

FOREST BALANCE ON THE NATIONAL LEVEL

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SELOSTE:

KANSALLINEN METSÄTASE

DEFINITION OF FOREST BALANCE

Forest balance is a comparison between the growing stock volume at the beginning and end of a balance period and the gross increment and drain during that period.

The forest balance of Finland during the period 1967—1973 and the increment and drain balance during the period 1953—1977 are used as examples. Concepts and terminology follow the usage presented in the reference paper (1). The unit of measurement is cubic meter (m^3) of stemwood from

the stump to the top of trees, over bark.

The growing stock, increment and allowable drain were estimated by the National Forest Inventory; the drain and its parts by the Timber Utilization and Drain Investigation. Both these studies were carried out independently by two research departments of the Finnish Forest Research Institute. Allowable drain in this connection is the greatest amount of timber which can be harvested on the basis of sustained yield.

FOREST BALANCE 1967—1973

The balance area comprises 19,7 mill. hectares of forest land, and 3,6 mill. hectares of poorly productive land, or a total area of 23,3 mill. hectares of wooded land. The balance period is 6 years.

The growing stock at the beginning of the balance period (G^n), according to the 5th inventory, was 1 492 mill. m^3 , and at the end of the period (G^{n+6}), according to the 6th inventory, 1 520 mill. m^3 (Fig. 1).

The annual gross increment estimated on the basis of the measurements of diameter and height increment during the 5 years preceding each inventory was 57,4 mill. m^3 . The gross increment during the balance period (I) was 344 mill. m^3 including the accretion (volume of wood including

¹⁾ European timber trends and prospects 1950 to 2000. Supplement 3 to Volume XXIX of the Timber Bulletin for Europe. United Nations Economic Commission for Europe and Food and Agricultural Organization. Geneva 1976.

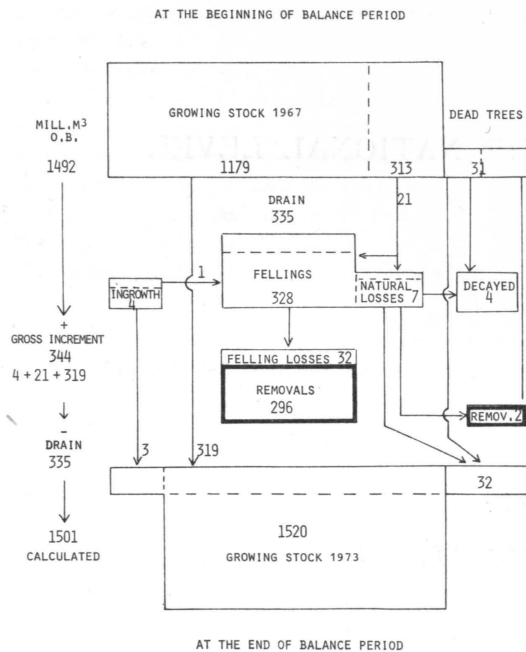


Fig. 1. Forest balance 1967-1973

bark added by growth to trees comprising growing stock at the end of the period and to trees felled or lost by natural causes during the period) and ingrowth. Ingrowth is the volume of trees which pass the minimum

INCREMENT AND DRAIN BALANCE 1953-1977

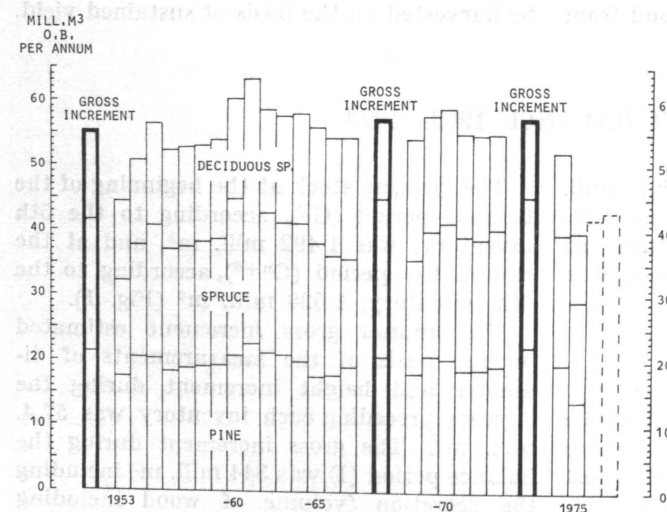


Fig. 2. Increment and drain balance 1953-1977.

caliber limit, 2,5 cm diameter at breast height, used in the inventory (Fig. 1).

The estimated drain (D) during the balance period was 335 mill. m³, including fellingings (328 mill. m³) and natural losses (7 mill. m³).

Fellings is the sum of removals (296 mill. m³) and felling losses (32 mill. m³).

Accuracy of the estimates can be checked by the formula:

$$G^n + I - D = G^{n+6}$$

$$1492 + 344 - 335 = 1501 \text{ mill. m}^3$$

Calculated G^{n+6} is 10 mill. m³ or 1,25 per cent smaller than G^{n+6} estimated by the inventory. The discrepancy is not significant because the mean error of the growing stock volume estimated by a statistical sample alone is $\pm 0,7$ per cent.

The estimated volume of dead trees with usable stem wood was 31 mill. m³ in 1967 and 32 mill. m³ in 1973. Removals of timber from dead trees amounted to 2 mill. m³ during the balance period. Consequently, 4 mill. m³ of the natural losses decayed in the forest.

