PRESERVATION AND CONSERVATION OF OLD BOOKS

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Abstract

The paper gives an overview of the basic issues in preservation and conservation of old books through the most important questions and knowledge necessary to understand preservation systematically and comprehensively. Basic terms and definitions in the field of preservation and relations between those terms are explained in the first part of the paper. The second part deals with materials that old books are made of, their structure, basic deterioration processes and ways to preserve materials. Conservation and restoration methods and techniques are presented. Also, the role of reformatting of old books is considered in the context of preservation.

Key words

preservation, preservation management, conservation, restoration, old book

Introduction

The word "preservation" is often defined to include all the managerial, administrative, financial, and staffing considerations necessary to safeguard the welfare of library collections. This definition is derived from the *IFLA Principles for the Care and Handling of Library Materials*.[1] As

1 IFLA Principles for the care and handling of library materials / compiled and edited by Edward P. Adcock. 1998 [cited: 2010-01-27]. Available at: http://archive.ifla.org/VI/4/news/pchlm.pdf, p. 5.

we can see, there is a lot of seemingly simple terms here, such as managerial, administrative, financial, and staffing. They are, however, too general to convey a concrete meaning. Preservation should also be considered through questions like: who deals with preservation, when we deal with preservation, what are the limits (or frameworks) in conducting preservation, etc. Here we can recognise several frameworks. One is the legal framework that represents legal acts relevant for these issues. We need to know what laws are important for preservation issues and how can they be implemented. The second framework is financial, and in practice we often hear that it is the most limiting factor in conducting any kind of activities, not just preservation of old books. We must understand that limited financial framework must not be an excuse for not doing something and solutions that can fit in the existing financial framework must be found. There are two important aspects of administrative issues. One is to know the existing administrative regulations that are necessary to conduct quality preservation activities. The other is to create administrative surroundings that will facilitate organisational tasks of old book preservation. Staff policy is also a very important issue, especially from the educational point of view. We should think of efficient ways to transmit important knowledge from theory to practice. Also, there is a variety of technical prerequisites significant for the welfare of old book collections. As we can see, the seemingly simple term "preservation" includes many subterms that can easily complicate and confuse the whole story of preservation.[2]

Understanding preservation

We can fall into several traps trying to understand the term preservation, as it can be seen from everyday practice and literature. Falling in such traps leads to a gap between invested effort and results. Today we witness that many resources, much of work and time are invested in the preservation of a collection, but the results are not satisfactory. Collections are still deteriorating or waiting to be preserved, or there are not enough financial resources to complete the task.

The first trap is understanding preservation too generally. It means that it is understandable and logical that old books should be preserved, but this concern exists on some general level, without concrete actions. That kind of understanding leads to "nothing" because

2 Preservation : issues and planning / edited by Paul Banks and Roberta Pilette. Chicago : American Library Association, 2000.

it is too general, and results in leaving books to deterioration, even though we know that they should be preserved. Another trap is understanding preservation too technically. It is a very dangerous, but a very common trap. It means that we understand preservation as a technical issue. In other words, preservation refers to application of sophisticated techniques and special procedures, and we do not have anything to do with this. The next trap is understanding preservation in an elitist manner, which means that preservation is the job of specially educated professionals, not ordinary librarians or archivists. We can often hear people say, "Our technical department deals with preservation issues, it is their task". It is also a trap to understand preservation only partially, namely, to identify one preservation technique with preservation in general, and to think that it is all that can be accomplished.

Closely connected with the mentioned traps are the last three traps in which preservation is considered as highly-priced, time and staff consuming process, which is not always the case. If we wait to have enough money, people and time, we will not do anything because such ideal conditions do not exist, at least not in the real world. So, when we think about preservation of old books we must be careful not to fall into one of these traps.

The term preservation should be distinguished from the term conservation. According to IFLA, conservation denotes "specific practices taken to slow deterioration and prolong the life of an object by directly intervening in its physical or chemical make-up. Examples would be repairing damaged bindings or deacidifying paper".[3] We can see here that conservation is oriented towards the material, its properties and longevity. It is very important to understand the relations between terms preservation and conservation because it contributes to the efficiency of their application.

This consideration can be completed by some sort of terminological hierarchy (Figure 1) in understanding the term preservation. Inside the general term preservation two concepts can be seen.

