

Naumche RIZOVSKI, M.A.

adviser - inspector

State Archives of the Republic of Macedonia - Veles Department

MOISTURE THE BIGGEST ENEMY OF ARCHIVE MATERIAL

Abstract:

This paper provides an overview of the key aspects of the protection of archive material with a focus on moisture as a dominant risk factor. The concept of archive and archiving is elaborated, as well as the characteristics of archive material, followed by an elaboration of the principles of preventive protection with moisture being singled out as the most critical element that can cause biological, chemical and physical damage. Special attention is paid to the archives buildings, both purpose-built and adapted, with a review of the criteria for their location, methods of external protection against moisture and standards for a safe archive depot. This paper also offers an overview of methods for monitoring the air humidity.

Keywords: archives, archive material, moisture, archive building, prevention

Introduction

Cultural heritage consists of the material goods of human creation in the past and present which, due to their historical, artistic, archaeological, ethnological, sociological and other scientific and cultural values, have cultural and historical significance by their content, form or function. It is the right and obligation of every state and every nation to preserve and protect their cultural and historical wealth.

Cultural heritage, according to its properties, can be immovable and movable, and according to its significance, it can be of religious and other cultural and historical significance.

Immovable cultural heritage includes various architectural buildings, archaeological sites, memorial buildings related to significant historical events and personalities, memorial complexes, monuments, etc.

Movable cultural heritage includes archive material, archaeological, ethnological, historical and artistic objects, books, etc.

6. Archives

The first association of the word archives is related to archive material as a cultural and historical heritage or as the only source without which it is not possible to know the past, i.e. the history and identity of the people and the state.

Archives are specialized institutions and primary bearers of the protection of archive material. The creation of documents and archives is closely connected to the entire day to day life of the people and their existence. In order to dispute or prove some truth, they communicate about past events, so that human existence and action are impossible without documents and archives.

Archives are also institutions in which archive material is acquired, stored, organized, processed, protected, and made available for use for the needs of the state, scientific researchers, cultural activities, and citizens.

The archives have obligation towards the future generations and provide optimal conditions what will guarantee protection of the archive material .

Written testimonies about the historical past of the Macedonian people are kept in the State Archives of the Republic of Macedonia (in its Central Section and in the 9 departments: Skopje, Kumanovo, Bitola, Veles, Ohrid, Prilep, Strumica, Tetovo and Shtip, as well as in archives abroad).

Thanks to previous generations who lived on the territory of Macedonia and created archive documents, today the State Archives of the Republic of Macedonia holds archive funds¹², collections¹³ and individual written documents¹⁴ from the 12th century, and in continuity, as archive funds and collections from the 16th century.

¹² It represents a whole of archive and documentary material, regardless of its form or record carriers, which has been created, received and used by the holder in the performance of their activity. The archive fund is kept as a whole and cannot be divided.

¹³ A collection of documents from different origins that relate to a single topic.

¹⁴ Written testimonies about certain facts, events and phenomena that occurred during the functioning of the holders.

7. Archive material

Archive material represents the entire original and reproduced (written, drawn, printed, photographed, filmed, audiovisual, typewritten, electronically, digitally, optically or otherwise recorded) documentary material of lasting value that is of importance to the Republic, science, culture, holders, as well as for other needs¹⁵. Archive material also represents a means of evidence with which the rights of the state, the people and citizens are protected.

Archive material is an essential and irreplaceable part of the functioning of every state and ensures the survival of human memory.

The most essential thing about the treatment, care, and role of archives and archive material is the fact that they are part of the cultural and historical heritage of every country.

The archive material represents demonstrative means and it is linked to the underlying human rights and freedoms. The Council of Europe Recommendation on the Accessibility of Archive Material states that a democratic society is one that enables all citizens to learn about their own history through it.¹⁶

Due to these facts, it is necessary to take all preventive measures regarding the preservation and protection of archive material as cultural and historical heritage.

8. Preventive protection of archive material

The term preventive protection encompasses measures and procedures taken to prevent, delay, or mitigate damage of documents.

Preventive protection consists of placing and storing archive material in purpose-built or adapted archive buildings, in archive depots, protected from light, temperature, moisture, dust, microorganisms, insects, rodents, mechanical damage and other factors that may affect the damage, destruction or disappearance of archive material.

