KARTVÅRDCENTRALEN (= MAP CONSERVATION LABORATORY) - A LABORATORY FOR THE CONSERVATION OF MAPS AND OTHER LARGE-FORMAT DOCUMENTS

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Abstract

The Map Conservation Laboratory is a department within the Swedish Ordnance Survey which deals with the conservation of maps, drawings and other large-format documents made of paper, and books.
A large proportion of its work is devoted to the conservation of maps for the Ordnance Survey. Commissions are also received from museums, public records offices, associations and private individuals.
The operation is on a relatively large scale. Its aims are to conserve large quantities and to maintain high quality.

Key words

LABORATORY, CONSERVATION, PAPER, MAPS, LARGE FORMAT, BOOKS

Background

Land surveying in Sweden began in 1628. Anders Bure, Mathematician General, was commissioned by the King to map out Sweden. Ever since, maps have been produced "under Government auspices" in Sweden. These maps were produced mainly in order to indicate ownership and the nature of the ground. They were used, amongst other things, as the basis for taxation and for military purposes.

The Ordnance Survey today has in its possession more than 2 million original maps and associated descriptions. The oldest are now almost 400 years old.

The Ordnance Survey has map archives in every county (of which there are 24). These are living archives, where the maps are used as working materials.
This has exposed them to constant wear and tear through handling and, on occasion, incorrect storage. The older, historical material in particular is often severely damaged and in need of restoration if it is not to be lost forever. It is estimated that there are at present between 75,000 and 100,000 maps which are in acute need of conservation.

The Ordnance Survey has a number of reasons for not wishing to see the maps destroyed. Even very old maps are in many cases still of legal significance and are important documents for present-day land surveying activities. The maps also represent a valuable and unique cultural inheritance of great significance to research. The Ordnance Survey, as a government body, is additionally under an obligation in accordance with Swedish public records legislation to preserve original documents.

Alternative approaches to satisfying the need for map conservation have been tried on numerous occasions. It was decided in the early 1980s to set up a central operation with the necessary capacity and skills to cope with large quantities of maps of large format. This operation was given the title of KARTVÅRDCENTRALEN (Map Conservation Laboratory).

The operation started in 1984 with the training of 6 technicians. A further 6 were trained in 1985 and 1986, and the number of staff, including management and administration, was then 20. The premises were built in 1985. Production commenced in conjunction with this, although initially it extended only to the restoration of Ordnance Survey maps.

The operation has been extended successively since then with regard both to the customers and the type of service requested. The operation has developed from being concerned simply with the conservation of maps to include the conservation of paper generally. It still specializes in large-format documents, however.

The operation today

The Map Conservation Laboratory now has 25 employees. We have a large number of customers apart from the Ordnance Survey, and our work involves many types of items other than maps. These include books, including leather-bound volumes, etc., drawings, posters, engravings and lithographs. Our customers are museums, public records offices such as the National Board of Antiquities, private individuals and village communities, etc. We are prepared in principle to accept all types of paper conservation, provided that we possess the skills required in each particular case.

We also run courses on practical map conservation and bookbinding.

Our operation now also includes consultancy in the conservation and storage of records.

Staff and organization

The staff consists of 18 conservation technicians, 2 bookbinders, 1 paper conservator, 1 supervisor, 1 caretaker, 1 administrator and 1 manager.

The technicians have 6 months' internal training in the conservation of maps and paper. They are responsible for the routine, practical conservation of maps and paper. Most of the technicians were employed at the start and now have more than 5 years' working experience behind them.

The bookbinders work on book conservation and run our bookbinding courses.
In addition to their fundamental training as bookbinders, the bookbinders also have additional qualifications in various specialized techniques and approximately 4 years' experience of practical book restoration.

The paper conservator is responsible for technical quality and for ensuring that the correct methods are applied. The conservator is also required to monitor developments and to make sure that we absorb new and improved methods and materials, etc.
Other important duties include the planning of and participation in our courses and the training of our own staff.

Premises and equipment

The premises, which total some 800 m_2, were constructed in 1985 to house the activities of the Map Conservation Laboratory. This means that the premises could be adapted from the planning stage to suit the needs of the operation. This was of great importance to our production and development activities. The large areas provided space for sufficiently large work tables and other equipment. The work can proceed rationally and in a sound working environment, in spite of the large formats with which we work. The large open areas are also easily adapted to changes in the operation.
The premises consist of two production halls with 10 workstations in each, and include space for book conservation work, a laboratory for simple analyses, etc., archive facilities for the storage of the records, office space and staff rooms.

Some of the equipment has been specially modified for large formats.
Each technician has a light table measuring 120 x 180 cm at his workstation.
Its area can be increased to 150 x 210 cm, if necessary, using additional panels.

