http://www-markinfo.slu.se). This is used *e.g.* for reporting changes in forest carbon pools,



according to the Kyoto protocol. The database is available to anyone. In addition to information on carbon concentration at different soil depths in different regions, there are data on pH, N content, base saturation, cation exchange capacity and much more.

To study a school forest

The projects could be carried out in any forest (or any other type of ecosystem), but it is advantageous if projects are carried out in a specially selected 'school forest'. This gives an opportunity for classes, teams or individuals to return to the same forest for various investigations. It is then easier to obtain background information (e.g. landuse history, climate,) and to follow environmental changes over time, in order to give a more comprehensive picture of the forest. It is also possible to arrange a climate station in the forest, to study the climatic conditions and to relate them to the measured data.

Other issues

The projects could also be carried out, to provide a wider view of the climate issue:

- What do we mean by the concept 'greenhouse-gas effect'?
- What activities contribute to greenhouse-gas emissions in Sweden and globally?
- How is the climate changing?
- How does a changed climate affect different ecosystems, food production and society?
- What measures can be undertaken to mitigate climate change
- What actions are being undertaken in Sweden to diminish emissions of greenhouse gases?
- What are the implications of the Kyoto agreement, and how are the climate negotiations between countries proceeding?

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