Preventive protection measures should be in accordance with the Law on Archive Material, by-laws and normative acts adopted by the State Archives of the Republic of Macedonia, as well as with the recommendations and standards adopted at the international level.

Archivists are in constant contact with archive funds, collections and documents. They should note changes in archive material, and documents that are more severely damaged should be separated from the fund and handed over to a laboratory for conservation and restoration of damaged archive material.

¹⁵ Law on Archive Material, Art. 3, item 1 (Official Gazette of the Republic of Macedonia, No. 95/2012)

¹⁶ Recommendation No. R(2000) of the 717th session adopted on 13 June 2000 by the Committee of Ministers of the Council of Europe to member states

In order to determine appropriate preventive and protection measures, it is necessary to know the reasons why documents are damaged. The reasons can be external and internal.

External factors that can cause damage or destruction of archive material and documentary material in archives are moisture, temperature, light (natural and artificial), dust, polluted air, natural disasters (earthquakes, floods, military destruction, accidents), mechanical damage due to improper handling of documents, appearance of microorganisms, insects and rodents, etc.

Internal factors - These factors should primarily be sought in the quality of the materials on which the archive documents were written, and the materials with which they were written.

The materials used as a basis for writing documents can be of natural and synthetic origin, i.e. organic and inorganic. In different time periods, people used different materials for writing documents (papyrus, parchment, leather, paper, etc.). All materials are of different types and have different chemical compositions, which depend on the technological process and the raw material used for them.

Common characteristics of the above materials is the process of natural aging. Adverse external factors accelerate the natural aging process of documents.

The archive materials stored in the depots of the State Archives of the Republic of Macedonia are mostly written on paper, and a small part on parchment. Under optimal conditions of storage, storage and protection, these materials are very permanent and stable.

9. Archive building

Creating optimal conditions for the storage, protection and use of archive material has always been a topical issue. With the development and organization of the archive service and the needs in terms of the overall manipulation of archive documents, the need for a modern type of archive building that will meet the needs arises.

The archive building can be purpose-built or adapted.

9.1. **Dedicated archive building** - is built in accordance with all necessary standards for its intended purpose (location, security of the facility, architectural and construction part, etc.).

In order for an archive building to meet its primary purpose - the preservation and protection of written cultural and historical heritage - it must be safe. This is achieved by choosing a good location, using appropriate building materials during

construction, and anticipating and eliminating all possible risks from floods, fires, earthquakes, military destruction, etc.

9.2. Adapted archive buildings

For the needs of archives (especially smaller ones), under certain conditions, buildings that were built for another purpose can be adapted. The adaptation of the archive building can be temporary or permanent.

- Buildings that do not have any historical or cultural significance and that can be adapted as needed.
- Buildings that have historical and cultural significance (châteaux, castles, palaces, etc.) and cannot be adapted.

The adaptation on object into archive building should consider the functional need of the archive. For each building that is adapted for an archive, solutions should be sought separately in terms of the functionality of the facility in order to have optimal protection of the archive material and documentary material.

4.6. Location of a new purpose-built archive building

With the development of the organization of the archive service and the needs in terms of the protection of archive material, the need for a modern type of building that will meet the needs arises.

The choice of location for the construction of an archive building is one of the most important issues.

The archive building, in order to meet its basic purpose - preservation and protection of written cultural and historical heritage, should be safe. This is achieved by choosing a good location. It should be built outside urban areas, taking into account that it is not near the central city area, industrial zones, gas stations, military facilities, water bodies (rivers, lakes and seas). busy traffic, etc. The archive building should be infrastructurally connected to the state institutions in its jurisdiction. When choosing a location, it is very important to have a water supply network, sewage, electricity and everything else that is necessary for the functioning of the facility nearby. Before choosing a suitable location, the size of the facility itself (administrative space and depots) should be taken into account, and this depends on the territorial jurisdiction of the archive, as well as the amount of archive material that needs to be stored in the archive depots. The archive building should be an independent facility and fit architecturally and urbanistically where it will be built. During construction, appropriate building materials should be used and all possible risks from polluted air, flood, fire, earthquake, military destruction, etc. should be anticipated and eliminated.

