An ecological and efficient wood harvesting means logging, where both the values of nature in forest and the efficiency in logging have duly been considered. This means, for instance, leaving of certain sensitive sites entirely outside the operation area and doing of the work otherwise by methods protecting or maintaining the values of nature. University of Helsinki is participating in an EU-financed research project ECOWOOD, where guidelines for an ecological and efficient work on sensitive forest sites will be produced. In Finland such sensitive sites are especially the forest areas with a low bearing capacity having a high risk to a rut formation. In European scale even the mountainous areas and other steep slopes susceptible to erosion will be covered.

One of the most essential factors from wood procurement point of view to be considered is the trafficability of the forest soils. On wet soils, as peat lands, the bearing capacity is directly a factor limiting the wood harvesting. On mineral soils the sites have to be divided into areas suitable for winter, summer or spring thaw operations. With winters becoming milder the role of the bearing capacity is getting even more importance. It is not possible to plan the operations properly, if not a large enough inventory of stands suitable for summer logging is available. Because of this reason one has to pay a special attention to how to draw the boundaries of the operation areas and how to collect a good enough data base on the operation areas and their logging conditions.

The aim of the ECOWOOD –project is to produce general guidelines on how to harvest wood from sensitive forest sites. The most important factors to be considered when determining the trafficability are the soil types and the moisture of the ground. Due to the variation in the soil moisture the extent of sensitive sites may vary according to the season. A model indicating the elevations and providing a basis for hydrological calculations, in addition to numeric soil maps, plays an important role in assessing the trafficability. In addition, as supporting data from terrain maps, land-use information, stand data and meteorological data, may be used. One may build up a model to illustrate, how the measures taken in wood harvesting may affect the flow of water and leakage of nutrients from the logging site. So one may choose suitable machinery and time for the logging as well as estimate, in what parts of the operation area some sensitive sites may exist. Furthermore one may decide not to harvest the logging debris and leave it to protect the ground or alternatively from where it would be possible to harvest even the logging waste.

The amount of sensitive logging areas is not known

It is not easy to determine the area of sites with a low bearing capacity. One possibility is to look at the sites where the operations already have been completed and to assess the eventual damage caused there. Because a prerequisite for such an inventory is that the operation already has been done, one cannot extend the results to
apply other areas. One problem is that on all areas there are spots where no operation has been possible at all, for instance, due to the low bearing capacity of the ground. In Finland into such areas belong, in principle, all such peat lands, where the ground is not freezing during the winter. However, the role of peat lands is getting more importance from forestry point of view, because according to the inventories done, at least one fifth from the tree growth is measured in peat land forests. This indicates that the possibility to use machinery on sites with a low bearing capacity is of great importance.

The forest industry needs raw material continuously. When serving the customer needs a certain type of raw material might be required with a short notice. The amount of stored timber at industry or at road side landings is kept as low as possible due to the risk of insect damage, maintaining of the quality of wood or the running interest costs. A high capital input is tied to the forest machinery and there is a demand of a continuos paying off. Thus an even and uninterrupted operation with them is a must year-around. The trafficability of a forest site usually is defined and the harvesting time fixed already when a sales contract is signed. A good quality of work in wood harvesting is also important from wood trade point of view and to the wood production as well. Serving a customer means that one has to harvest the needed wood assortments at the time required. This all makes the planning, organising and monitoring procedure very demanding. One has to balance all the aspects related to the result of work, efficiency in the operation, timber trade and economical aspects.

More weight to the assessment of the possibility to harvest

There always is a risk to cause damage to the ground and remaining stand during the harvest. Some changes in the soils are reasoning from the use of forest machinery. Those can be recorded by measurements or by eye. A theoretical forecast is not easy due to the great variability in forest terrain. Based on the theories and applications of the terra-mechanic one may understand the meaning of terrain on the mobility of forestry vehicles and their use as well as to try to develop the machinery more suitable for off-road operations.

Up till now we only know, what are the soil types and working conditions, where problems may exist. Assessment of the operational conditions should so have more weight than today in planning of logging. In practice, it would mean that one could consider the changing environmental conditions better than today and plan the timing of the operation to suit better to the current state of the environment. Drawing of the boundaries for the operation areas should not any more solely be based on the biological criteria, but also be adjusted to the requirements of the forest operations. Assessments based on geographic information may also indicate where there most likely would be some sensitive sites from forest operations’ point of view. By combining all the available information into the planning procedure one may in future improve the quality of work in wood harvesting.