There is the concept of preserving material, or artefact, and the concept of preserving intellectual content. So, this hierarchy contains a conceptual scale. The approach is next. Inside the concept of preserving material there are preventive approach and remedial (corrective) approach. Preventive approach includes all the activities that would prevent damaging and deterioration of material, while corrective ap-

3 Ibid.

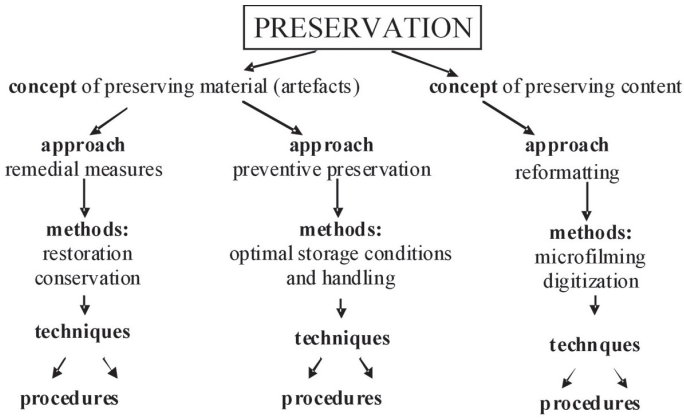

Figure 1.
Terminological hierarchy in preservation context

proach includes activities that restore the primary function of the damaged library material and prevent its further deterioration. Inside the concept of preserving content there is the reformatting approach. The next segment of this terminological hierarchy is the term method. The meaning of this term is generally much broader than the one used here. Here it should be understood as a part of the terminological hierarchy where restoration and conservation are seen as methods inside a corrective approach while optimal storage conditions and handling are seen as methods within preventive approach. The same goes for microfilming and digitisation, which are seen as methods inside the concept of preserving content, and they should by no means be considered as a concept, which is often the case. However, the terms preservation/conservation or preservation/digitisation are often considered similar, whereas they are actually on different hierarchical levels. Next segment contains different techniques used in specific methods, and different procedures used inside these techniques. It should be said that efficient preservation measures usually include both concepts and various methods and techniques.

We must notice here that two new concepts emerge out of the concept of preserving content and out of the reformatting methods, microfilming and digitisation. One is the results of microfilming and there is a need to preserve the newly made artefacts (or microforms). Here it is most important to apply preventive methods so

that microforms are usable and reliable in the long term. Digitisation creates a new concept called 'digital preservation'. Inside this concept we can recognise a variety of methods and techniques applied to the content that needs to be preserved.

Next step in understanding preservation is to consider it at different levels. There are three levels, strategic, technical and operative. *Strategic* level implies issues on the national and international level, and includes different preservation initiatives, suggesting, adding and correcting legal regulation of preservation; promoting awareness, organising education of experts in the field of preservation etc. The second level is *technical* and it includes technical issues such as specificity and characteristics of materials, factors that endanger them, organisation of restoration and conservation tasks, application of various chemical, physical and mechanical methods and procedures, researching the interaction of different factors (chemical, biological, physical, etc.) and materials out of which old books were made, and so on. This level is often identified with preservation in general, but it is not enough just to conduct preservation on the technical level. Inside this level there is a great potential for scientific and other research as well as improvements of technical aspects of preservation. This is the dominant topic in the professional literature. Another important question is how to apply new knowledge and achievements on other levels. The third level is *operative*, which includes issues that are dealt with every day by information experts in heritage institutions. They are controlling and regulating microclimate conditions, using standards for storing and handling written material, educating users, safety issues (protection from fire, flood, burglary, vandalism, etc.), organising work in the legal and financial framework of an institution where material is stored, developing criteria for evaluating, assessing and choosing certain items of written material that need to be conserved or restored, etc. If preservation activities do not exist on this level, then all the technical achievements and strategic organisation are in vain. Education of the staff that will conduct preservation on this level is crucial. Interaction and intertwinement of these three levels are necessary. Only with good understanding of all these issues is it possible to create an efficient old book preservation system. Individual efforts at only one level without interaction with the others are not enough.

Understanding materials of old books

Besides defining basic terms in the general context of preservation, it is important to consider some other issues pertinent to old book preservation. This certainly refers to materials old books are made of.

