

Conservation of Estonian Forest Brothers' Maps Found in a Milk Container

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All photos by author

In the autumn of 2023 a hideout (milk container) of forest brothers was discovered in western Estonia (Raplamaa), containing three maps and related documents among other items. It was known that the milk jug and its contents were hidden underground in the second half of the 1950s and were discovered 70 years later.

Object: three maps, No. 12, 14 and 15 (ill. 1, 3, 4) are part of the Estonian Road Map collection 1:300,000, published by Ministry of Roads.

Maps size: 25 × 28 cm

Material: wood pulp paper, lined on a gauze cloth (ill. 2)

Technique: print

Owner: Estonian Institute of Historical Memory

Condition before the conservation

- Maps have a distinctive musty smell and dusty surface.
- Maps are deformed, have been stored folded and rolled up (ill. 1, 2, 3, 4).
- Gauze cloth are lined with thick layer of unknown adhesive (ill. 2, 7).
- Map papers are brownish, brittle and the edges are delaminated. There are lifted areas and missing parts (ill. 5, 6) on the fold lines. There are tidelines, stains and abrasion on the surface (ill. 6).
- Lignin test using phloroglucinol (TAPPI Test Method T401) is positive.
- Surface pH of paper before conservation is 9.0 (Seven2Go pH-meter, Mettler Toledo).

The unusually high pH value of the paper may have been caused by the storage environment (an aluminium milk container and other objects placed in it). The alkaline environment and humidity may have had a detrimental effect on maps.

ill. 1 Map no.12 before the conservation



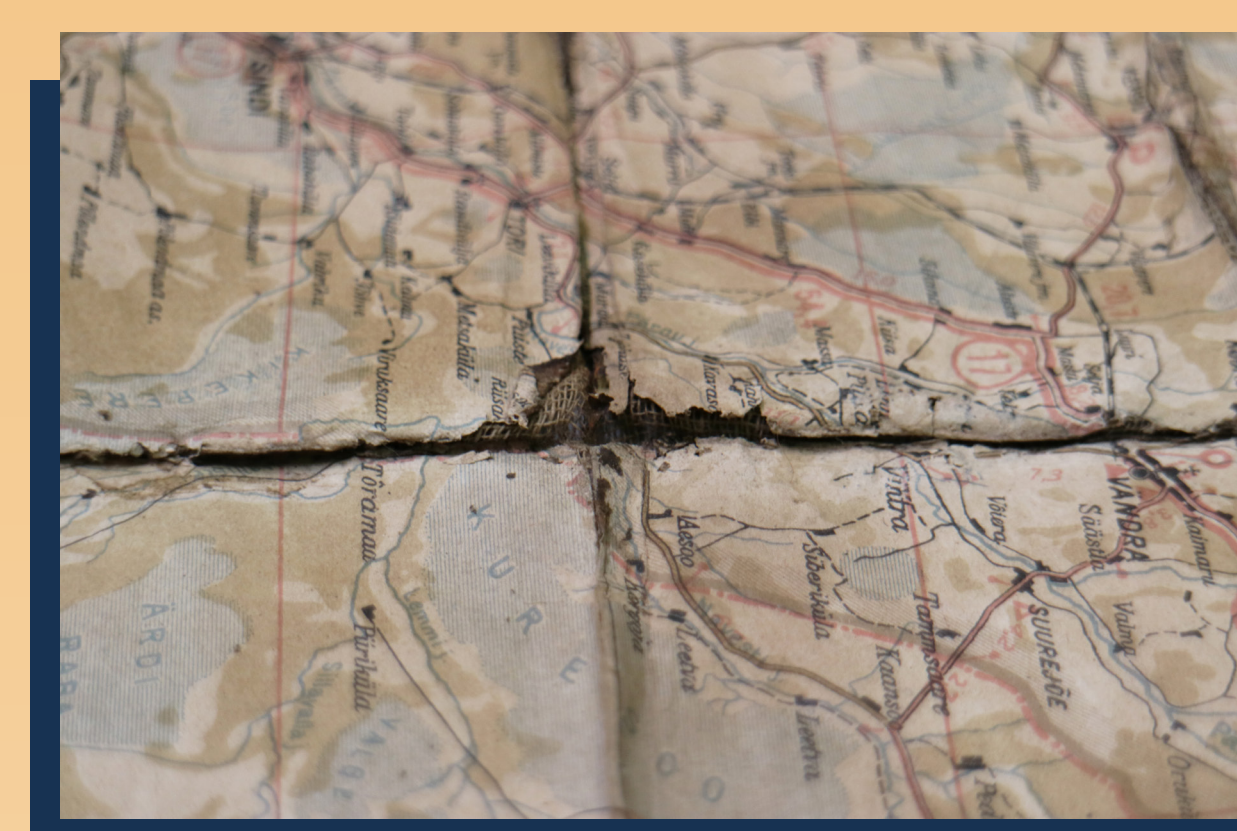
ill. 2 Map No.12 verso side before the conservation



ill. 3 Map No.14 before the conservation



ill. 4 Map No.15 before the conservation



ill. 5 Map No.12 folding lines, lifted area, missing parts



ill. 6 Map No.14 abrasion, tidelines, stains

ill. 7 Removing glue with Crepe Eraser



Conservation treatments

- Dry cleaning.
- Removing the old adhesive with Crepe Eraser (PEL, ill. 7), acetone (Kemet RV) and eucalyptus oil (Kaigert).
- Wet cleaning in a water bath, resized with a 0.5% aqueous solution of SCMC (sodium carboxymethyl cellulose; PEL). After wet treatment, the pH decreased to 6.1.
- Infilling the losses manually using the leaf casting method.
- Repairing with Japanese paper (9 g/m², 24g/m²).
- Interleaving with tissue paper (Klug Conservation), storing in an archival-quality folder (Klug Conservation).

During the conservation, the most significant problem was the adhesive used for lining, which was difficult to remove due to the fragile state of the paper. Because of that, it was decided that the map in the best condition (map No.14) will be the only one from which to remove the gauze cloth completely.

To remove the adhesive Crepe Eraser, acetone, eucalyptus oil, and Nanorestore® gels in polar and apolar solutions were tested. Nanorestore® gels did not show the desired result. On the recto side it was decided to use the acetone compress. On the verso side eucalyptus oil compresses were used, because it evaporates more slowly and works better over a larger area. The softened adhesive was easier to remove mechanically using a Crepe Eraser (ill. 7).

Because the gauze cloth had bonded tightly to the paper, there were no options for removing glue residue from between the fibers.

Condition after the conservation

Initially, the maps stored in the milk container appeared to be in relatively good condition, but during conservation, the real extent of the damages became evident. After the conservation the condition of the maps have been improved and their better preservation is ensured. The conserved maps (ill. 8, 9, 10), which have historical importance, have been returned to the owner.

ill. 8 Map no.12 after the conservation



ill. 9 Map no.14 after the conservation



ill. 10 Map no.15 after the conservation

