



## Deterioration factors

Deterioration of materials stems from a variety of causes.

### Damage and deterioration by use



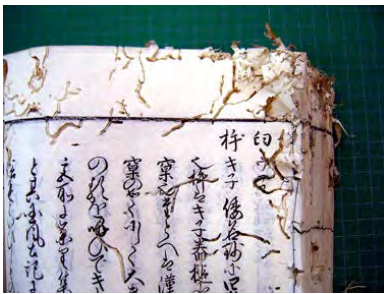
We cannot avoid damage and deterioration of library materials arising from daily use. Recently, damage from photocopying in particular has been increasing rapidly and is becoming a major problem. Materials are also damaged by misuse such as cutting pieces off or writing on the pages. Turning pages carelessly, tossing or dropping materials, or reading while eating or drinking also poses risks.

### Disasters

Disasters such as fires, typhoons, floods and earthquakes can threaten the loss of an entire library collection.

### Environmental threats

Inappropriate storage environments such as high temperature and humidity, inadequate cleaning, and exposing materials to light for a long time, can cause materials to be damaged by insects, mold, and discoloration.



Book eaten by insects



Book with mold



Books discolored by light



Crumbled acid paper

### Acid paper

After the mid-nineteenth century, the spread of printing technology increased demand for paper and brought in the mass production of paper. To increase productivity, various chemicals were added to paper in the manufacturing process, and consequently a large amount of acidic paper was produced. This so-called "acid paper" becomes brittle over time, as the cellulose in it loses its stability.

### Deterioration of non-paper materials

Microfilms have been used as media with long-term durability. However, the cellulose acetate-based films which were produced up to the 1980's have problems with stability and need to be checked and cared for regularly.

Magnetic tapes (such as audio tapes and video tapes), magnetic discs and optical discs all have various problems for preservation. In addition to deterioration, the equipment and systems necessary for their use may become obsolete, and sometimes the data itself may disappear.

Information disseminated via the Internet and digital data converted from paper and other materials have the same issues. Preservation of digital information is a major challenge for us.



Polyester-based film in good condition (above)  
Deteriorated cellulose acetate-based film (below)

## ■ Preservation in the NDL ■ ■ ■ ■

We strive to maintain a suitable environment and take measures to prevent damage to materials. With a limited budget and manpower, we cannot treat all damaged materials. So we sort them into groups by damage level, frequency of use and other factors, then assess their preservation needs, set priorities and seek the best means of treating them.

### Environmental management

The NDL employs a closed stack system. Most of the collections are stored in the stacks with limited access. To maintain a suitable environment, the temperature in the general stack space is kept around 22°C and the relative humidity around 55%. The stack space is kept dark to reduce damage by light. In case of fire, the stack space is divided by fire doors, and fire extinguishing systems that do not use water are installed. For pest management, we set out sticky traps and monitor them regularly. Rare materials and microfilms are kept in their own separate storages in the general stack space.

General stacks space  
(Annex)



Stacks for  
rare materials



Microfilm storage



### Preventive measures

#### Protective enclosures



Protective enclosures made  
from acid-free board paper

Some materials are put in protective enclosures to prevent loss or damage. Some materials which are single sheets are kept sealed between two sheets of polyester film. Chemically stable materials are used in both cases.

Covering with  
polyester film

#### Reinforcement and removal of factors causing deterioration



Bound serials

We bind collections of periodicals and rebind materials to improve durability and prevent loss. Dirt and dust on materials are removed, as metals such as staples which may rust and damage paper in the future. Deacidification is carried out to slow the deterioration of acid paper.



Dry cleaning with  
a brush

### Repairing damaged materials



Our policy for repairing damaged materials is: (1) save as much as possible of the original materials, (2) choose a reversible process, (3) make a record of the repair, and (4) use products which will not negatively impact the material. Repairs which require advanced techniques or high-level decisions are carried out by specialist staff.

"*Chûson naoshi*,"  
mending worm-eaten parts

## Reformatting

The NDL has been converting the content of library materials into other media to achieve they can be both used and preserved. In general, we have been digitizing materials. Materials to be digitized are selected in view of their uniqueness, rarity, degree of deterioration and need for use. We protect our collections from deterioration and damage by converting materials' formats and providing users with digital copies.



National Diet Library Digital Collections  
<http://dl.ndl.go.jp/>

## Long-term preservation of digital information

The NDL has been collecting and preserving websites and digital books and journals on the Internet through the Web Archiving Project (WARP) and the e-legal deposit of online publications to pass down Internet resources, which disappears daily, to future generations. We preserve digitized collections both in optical discs and in a computer system, in which we backup the data regularly.

### ■ Preservation Research ■■■

#### **The NDL conducts research on the preservation of materials.**

The NDL researches the state of deterioration of materials in its collection, determines materials to carry out preservation on, and uploads the results to its webpage.

For twenty years up to 2007, we conducted surveys on the use rate of acid-free paper in domestic publications, in order to cope with acid paper issues. Based on the survey results we called for the use of acid-free paper. In 2007, the results showed clearly that more than 90% of newly-acquired materials were printed on acid-free paper, which has a longer life than acid paper. In 2009, we tested out two mass deacidification methods used in Japan, the dry ammonia ethylene oxide (DAE) process and the BookKeeper method, and studied their effectiveness and safety. We have also been researching how to ensure the long-term preservation and usability of digital information. This includes research on existing examples, domestic and international trends, surveys on the usability of packaged digital publications of the NDL, studies on migration and emulation, and research on system for long-term preservation of digital information

### ■ Preservation cooperation activities ■■■

#### **The NDL conducts activities to promote the preservation of materials in domestic and overseas libraries and related organizations.**



Activity in IFLA/PAC

We disseminate information via the NDL website, and organize symposiums and training programs for librarians. After the Great East Japan Earthquake, we provided support for restoration of damaged materials at the disaster-affected libraries.

The NDL also carries out international cooperation as the IFLA Preservation and Cooperation (IFLA/PAC) Regional Centre for Asia.

(\*IFLA: International Federation of Library Associations and Institutions)



Workshop on basic conservation treatment

**For details of the research, symposiums and publications cited above, please see the NDL website.**