Paper is the most relevant and most common material in old book collections, but there are also leather, parchment, textile, metals and other materials. The basic constitutional element of paper is its fibre structure. In the case of old books, fibre structure is made of cellulose fibres of different purity. Since a long time ago different fibril and net-like structures have been used for producing writing material. In its essence it is a very simple structure that is made of many intertwined fibres inside which there are intertwined macrofibril fibres, inside which are intertwined microfibril fibres constituting of cellulose molecules. This structure, however, is rather stable, chemically, physically and mechanically but still it can be easily disturbed by different chemical, physical and mechanical influences. In this case preservation is focused on stopping the influence of these factors on cellulose material. Keeping the original cellulose structure is actually the supreme method of preservation.

Cellulose is a polysaccharide, which means that it is built in a form of a chain of the same molecules, or saccharide units. Basic unit is a glucose molecule (grape sugar, blood sugar, or corn sugar) which is a monosaccharide composed of six carbon atoms and has aldehyde group called aldohexose. The key is in the bond between two molecules of glucose because that bond is what determines how the material will look on the macroscopic level. Cellulose is a straight chain polymer. Unlike starch, no coiling or branching occurs, and the molecule adopts an extended and rather stiff rod-like conformation, aided by the equatorial conformation of glucose residues. The multiple hydroxyl groups on the glucose residues from one chain form hydrogen bonds with oxygen molecules on the same or on a neighbouring chain, holding the chains firmly together side-by-side and forming microfibrils with high tensile strength. Microfibrils are meshed into a carbohydrate matrix.[4] Completely the same structure, but with differently oriented bond will give very different properties of this material. The best example is starch that has the same quantitative compounds as the cellulose, but different bonds between glucose units. So, cellulose is derived from

4 Perez, Serge; William Mackie. Structure and morphology of cellulose. 2001 [cited: 2010-01-27]. Available at: http://www.cermav.cnrs.fr/glyco3d/lessons/cellulose/index.html

D-glucose units, which condense through β(1→4)-glycosidic bonds. It is important to understand that breaking of this bond is the most common cause of deterioration of paper material, in a chemical sense. Breaking of glycosidic bonds leads to degradation of cellulose molecule which loses its primary properties.

The whole story of paper as a material and of its longevity is based on understanding that glycosidic bond inside the cellulose is the key factor. This is especially visible if we understand the essence of cellulose molecule stability. All the preservation and conservation measures should be oriented towards preserving this structure and preserving bonds that link cellobiose molecules into cellulose chain.

We should also mention other compounds present in paper, especially those that have harmful effect on its resistance. One of them is certainly lignin, which is the basic compound of the wood cell walls. Lignin remains in paper produced from wood cellulose fibres. It has a very reactive molecular structure. Chemical changes of lignin lead to the destabilisation of the fibre cellulose structure, and create specific coloured products that are the main reason for paper turning yellow. When we are talking about old books, it is important to understand that in the past paper was manufactured from raw materials that were of better quality then those used in mass production of paper. Raw materials used as a source of fibre such as cotton fibres and annual plants are, from chemical aspect, of a better quality then raw materials obtained from mechanically treated wood pulp that contains lignin. Knowing materials from this point of view is an important step in managing the preservation of old books.

Having in mind the stability of chemical bonds inside the cellulose molecule, specific reactions that occur during chemical degradation of paper could be understood. They are oxidation, hydrolysis and photochemical reactions. They degrade chemical bonds and cause the reactivity of lignin. Hydrolysis is an especially dangerous reaction that destroys paper. It is a consequence of acids affecting the bonds inside the cellulose molecule. The harmful influence of acids can occur as a result of the acidic character of residues created during manufacturing (intrinsic factors), but also as a consequence of acidic effects from the environment (external factors). So, it is important to determine the acidity of paper before applying other preservation measures because acids present in paper have autocatalytic character and will result in continuous degradation of paper, until they are completely removed.

Other compounds present in paper are fillers, coatings and sizes. Their role is to fill fibre cellulose structure and to enable application of materials used for writing. Chemical stability of these components also significantly affects stability and permanence of paper. In papers used for production of old books, mainly natural materials and organic sizes were used. In new papers, mainly synthetic materials are used. In the case of damaged material that needs to be conserved or restored, it is important to know which paper compound is damaged and which needs to be preserved from further damage.