Each production hall has a wet treatment tank measuring 140 x 190 cm.
We have four hydraulic presses in which treated material is dried. The presses can accept formats up to 200 x 150 cm.
In 1990 we purchased a paper filling machine (supplier Per Laursen) with an effective working surface of 80 x 150 cm.

What we lack at the present time are the space and equipment for the treatment of mildew capable of accepting large-format documents.

Working methods

Maps and similar documents (but not books) are treated in principle in a similar fashion. We use established methods which are commonly used in other conservation laboratories.

By far the majority of the methods which we use are wet methods. An exception is made, of course, in those cases in which the inks and paper material, etc., will not tolerate water and other liquids, for which a test is always made before starting the work. Briefly, the process involves the following steps.

The condition of the map before conservation is documented in a report. This covers damage, observations relating to inks, the pH value of the paper and the character of the paper material and other important points.

The map is cleaned in water, so that old repairs and dirt can be removed. This wet cleaning can be preceded, if necessary, by dry cleaning or cleaning with solvent.
If the map requires to be disinfected, for example because of attack by mildew, this is done with 70% ethanol.

The map is transferred from the water tank to the light table, where the work of cleaning continues. Ordnance Survey maps in particular often have earlier repairs which are of poor quality. An incorrect repair material and adhesive (PVA-type) may have been used. We wish to remove these repairs as far as possible, which sometimes proves to be a difficult and time-consuming procedure.

Corrections are then made to the map image, and any loose pieces are laid in place. Holes are filled with inlays or with the help of the paper filling machine, and tears and folds are reinforced with tape. Finally, a lining is applied over the whole of the rear surface of the map.

The map is then allowed to dry in a press, which takes about 4 days.

Details of the operations performed and the repair materials used, etc., are recorded in the report.

Any acidity in the map is neutralized with a magnesium bicarbonate solution, $(Mg(HCO_3)_2$ which is sprayed onto the map.
Lime water, $Ca(OH)_2$ may be used exceptionally.

In order to replace the size which is washed out of the paper by the wet treatment, the paper is re-sized with a 0.3% ethyl cellulose solution.

Japan paper of various grades and hand-made cotton rag paper are used as the repair material and the lining.

The repairs and linings are glued in place with a wheat starch glue which we mix ourselves.

Very large maps which cannot be dried in the presses are spread out on a table, where they also "stretch" themselves flat as they dry. Alternatively, they may be placed under large sheets, which are then loaded with weights.
The largest map which we have dealt with so far was 8.5 m^2.

The paper filling machine has been used only to a limited extent until now for maps and other large-format documents. In our opinion the machine produces repairs of very high quality. However, we have not yet perfected our working routines to the point at which we are also able to save time compared with manual repairs. The machine has been used mainly for repairs and strip application in conjunction with book conservation. Very good results have been achieved, with regard both to quality and time saved.

The working methods described here are highly schematized, of course. The character of the document concerned and the nature of the damage, etc., determine what is appropriate and possible from one case to another.
Our starting point is always that the original must be affected as little as possible. Nevertheless, we are also obliged to take account of the customer's wishes as far as wear resistance and cost, etc., are concerned.

The method of working involved in book conservation is not touched upon here.

Production and quality

The Map Conservation Laboratory was established with the aim of creating a production unit for map conservation. I.e. production was subject to two principal requirements.

1. The largest possible volumes within given financial constraints.

2. Sufficiently high quality in accordance with accepted values and standards.

There was a further requirement at the time, to the effect that the operation should be developed so as to attract an increasingly large proportion of external customers.

As far as Ordnance Survey maps are concerned, approximately 2000 items are processed each year (current budget year), which corresponds to ca. 0.8 of an item per employee per day. Production per employee day has increased by a total of 47% over the last three years.

Taken together with other commissions, approximately 2,350 items are conserved each year.

The proportion of commissions received from customers other than the Ordnance Survey now accounts for ca. 15% of total turnover.

To judge from the reactions of our customers and other external evaluators, our conservation work continues to achieve a high standard of quality.

Experiences and conclusions

The question has been raised from time to time of whether it is possible to combine such delicate work as paper conservation, which demands such a high degree of quality, with large-scale production.

The Map Conservation Laboratory is one example of how this can succeed.

An efficient operation has been built up relatively quickly. This can be attributed to a number of factors, of which the following are the most important.

The Map Conservation Laboratory was a part of the same organization (Ordnance Survey) which was experiencing the need and which was in charge of the financial resources. Complications relating to the allocation of resources and the management of the operation were accordingly insignificant.

Access to spacious and appropriate premises.

A large throughput of records of varying character, combined with the fact that problems of a similar kind were associated with many of the jobs, enabled us to gain experience rapidly.

High demands and careful selection criteria were imposed in respect of the suitability of prospective employees. The result is that we now have an interested and highly motivated staff.

This is also an essential requirement, given the quantities of records which are awaiting conservation.