Based on these standards, it is necessary to search for a suitable location that will enable the construction of a modern archive building.

4.7.External protection of the archive building from moisture

Moisture is an external factor that greatly affects paper, but also other substrates used for writing archive documents, both directly and indirectly. Preventive protection of archive material from moisture begins with the selection of a location where the archive building is to be built or adapted.

The building must not be located near water bodies (rivers, lakes and seas), where there is high relative humidity, on marshy land and land with a high groundwater level but should be built on dry and hard terrain. Therefore, it is necessary to first examine the geological composition of the land, i.e. whether that location is suitable for the construction of an archive building.

There should be a lawn and low-growing trees around the archive building, i.e. a green belt that represents preventive protection from dust, and between the lawn and the archive building there should be drainage connected to a drainage channel, thus protecting the foundations, basements and ground floor of the building from moisture.

The foundations should be made of reinforced concrete and waterproof materials, which are preventive protection against moisture between the foundations, the basement, and the ground floor of the building.

The archive building should be constructed of reinforced concrete, iron and glass, and it is divided into two parts: an administrative section and an archive depot for receiving, storing and storing archive material.

When designing the archive building, a larger percentage should be archiving depots (around 60%), and a smaller part for administrative premises, reception depot, office space, meeting room, library, laboratory for conservation and restoration, bookbinding, etc. (about 40%).

There must be no water pipes (supply and drain), heating pipes, etc. in the archive depots and they should be separated from the administrative premises.

The roof structure should be sloped with adequate internal insulation and have gutters to take the stormwater into the building's drainage, and further into the drainage channel. The building should also have a lightning rod installation, which represents preventive protection against lightning strikes.

A possible architectural construction is for the archive building to be on pillars, which would ensure drafts under the building itself.

4.8. Archive depot

The archive depot is the most important part of the archive building, a space where the holdings, collections, and documents (archive material) are stored, and it should be built according to high standards.

During its construction or adaptation, it is necessary to take into account the weight with which it will be loaded, to take into account that in the vicinity of the depots there are no production plants,¹⁷ laboratories, gas stations, chemical warehouses and other facilities in which various materials are stored or various processes are performed. Pipes for water supply, drainage or storm water should not pass through the depots. In addition, in this space (immediately above it or next to it) there should not be ventilation systems, boilers, freezers, compressors and other machines that cause vibrations. (Kalajlieska 2001:78)¹⁸

The proper storage and protection of archive material is one of the basic tasks and activities of archives.

The archive material stored in the depot is subject to a special storage regime and protection from adverse influences, including temperature, humidity, sunlight. Light, dust, microorganisms, insects, rodents, fire, flood, burglary, theft, etc.

Archive depots should be equipped with metal shelves and racks for storing archive funds and collections, air conditioning devices for regulating the ambient temperature, fire alarm devices, fire extinguishers for dry fire extinguishing,

"Archive" depot must be equipped with devices for control of the ambient temperature and humidity (thermometers and hygrometers) or (polymeters¹⁹)

The microclimatic conditions for the rooms in which archive and documentary material is stored are the following:

Material	Temperature	Relative humidity
paper, parchment, leather	13 - 19°C	45 - 60 %
black and white photos	maximum 21 °C	30 - 35 %
color photos	maximum 21°C	15 - 40 %
microfilm photo negatives	16 - 21°C	30 - 40%
diazo microfilm	16 - 21°C	15 - 30%

Light - constant darkness with occasional lighting for work in the depot
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7 Vera Kalajlieska, Preservation and Protection of Archive and Library Materials, ZMD Skopje 2001, 78.

¹⁹ Instruments for measuring temperature and relative humidity.

If the temperature in the depot is significantly lower than the temperature at which the archive material is used, it is absolutely necessary to acclimatize this material in an anteroom, thereby preventing the impact of condensation on the archive material.

"Temperature and relative humidity are regularly monitored²⁰."

10. Air humidity

The amount of water vapor in the air is expressed in two physical quantities: absolute humidity and relative humidity.

10.1. Absolute air humidity

Absolute humidity is the ratio of the mass of water vapor to the volume of air in which it is contained.

