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Maintenance of streams and drain flushing

Machinery demonstrations indicate level of technology

Servicing of streams is essential for correct drainage and represents a public and legal duty which increasingly has a role in Nature protection and countryside care. Labour and machinery costs in this context differ in relation to the various factors such as bank steepness and extent of vegetation. The wide range of technology available for these tasks was on show at a machinery demonstration in Hausstette. Controlling undergrowth and drain flushing equipment were themes.

Lowland areas feature kilometre-long networks of small and large streams which in their natural form are important biotopes for many types of plant and animal. Maintenance should be aimed at correct channelling of the water flow and such operations represent a legal and public duty on which targets of Nature and landscape protection are greatly dependent. Thus, e.g., according to [1], the lower water authorities can decide on the type, time, and extent of the maintenance and special duties in individual cases for Nature-near care of surface water and streams. The type of water body, its state of development and local conditions all influence the technical possibilities for maintenance and care. The aspects of space and time have to be considered when carrying out such work. Field drainage efficiency is also affected by stream maintenance. Drainage and stream maintenance are integral factors in landscape care and thus conflicts can occur between the demands of agriculture and Nature protection. The current level of technology for such work was shown at a machinery demonstration of much of the state-of-the-art equipment by the Weser-Ems Chamber of Agriculture in Hausstette (Lower Saxony) in October 2000.

Keeping drains in working condition requires regular maintenance, e.g., checking pipe throughflow and flushing [3]. The required regularity of flushing depends on the type of soil, annual amount and seasonality of precipitation and material around the drains [4]. The drain flushing equipment presented (*fig. 1*) usually takes water straight from the receiving stream. There was equipment on show with own water tanks which could thus flush independently of the water level in the receiving stream. Displacement membrane pumps with capacities of at least 100 l/minute have become established for this work because they are less sensitive to dirty water. Most of the polyethylene cleaning hoses have diameters of 19 to 27 mm (wall thickness 3.3 to 3.5 mm). The feeding-in of the flushing hose takes place either through self-propulsion by jet nozzles or with hydraulic hose drive featuring four (with at least two driven) reels. The control arms are operated hydraulically meaning it's possible to reach nearly all drain openings from the excavation site. Working pressure is adjustable up to 120 bar and at least 30 to 40 bar should be used. Price of equipment shown ranged between 13500 and 37500 DM [5].

Drain flushing

Problems in water flow occur especially where silting and/or mineral blocking can be expected or when plant roots grow into drain-

Waterway maintenance

Maintenance of flowing water channels covers the following operations:

- Mowing stream banks and, where neces-

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Keywords

Maintenance of running waters, landscape care, drainage flushing, machine demonstration

Fig. 1: Drainage flushing equipment in operation



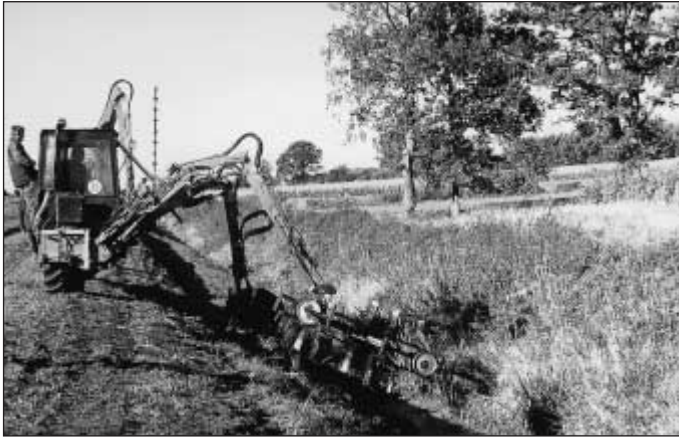


Fig. 2: Three wheel boom mower with rake combination

sary, bordering vegetation strips

- Cutting stream bed vegetation, i.e. mowing plants growing in the water
- Removal of silting or soil blockages and plant material for reinstatement of desired water course profile [6].

The choice of equipment depends on the size of the stream and especially on the form and utilisation of adjacent bordering areas. The bank area and stream bed should be protected from damage as much as possible when mowing and removing vegetation [1]. In addition to motor-scythes for special areas (work on steep banks, poorly accessible areas and new-planted strips), and hand-operated bank mowers (exceptionally mobile application possibilities with limited performance capacity, higher labour demands, working widths 0.8 to 1.9 m), *self-propelled bank mowers* and *tool carriers with attached mowers* are suitable for mowing waterway banks. Four-wheel-drive mobile mowers offer high output and their low centre of gravity mean they're also suitable for steep bank work. In general these are equipped with Terra low pressure tyres and have hydrostatic drive (= infinitely variable speed control). Because of their even-lighter ground pressure the more expensive tracked mowers are especially suitable for maintenance wet biotopes. Three-wheel mounted mowers (fig. 2) have a wheel on the bank area and can be combined with a variety of other implements. These are especially suitable where there's only a narrow wheel track on the stream channel edge available. The working width of all self-propelled bank mowers (excepting sitting mowers) varies between 1.25 and 3.80 m. Power is from 22 to 83 kW power and price 48000 to 195000 DM. *Tool carriers with attached mowers* offer especially flexible modes of utilisation. So too, do track-laying digger tractors with mowers mounted on the hydraulic backhoe arm as well as mounted or attached bank mowers on tractor or Unimog. Working widths of the mowing implements used with the backhoe are between 2.5 and 5.0 m. Price of this ad-

ditional equipment: from 9000 to 20000 DM. Tractor-mounted or fitted mowers come in attachment lengths from 2.5 m to 9 m with front or rear positioning. Infinitely variable adjustment of the attached implement position is possible. The power requirement for such additional equipment is given as from 37 to 74 kW. With working widths of 1.5 to 1.8 m, the price runs from 40000 to 135000 DM, depending on equipment and combination. Especially in this area there are possible opportunities in agriculture and forestry for better exploitation of available machinery. Implements with combined cutting, chopping and vacuuming capacity must, e.g., according to [1] make certain no small living organisms are endangered by the vacuum system.

Different operational application possibilities could be seen: cutter bars and mowing baskets are suitable for both dry and wet areas; drum and disc mowers are not really suitable for wet area, and chopper mowers certainly not. Many implements are set-up as mower-rake combinations and this means that when mowing, cut material is swathed in the bank by belt rake or wheel tedder. From there, it must be collected and transported off.

Stream bed vegetation

The cutting of plants in the water is done with machines such as mower-boats with drag cutters or cutterbars, or track-laying digger-tractors with mower baskets. Where digger and mower basket is concerned, the bank must of course be driveable. Only implements should be used that are able to cut the plants above the stream bed. Mower-boats on show were of steel plate or light metal and equipped with hydraulic drive and T cutterbars. The working width was 1.3 to 3.0 m and power from 18 to 40 kW at a purchase cost of between 45000 and 145000 DM. Often sufficient in stream maintenance is simply alternate-side mowing of the channel edges and cutting-back of stream bed vege-

tation areas when required, an approach which can incorporate simultaneous protection of specially designated areas [6].

Undergrowth care

A further important point is the care of undergrowth and trees along the water edges (fig. 3). Depending on the local conditions and the thickness of the branches, there exists a range of possibilities for such maintenance operations. Suitable is a light area profile cutter attached to an operating arm and with a mounted circular saw, branch shears or rotary knives. With working widths between 1.0 and 2.2 m, costs lie between 10000 and 55000 DM.

Literature

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Fig. 3: Coppice trimming in embankment