Leather is also the material often found in old book collections. In the past it was used a lot, mainly for bindings. Leather is an organic material of animal origin, made by special procedure called tanning. Tanning is the procedure of chemical stabilisation of animal skin that aims at prevention of denaturalising its basic compound – collagen. Collagen is a protein with a net-like structure. It consists of many meshed fibres of organic origin. Without the tanning process collagen would deteriorate and lose its role as a building element of this material. The most visible effect of deterioration of leather material is in the loss of its elastic properties and mechanical deformations that are the results of drying out. Because of its organic origin, leather is a source of food for moulds. That is why we can often find old books collections where leather items are dried out, deformed and damaged by mould. It is necessary to recognize here the type and cause of damage, to prioritise in choosing the preservation measures and to determine the appropriate level of preservation. If materials are in such condition that they endanger the rest of collection, they should be immediately sent to technical unit to prevent further damages.

Another material used for writing was parchment. Parchment is also of animal origin, and it contains collagen. It is different from leather because it is thinner, and it was not tanned. Collagen was stabilised by immersing into calcium hydroxide solution (or lime). Thus, parchment is different from leather because it is not waterproof to such a degree, and it is very sensitive to humidity variations. So, the most important preservation measure for parchment is appropriate and stable environmental control and use of enclosures.

There are several other materials that can be found in old books, such as different textile materials mostly used for bindings, bookmarks, sawing books etc. What is interesting here is that textile materials also have fibril net structure. So, paper, leather and textile, as dominant ma-

terials that old books are made of, all have basically the same, stable, net-like structure.[5] The best preservation method is to keep this structure stable. There is no preservation method that could improve the structure of these materials, only those that can preserve it, whether by preventive or remedial measures.

Metal materials can also be found in old books. They are mostly used for decorations or as clips. Metal materials are iron, copper, tin and lead alloys subject to corrosion, the oxidation process that results in creating metal oxides and loss of mechanical properties of metal materials. Metal in old books should be restored by using remedial measures such as cleaning or replacing it with new material.

Besides the mentioned materials, there is a variety of other materials used for writing, like different types of writing materials such as various kinds of ink, Chinese/Indian ink, printing inks, lead pencil, etc. These materials can also be significant causes of damage. The best example is damage by iron-gall ink in old manuscripts that is the result of corrosion of iron ions. It is important to recognize writing material as a cause of damage and to send such damaged books to a specialist in a technical unit.

There are three possible types of damage – chemical, physical and mechanical – which are the result of a variety of causes. We need to be aware that old books were exposed to chemical degradation for a long time. Well preserved old books that were stored in good environmental condition support the thesis about quality of materials used in production of books in the past. Most of today's paper will be in much worse condition after the same period of time. The causes of damage are humidity, temperature (or temperature variations), light, atmospheric pollutants, biological causes such as moulds, insects, rodents, and humans as the biggest factor of mechanical damage. Each of these causes can create one or more types of damage. For example, light causes many chemical reactions, such as oxidation of lignin that turns paper yellow, destroys mechanical stability of paper and leads to mechanical type of damage. When our assignment is to preserve a large collection of old books we need to recognise main type and cause of damage. We also need to determine intensity of damage. This information will indicate what needs to be done next. In the case of old books, conservation is usually considered as a preservation solu-

5 Conservation science : heritage material / edited by Eric May and Mark Jones. Cambridge : RSC Publishing, 2006.

tion. From the definition mentioned earlier we know that conservation is oriented toward preserving materials of old books. Different techniques are used for this purpose.

Understanding conservation and restoration in preservation of old books

There has been considerable concern about the condition and preservation of library and archival materials over the last decade. A large portion of written heritage has already disappeared forever as a result of bad or no preservation practices. The poor condition of many documents and books make the preservation of written heritage a very time-consuming, expensive and difficult job. Even the survival of the remaining books and documents is seriously threatened by the lack of resources for providing proper storage conditions, and by wear and tear resulting from the frequent consultation of books and documents. Most damage to the archival and library objects are caused by a few reasons:[6]

- INTERNAL CAUSE: poor quality of material itself – collections in libraries and archives are mostly made of natural materials, polymers, which have a tendency to degrade. It is impossible to stop this completely. The damage it causes has its origins in the raw materials and production methods used.
- EXTERNAL CAUSES: The environment in which they are stored – air pollution, light, temperature and relative humidity; microorganisms, insects and rodents; extensive use –people consulting original books or documents.

