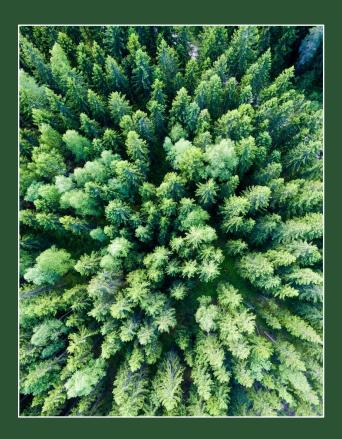# From Forest Research to Forestry Practice -
Approaches in Leveraging Forest Research in Northern and Central European Countries

Risto Päivinen and Liisa Käär (editors)

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Risto Päivinen and Liisa Käär

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Forestry Knowledge, a comprehensive decision support system for forest owners

Mats Hannerz[1], Lars Nylander[2]

[1]Silvinformation AB, Kalmar, mats.hannerz@silvinformation.se, +46-70-5288554, editor of *Skogskunskap*
[2]Skogforsk, Uppsala, lars.nylander@skogforsk.se, +46-70-3976453, project leader of *Skogskunskap*

Skogskunskap **(www.skogskunskap.se, Forestry Knowledge) is a web-based decision support system aimed to guide forest owners in their decisions about silviculture, nature concern and road building. The first version was launched in 1999, and the system has over the years evolved to cover most of the topics a forest owner or his/her advisors need in their planning and operations.**

1. Shortcut from science to practice

Private forest owners own about half of the forest in Sweden. In total, there are about 330.000 individuals or families who make important decisions affecting the health, growth and economy of the forests in the country. Competent decisions require access to information and knowledge. If the forest owner does not possess the experience and knowledge, he/she has to rely on personal advisors or skilled entrepreneurs. Internet has provided a new channel for accessing knowledge and advises. This is where *Skogskunskap* fills the needs (Figure 1).

Skogskunskap is produced by *Skogforsk*, the Forestry Research Institute of Sweden, with additional support from the Swedish Forest Agency (*Skogsstyrelsen*) and the Forest Owners Association (*LRF Skogsägarna*). Experts in each of the topics safeguard the quality of the content and give input to an editor who runs the daily work. The close collaboration with researchers makes it possible to update instructions and contents in line with new scientific findings. In this sense, *Skogskunskap* is a shortcut in the communication chain from science to practice.

Fig. 1. Skogskunskap is organised in sections and chapters. This is an example from the chapter Soil and water concern. In each chapter, the user finds thorough facts about the theme, practical guidelines, instruction films and knowledge tests.

2. Calculation tools

One of the core contents is the kit of practical calculation tools. In these, a forest owner can use data from his/her own forest stands and calculate for example harvest possibilities, costs, revenues and growth. Currently, there are about 50 tools ranging from simple stock estimates to more complex calculations of frost risk in a changing climate.

The first tool to be published (in 2001) was Pre-commercial thinning analysis (*Röjningsanalys*), where the cost of thinning is compared with the value of the stand at time for the first and coming commercial thinnings (Figure 2).
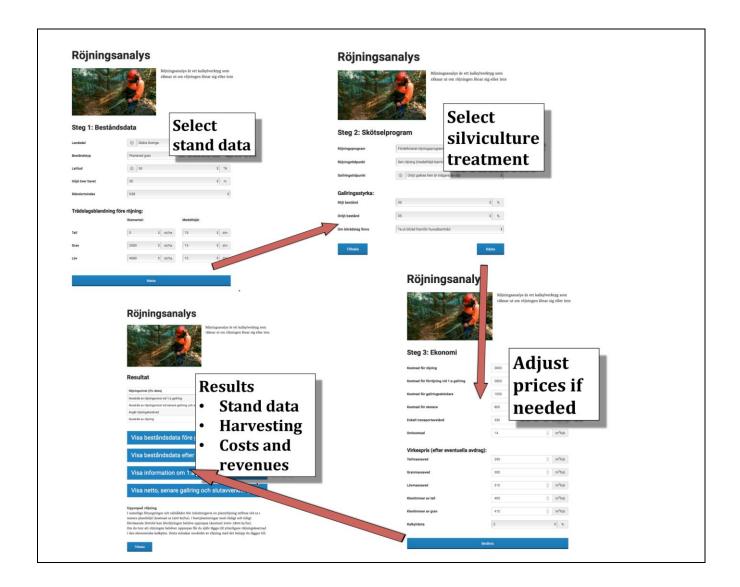