Absolute humidity indicates how much water vapor the air can hold per unit volume at the same temperature.

Water vapor is usually measured in grams, and air volume in cubic meters. The measurement can give us information about how much vapor is in the air and is expressed in g/m^3 .

10.2. Relative humidity

Relative humidity means the amount of water vapor in the air, i.e. the percentage ratio of the amount of water vapor in the air to the maximum amount of water vapor that the air can hold at the same temperature, and it is expressed in percent (%).

The relative humidity of the air depends on the air temperature. If the air warms up, the relative humidity decreases. Therefore, in winter periods, due to heating devices, the relative humidity in the rooms decreases.

If the relative humidity reaches 100%, the air will no longer hold water vapor at a given temperature.

By regulating the temperature, the relative humidity of the air is regulated.

For optimal protection of archive material, the relative humidity should be neither too low nor too high.

²⁰ Regulation No. 01-134/1 of 10.01.2023 of DARSM on the necessary conditions for providing adequate space and equipment for the accommodation, storage and protection of archive material in archive depots.

When the relative humidity of the air decreases (below 40%) for a longer period, the paper dries out, i.e. becomes brittle and fragile, while when the relative humidity of the air increases, it absorbs moisture. When there is a high relative humidity of the air - over 75%, the paper swells, its chemical structure weakens and it is suitable for the occurrence of many harmful chemical reactions and in combination with high temperatures, it allows development of microorganisms, fungi and molds that further damage it.

High relative humidity, if maintained for a long period of time, can also affect the means used to write documents (printing inks, ink, pencil, etc.), and it can also affect the cellulose and glue from which the paper is made, which will soften the sheets and cause them to stick to each other.

10.3 Measuring instruments

Instruments for measuring temperature and relative humidity in archive depots are thermometer, hygrometer or polymeter.

1. Thermometer - An instrument for measuring and checking the temperature in a room (archive depot). The temperature is measured and recorded regularly, and the relative humidity of the air also depends on it.

2. Hygrometer - an instrument used in meteorology to measure the humidity in the atmosphere²¹. The results are expressed in g/m³ and in percentages (%).

There are two types of hygrometers:

- Analog - very accurate, as they almost immediately detect changes in humidity in the environment.

- Digital - also accurate (although somewhat less) - do not require any maintenance.

3. Polymeter or a thermo - hygrometer is an instrument for measuring temperature and relative humidity. This instrument can measure temperature from -35°C to +55°C and relative humidity from 0 to 100%.

Conclusion

The optimal conditions for storage and protection of archive and documentary material begin with its creation with the holders where it is kept for 20 years from its creation²² as well as in the State Archives of the Republic of Macedonia where it is taken over for permanent storage, professionally arranged and processed, placed in archive depots

²¹ Absolute and relative air humidity.

²² Law for archive material, etc. Official Gazette of RM no. 95/2012, art. 27 paragraph 2. p.46.

where there should be optimal conditions for storage and protection, made available for use for the needs of state authorities, public enterprises, scientific researchers, legal entities and individuals, and presented to the general public through the organization of exhibitions, issuing monographs, publications, etc.

With the development of the organization of the modern archive service and the needs in terms of storage and protection of archive material, there will be a need for modern buildings that will meet the needs.

Archives are the foundations of historical and cultural identity, they provide data on the past and the present, and without them it is impossible to make distinction between different nations and states. The archive material stored in them relates to the overall state and social system within the state as well as to all citizens, present and future, and is evidence of their rights and privileges. Therefore, it is necessary to take all necessary preventive measures in terms of protecting archive material as a cultural and historical heritage for future generations.

References

Вера Калајлиеска, Чување и заштита на архивски и библиотечни материјали, 2МД Скопје 2001, 78.

Правилник бр. 01-134/1 од 10.01.2023 на ДАРСМ за потребните услови за обезбедување соодветен простор и опрема за сместување, чување и заштита на архивскиот материјал о архивските депоа.

Recommendation No. R(2000) of the 717th session adopted on 13 June 2000 by the Committee of Ministers of the Council of Europe to member states

Закон за архивски материјал, Службен Весник на РМ бр.95/2012, чл.27 ст.2. стр.46.