Most of the libraries and archives in Croatia holding written heritage have neither conservation departments nor have they had systematically and substantially applied preservation practice. As a consequence, there are conservation backlogs and no effective management strategies to clear them. Moreover, staff and resources across the sector are almost always insufficient. What can be noticed in most Croatian libraries and archives:

- Inadequate storage conditions in repositories. In most cases, storage areas are without air conditioning, thermo-hygro meters, humidifiers and dehumidifiers. Microclimate conditions are therefore not regulated, so changes of temperature and relative humidity are big, frequent and sudden. It is well known that some

6 Preservation of library & archival materials : a manual. Andover, MA : Northeast Document Conservation Center, 1999.

types of damage strengthen each other. Chemical reactions like acidification progress faster in high temperature and high relative humidity. Air pollution also contributes to degradation processes such as acidic boxing material. Bad quality of storage area is another factor that can influence life expectancy of the material in a negative way. Storage rooms are often in poor condition (dirty rooms, draughty attics or damp cellars with no heating, no window shutters, old installations (water, heating, electricity) etc.) As a result, the physical condition of a large number of our libraries and archives is poor. This means that they cannot be made available for actual use.

- Bad/poor quality of storage boxes or no protective boxing at all (acid wrapping materials and boxes, metal parts, etc). Inadequate storage furniture (worn shelves made of unsuitable formats and materials).
- Problem of accessibility of library and archival objects and their inadequate handling. The core activity of libraries and archives is the encouragement of maximum accessibility to information and materials stored there, but at the same time their protection for future accessibility. Experience has, however, proved that frequent use of written materials causes great damage to them. Many objects cannot be handled without being damaged. Insufficient quantity of protective copies (digital data carriers such as CD-ROMs or microfilms) means that the originals are still too often (if not always) in use, or some objects are, because of their damaged state, completely unavailable to users.
- Large quantities of endangered or damaged materials and their frequent use. Restoration treatments are too complicated, time-consuming and expensive, and financial means and trained staff are limited and insufficient for single-item treatment.

To overcome the problems of the size of library and archival collections, of limited budgets and time-consuming nature of conservation, choices have to be made constantly. This means, first of all, that a thorough knowledge is needed of the physical condition, uniqueness and usage frequency of individual objects, series and collections. Priorities can then be set on the basis of an analysis of these factors. A choice can also be made between various conservation methods available. Here, a cost-benefit analysis should be decisive.

A lot has happened in the field of preventive conservation over the past 20 years. A great deal of knowledge has been developed about the chemical causes of all kinds of physical degradation. Advanced conservation methods and techniques have been developed. Based upon the notion that prevention is the best solution, a lot has been invested in improved storage conditions and appropriate packaging. A lot of material has been put on film to prevent further damage to the original documents caused by repeated use. The approach can vary, from reformatting to conservation, or a combination of the two, a combination of conservation, restoration and reformatting, etc.

Conservation activities can be divided into different types of activities. Each activity needs a different kind of expertise. The preservation model looks like a pyramid (Figure 2).[7]

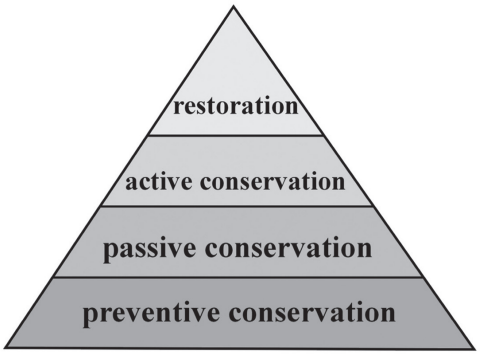

Figure 2.
Conservation pyramid

- Preventive conservation

The basic activity of the preservation pyramid. It comprises policy making, including training, attitude, professional thinking and actions of all personnel.

- Passive conservation

Good housekeeping, air purification, air conditioning, storage area hygiene and storage area monitoring for insects and moulds; these measures are beneficial for the whole collection. An important element of passive conservation is the assessment of the physical condition of the collection.

7 Conservation methods [cited 2010-01-25]. Avaliable at: http://www.tanap.net/content/archives/conservation/conservation.htm

- Active conservation

It includes re-wrapping and re-boxing of the objects, cleaning, mass-deacidification and disinfection. Most of these elements can be done by employees who are not conservators. It is essential that these employees are properly trained.

- Restoration

It is the most expensive and time-consuming part of conservation. At the same time, it is less productive compared to the other mentioned activities. The top of the preservation pyramid is the domain of well-trained conservators.

There is a hierarchy for preservation, passive and active conservation, and restoration. The most effective and cheapest is preservation followed by conservation. Restoration is the most time-consuming. The approach is like a funnel: it starts with preservation and ends with restoration, i.e. it is comparable to working from the outside of the building on each object inside.