Fig. 2. An example from the calculation tool *Röjningsanalys*. The user selects options for the stand in three steps. The tool uses functions for growth, thinning costs and stand value, showing if the operation was rewarding or not. The user can also list details about the stand and its development.

Röjningsanalys was soon followed by other tools allowing the user to calculate e.g. benefits of genetically improved regeneration materials, fertilization or priority of stands for final felling. Table 1 shows the most used tools in 2016 based on user statistics. It is noticeable that many of these tools are rather simple, giving quick answers to relevant daily questions. The more complex tools, which integrate a chain of economic and yield functions, also have their enthusiastic users, but their imprint on the user statistics is less.

Table 1: Most used calculation tools in Skogskunskap in 2016 based on user statistics.

Tool	Swedish name	Number of hits
Volume of a tree	*Volymberäkning*	18118
Choise of harvesting stand	*Beståndsval*	15777
Thinning guidelines for pine and spruce	*Gallringsmall - tall och gran*	13299
Standing volume	*Virkesförråd*	8688
Choise of regeneration material	*Plantval*	8128
Site quality	*Bonitet*	6140
Costs for building roads	*Kostnad för vägbyggnad*	6002
Site index for spruce and pine	*Ståndortsindex - gran och tall*	5869

3. Instruction films

The user of Skogskunskap can find over 50 instructive short films on all operations from using a chain saw to planning a logging without leaving any traces on the ground or in the water. These films, or often clippings from full films, support the written instructions and calculation tools, and are very popular among users. The films are available on Youtube and are also embedded in *Skogskunskap*. Until 2016, the films had been viewed 1,5 million times according to Youtube statistics.

4. Project financing

The running costs for maintaining the content are provided by *Skogforsk* and the partners *Skogsstyrelsen* and *LRF Skogsägarna*. Development of new content needs however to be funded by external sources, often research grants. The implementation of new knowledge and functions into *Skogskunskap* has proved to be a successful argument in the applications, rewarded by many grants over the years. *Formas*, *KSLA*, *Skogssällskapet, Södra* and *Norrskog* are examples of financial sources supporting the decision support system over the years.

An example of an externally financed project is the build up of a package for forest road building and management. An expert group from *Skogforsk*, *Skogsstyrelsen* and the forest industry produced the content, and EU through *Skogsstyrelsen* provided the funding. The text content was complemented with tools for calculation of road building benefits, costs for building and management of the road and for calculation of how much stone and gravel that has to be used for various roads.

5. New design and new name

The decision support system was first known as *Kunskap Direkt* (Knowledge Direct). The first section, about management of broad-leaved forests, was launched in 1999. Since then, the system has changed design and technique several times. The currently growing use of mobile equipment (smartphones and iPads) has put a pressure on making the content accessible for many kinds of devices. In December 2016, a new responsive

design was launched. The relatively complete make-over of the system was also a trigger to change the name. Since then, it is known as *Skogskunskap*.

6. Used by forest owners and their advisers

The number of visits to the website amounts to about 250.000 per year, and 150.000 of these are unique visitors. Inquiries have shown that about 50% of the visitors are forest owners, 12% are forest students, and 16% are staff in the forest companies working with advisory.

Several inquiries and evaluations have been made over the years about how forest owners and forest servants use different communication channels in general, and *Skogskunskap* in particular. It is apparent that forest owners still prioritise personal communication with skilled advisers, but internet increases as a complement, particular among younger and well educated users. Several of the test reports along with the history of *Kunskap Direkt/Skogskunskap* are summarised in Hannerz (2012), and a more comprehensive study can be found in Hannerz et al. (2010). A recent overview of digital sources for forest owners in Sweden is also given in Hannerz & Ahlstedt (2015).

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