Ingrowth and natural losses are magnitude estimates based mainly on the yield table information. Other estimates are based on sampling measurements and timber utilization statistics.

Trends and developments of timber production can be studied by time series. Annual increment according to three inventories (1952, 1967 and 1973) and annual drain are illustrated in Fig. 2 by tree species. Some conclusions are obvious:

- During the period 1955-1964 the drain was greater than the gross increment. The estimate of the growing stock decreased from 1 538 mill. m³ in 1952 to 1 492 mill. m³ in 1967.
- During the period 1965-1977 the drain

was smaller than the increment and the growing stock increased. Drain for years 1976 and 1977 are preliminary estimates.

- The volume of spruce has increased and the volume of deciduous species, mainly of birch, has decreased in the growing stock.
- The trend for drain has been a decreasing one since 1961. Excluding the depression years 1975-1977, drain has levelled at 55 mill. m³ per year.

THE INCREMENTAL BALANCE, ACTUAL DRAIN AND ALLOWABLE DRAIN WITH REFERENCE TO TIMBER IMPORTS AND INPUTS INTO TIMBER PRODUCTION 1955-1976

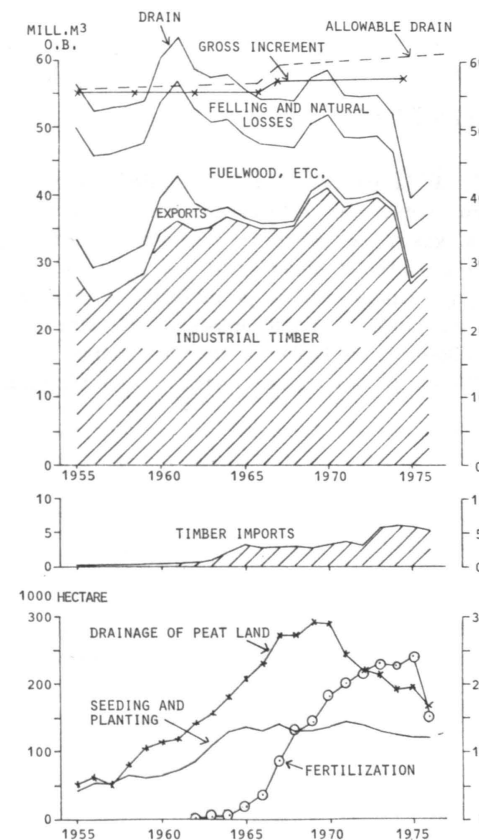


Fig. 3. Balance of increment, drain and allowable drain, timber imports and inputs into timber production.

Forest balance estimates combined with other information concerning forestry production is illustrated in Fig. 3.

During the years 1960-1964 the balance was characterized by overcutting. The capacity of forest industries and the need for timber were increasing. Several measures were introduced:

- Plans were prepared to increase and finance silvicultural and forest improvement measures.
- Annual achievements of peat land drainage, seeding and planting new tree stands and forest fertilization increased.
- Timber exports decreased and imports increased.

Overcutting ceased in 1970. However, the drain continued to decrease. This can be explained by the structural changes in the Finnish national economy. Production industrialized very rapidly and the rural population decreased. During the period 1950-1970 the rural population urgently needed income from forest work and sales of timber. More recently the bulk of forest owners have become less dependent of forestry income and have lost their earlier willingness to sell timber. Shortage of forest labour has also been a local problem.

CONCLUSIONS

Forest balance is a check of the accuracy of basic estimates. If the discrepancy between the calculated growing stock at the end of a balance period and the growing stock estimated by an inventory is great, it calls forth improvements in forest inventory methods and timber utilization statistics.

Balance may reveal possibilities for improving and increasing the utilization of forest resources:

- If natural losses are great, increased thinnings and regeneration cuttings of mature and over-mature tree stands increase the supply of timber.
- If logging losses are great, the efficiency of harvesting should be improved.

- An overcutting situation calls forth efforts to increase timber production or to decrease the uses of timber in order to avoid the overexploitation.
- If gross increment is greater than the drain there are possibilities to increase harvesting, forest industrial expansion, etc.

Forest balance is a way to check and improve the basic estimates of forestry production, to increase the effective use of timber grown in the forest, to commence policies and measures concerning increment and to control timber utilization on the basis of sustained yield.

SELOSTE:

KANSALLINEN METSÄTASE

Metsätase tarkoittaa puuston runkotilavuuden, tilavuuden kasvun ja puun poistuman vertaamista toisiinsa tasejakson pituisen ajan kuluessa. Vertailuun voidaan ottaa myös hakkuumahdollisuuden arvio eli suunnite.

Tase on välttämätön jo sen vuoksi, että vain sillä voidaan tarkistaa puustoa ja sen käyttöä koskevien tärkeimpien arvioiden keskinäinen yhtäpitävyys ja luotettavuus.

Metsä- ja puutalouden kehittäjille se osoittaa miten metsävarat kehittyvät, kuinka suuri on puun kasvu ja poistuma toisiinsa verrattuina, onko tapahtunut liikakäyttöä tai onko metsään kertynyt hakkuusäästöä ja minkälaista puutavaraa on hakkuumahdollisuuksissa. Metsätase ja sen aikasarja on keskeisin tietojärjestelmä suunniteltaessa ja ohjattaessa metsä- ja puutaloutta.