Conservation is not a goal in itself; it is integral to the work process of an institution and has to be considered as such. Preservation is not an exclusive duty of a group of trained conservators and restorers but should be the core activity of the whole institution. It is important to implement as many protective measures as possible in regular, daily routine activities. Therefore, the compatibility of planning and implementing activities in different departments of an archive or library is indispensable for the application of a successful conservation policy.

Technical implementation of a successful conservation policy should begin with passive conservation, as all measures taken in this area are beneficial for the whole collection.

Well-built repositories and exhibition rooms, good housekeeping, air purification, air conditioning, storage area hygiene and monitoring for insects and moulds is beneficial for all collections, and it is the only affordable solution to save large number of libraries and archives over the long term.

However, climate control in repositories is expensive and unaffordable to most institutions in Croatia that hold written heritage. Nevertheless, it is possible to improve storage conditions by many inexpensive and feasible solutions and techniques (portable thermo-hygrometers, humidifiers and dehumidifiers; airing rooms by opening and closing windows for humidity exchange; custom-made window blinds of fabric or paper, UV filters for lamps, insect traps, etc.). Within

the policy frame of an institution, and of course, within the limitations of the financial resources, a time schedule should be made for upgrading the housing, air quality and the manner of storing written heritage.

An important element of passive conservation is the assessment of the physical condition of the whole collection. One of the examples of such procedure is Dutch UPAA – Universal Procedure of Archive Assessment.[8] This is a statistically based damage survey, a scientific instrument to get a reliable impression of the type of damage and the level of deterioration. In order to get a better insight into the quality of a library or an archive, one can carry out a number of measurements on some of the individual items, but that process is difficult, too time-consuming (if not impossible) and expensive. This method involves the development of a measurement tool which can transform measurements on individual objects to objective statements about the general condition of an archive or library as a whole. On the basis of the result of such an assessment, an institution can make a conservation policy and determine the needs for conservation and restoration (what actions should be taken, e.g. conservation and/or restoration of the whole archive or parts of it, and the establishment of priorities between collections).[9]

When a survey is done and an idea is obtained about the condition of the entire collection, before starting the work on a particular collection or an object, it is necessary to make a selection. It is impossible to treat every single item in an archive or a library.

Selection criteria[10]

- High frequency of use and stimulation of use by special programmes for the public.
- Vulnerable collections or parts of collections, with a high degradation speed (degradation processes such as acidity, iron-gall ink corrosion, fire damage). Damage can be caused by external factors or by bad quality of materials the books are made of.
- Unique historical/symbolical value – single items with a high intrinsic or historical value (owing to the information or the object itself).
- Objects that require treatment for exhibition purposes.

8 Havermans, John; Pieter Marres; Peter Defize. The development of a universal procedure for archive assessment. // Restaurator 20, 1 (1999), 48–55.

9 Bruin de, Gerrit. An assessment of Deltaplan : The Dutch National Preservation Strategy. // Liber quarterly 14 (2004), 356-367.

10 Steemers, Ted. Preservation policy (a draft). Den Haag : National Archives of Netherlands, 2003.

Equal attention should be given to all factors that play a role in operational choices. Active conservation includes activities such as re-wrapping and re-boxing of the objects, cleaning objects, mass-deacidification and disinfecting. Most of these activities can be done by employees who are not conservators. It is essential that these employees are properly trained.

Acid-free boxing. Boxing is crucial to the preservation of written heritage. Protective boxes made of chemically stable materials provide both physical support and chemical protection from dust, dirt, light, and mechanical damage. Materials from which enclosures are constructed should meet the preservation standards, since poor-quality materials can cause irreparable damage. It is essential that storage enclosures are made of acid-free materials that are chemically stable, so that they do not form acids over time.

All damaged material should be packed in acid-free, calcium carbonate buffered wrapping paper and put in acid-free boxes, after removing all ironwork (staples, paperclips). It is now well known that even a bad box is better than no box at all!

Boxes can be obtained in many standard sizes, but they can also be custom-made for every single item in a particular collection (only if the collection is very important – custom-made boxes are time-consuming and therefore expensive to make).

Surface cleaning. After having selected a particular collection for conservation treatment, it is recommended to dry-clean it. Superficial grime, dirt, and soot disfigure and abrade book pages and paper in general. They can be removed with a soft dusting brush, with a powdered eraser, a soft block eraser such as *Faber Magic Rub Eraser*, or conservation sponges *Wallmaster* and *Wishab*. Secretions like insect specks and mould residue may have to be removed mechanically with a small sharp tool like a spatula or, in the case of mould, with an aspirator, which vacuums the mould. Mould removal is a delicate procedure and requires careful work hygiene to avoid spreading contamination as much as possible. Mould can also affect the health of personnel, so protective equipment such as respirators, gloves, and fume hoods should be used when removing it. Disinfecting (with ethanol) is recommended.

Mass-deacidification. Although acid-free paper has become more common, a large body of acidic paper still exists in books made after the 1850s because of its cheaper and simpler production methods. Acidic paper especially when exposed to light, air pollution, or high relative

humidity, yellows and becomes brittle over time. Deacidification and alkalization of acidic paper is a generally accepted conservation practice, which can be carried out aqueously or nonaqueously.[11] The purpose of the treatment is to neutralise acids (by increasing pH of acidic paper) and to deposit in paper a buffer that will protect it from the formation of acid on a large scale in the future. Washing followed by aqueous deacidification is a more thorough treatment than nonaqueous deacidification. However, aqueous treatment requires that a volume be unbound. If the volume should not be unbound or if inks are soluble in water, nonaqueous deacidification is an acceptable alternative.

Reformatting. There are three methods to do this: photocopying, microfilming and digitisation. Each of them have its advantages and disadvantages, so it is important to know the answer to several key questions before we start reformatting old books. They are primarily the questions of purpose, aim and criteria, but also the question of preservation role.

Photocopying and microfilming were not used much as reformatting methods of old books, especially not in the form of projects, because of technical and usability issues. So I will focus here on digitisation projects of old books. Digitisation has well known benefits for users, and this is usually a very strong reason to conduct the project. Preservation on the other hand, is not the primary reason for old book digitisation projects, because old books' materials are far more resistant and durable than digital media. So the accent in these kinds of projects is moved from preservation to access, because users are faced with number of limitations when using old books' originals. When old books are digitised, the need to preserve originals still remains, but the potential damage caused by inappropriate handling and excessive use are removed. Digitisation in this case is a supplement to other preservation measures, not the only solution. There is another important question here. Since digitisation is considered inside the concept of content preservation, what are the actual needs for the old books' content? Who are the users of old books and how are they using them? User needs should be as clear as possible when we are dealing with projects of digitising old books. Digitisation of historical newspapers is, on the contrary, a different example. Their material is not as durable, but the need for their contents is highly demanded by a variety of user profiles. I would like to

11 Cheradame, H.; S. Ipert; E. Rousset. Mass deacidification of paper and books. I: Study of the limitations of the gas phase processes. // Restaurator : international journal for the preservation of library and archival material 24, 4 (2003), 227–239.

stress once more the importance of establishing appropriate selection criteria for digitisation of old books. Professionals that deal with history of book and other similar disciplines can be very helpful here.

Damage inventory. While doing re-boxing and surface cleaning of a particular collection, it is recommended and useful to make inventory of damage of individual objects by describing book constructions, types and level of damage in special forms. On the basis of such documentation it is possible to determine priorities within the collection that need to be brought on the next treatment level – restoration.

Restoration is the most expensive and time-consuming conservation method. At the same time, it is less productive when compared to the other mentioned activities. Restoration consist of a wide variety of book conservation-restoration treatments, with work ranging from basic stabilisation to extensive chemical, structural, and cosmetic treatment of both paper and bindings. Conservation standards (such as reversibility) are employed and only materials that are stable and durable must be used. This kind of work can be done only by well-trained conservators, professional staff that has extensive knowledge and experience in both book and paper conservation techniques.

Treatment documentation (Detailed book description and damage report documentation). Preparation of written and photographic records is a requirement of responsible conservation treatment of valuable materials. The purpose of documentation is to record the appearance and condition of a book prior to treatment, to describe the treatment that was done, and specify the materials that were used in the treatment. The purpose is also to identify the book that has been treated and to provide information helpful to conservators who may further treat that book in the future, especially as new improved techniques and materials become available. Documentation includes a written description of the condition prior to treatment, a listing of the procedures and specific materials used in treatment, and a statement of where and when the treatment was done. Written records are supplemented by photographs taken before, after, and sometimes during treatment. These records should be retained permanently.

Collation is an important part of documentation because it includes careful checking of each page of a book to document the number and order of pages, plates, maps, etc.; to check for missing pages; and to note serious tears, stains, or other types of damage or irregularity. Treatment of books can range from minimal to extensive.

Minimal treatment (Basic stabilisation). Basic stabilisation is the minimal level of treatment required to slow down the deterioration of a book. It excludes all cosmetic treatments and many structural repairs as well. For example, a book with detached boards and fragile paper may only be microfilmed, nonaqueously deacidified, and boxed. Basic stabilisation is frequently chosen for books of limited value or for those that are rarely used. It is also appropriate for books that are valuable as historic objects or artefacts. Since treatment always results in at least slight alteration of the original object, boxing is sometimes preferable to treatment of artefacts.

Extensive treatment. This refers to full treatment of both pages and binding. Restoration treatment may include chemical and physical treatment, structural repairs, some of which may be cosmetic. Partial or complete unbinding, surface cleaning, removal of old repairs and tape on book pages, washing the book pages, aqueous or nonaqueous deacidification, mending and protection of pages (manual restoration with Japanese paper and a starch paste or leaf-casting with paper pulp), and resewing are techniques that may be undertaken to stabilise the text block. For books that have partially or completely detached boards or spines, repacking is a means of repairing the original bindings and reattaching them to the text. If the original binding is too deteriorated to be reused, the book is rebound in one of a variety of binding styles (case, split-board or laced-in structure) and titled. Extensive treatment is usually reserved for books of high value.

Boxing. Books with bindings of historic or aesthetic value, which should be retained as much as possible in their present condition, should be boxed. Damaged books, which are rarely used and do not warrant treatment or repair of the binding, should also be boxed. Boxes should be constructed of durable materials of conservation quality and should be custom-made to fit a book's dimensions exactly.

Conclusions

In practice, organising and implementing conservation policies and activities within an institution and setting up a conservation-restoration workshop, is often, despite the knowledge, good will and enthusiasm, a slow and difficult process, encumbered by the lack of money, time and professional staff.

Restoration is still the most common policy in place even though financial means, time and trained professional staff for single-item treatment are absolutely insufficient. To make matters worse, objects

after restoration (done in or outside the institution) are, in most of the cases, placed back to inadequate storage conditions, and thus they are exposed to damage again.

As a result of such practice, there is no overarching conservation plan or policy across the sector, no knowledge about the conditions of whole collections, and consequently no prioritisation.

Growing awareness and training of people is therefore very important. Legislation and regulations covering storage area arrangement, information media, packaging materials and storage methods are necessary to help overcome the ever growing problem of safeguarding written heritage.

In order to be efficient, preservation must be considered systematically and comprehensively. As such, it includes five basic aspects which reflect all issues given in this paper. The first one is strategic and theoretical aspect. It includes planning and developing preservation programmes, plans and policies on national and institutional level, and taking into account contemporary theoretical knowledge about preservation, as well as examples of good practice. The second is economic and legal aspect which includes managing available financial resources and finding additional resources, but also following, changing and implementing legal documents relevant for preservation. The third is educational aspect such as training staff to conduct regular preservation activities and, if necessary, educating them for specific preservation activities, educating users and including knowledge about preservation issues into formal education of information experts. The fourth aspect is technical and operative and it implies estimating storage conditions and deterioration rate, conducting collection condition surveys, handling material and applying preservation methods and techniques. One remaining element that lies in the essence of preservation purpose is cultural and social aspect. It focuses on establishing and applying evaluation and selection criteria for preservation, offering new services or services with added value as a contribution to the social development.

As it was shown in this work, efficient preservation of old books includes many different issues. Understanding and applying them in the right way is the best solution for old book preservation.

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ZAŠTITA I KONZERVACIJA STARIH KNJIGA

Sažetak

U radu se daje pregled osnovne problematike zaštite i konzervacije starih knjiga kroz najvažnija pitanja i znanja potrebna za njihovo sustavno i sveobuhvatno razumijevanje. U prvom dijelu rada objašnjavaju se temeljni pojmovi u zaštiti te njihovi odnosi i značenje. Drugi dio rada bavi se materijalima stare građe, njihovom strukturom, procesima propadanja kao i načinima kako ih zaštititi. Predstavljene su neke osnovne metode i tehnike konzervacije i restauracije. U kontekstu zaštite starih knjiga razmotrena je i uloga preformatiranja.

Ključne riječi: zaštita, upravljanje zaštitom, konzervacija, restauracija, stara knjiga