Prejeto / Received: 4. 5. 2026

1.02 Pregledni znanstveni članek 1.02 Review article

https://doi.org/10.54356/MA/WHTD2356

CLIMATIC CHANGES IN THE ALPS-ADRIATIC REGION: CONSIDERATIONS AND MEASURES FOR PROTECTING ARCHIVAL RECORDS IN THE CARINTHIAN REGIONAL ARCHIVES – A FIELD REPORT

MMag.ª Katja Almberger, MA
Deputy director, Carinthian Regional Archives, Klagenfurt, Austria
katja.almberger@ktn.gv.at

Abstract:

Climate change is increasingly threatening cultural heritage. The Carinthian Regional Archives, opened in 1996, was based on 1980s climate data and the "Cologne Model". However, climate shifts since the late 1990s – especially higher winter temperatures, with declining precipitation, and hotter summers – have reduced its effectiveness. From 2017, several measures, e.g., disaster planning, improved storage materials, digitization, and IPM. Nevertheless, data from the early 2020s showed ongoing instability, with significant fluctuations in temperature and humidity. As a result, a fully automated climate-control system with emergency power and photovoltaic support was installed, successfully stabilizing conditions and ensuring the long-term preservation and usability of archival records. In an effort to minimize the archive's carbon footprint, a photovoltaic system was installed simultaneously.

Keywords:

climate change, preservation, air conditioning, sustainability

Izvleček:

Podnebne spremembe v alpsko-jadranskem prostoru: razmislek in ukrepi za zaščito arhivskega gradiva v Koroškem deželnem arhivu – poročilo s terena

Podnebne spremembe vedno bolj ogrožajo kulturno dediščino. Dejavnost Koroškega deželnega arhiva, odprtega leta 1996, je temeljila na podnebnih podatkih iz 80. let prejšnjega stoletja in na »kölnskem modelu«. Vendar so podnebne spremembe od konca 90. let – zlasti višje zimske temperature ob manjših količinah padavin in vroča poletja – zmanjšale njegovo učinkovitost. Od leta 2017 so bili sprejeti številni ukrepi, npr. načrtovanje za primer katastrofe, izboljšani materiali za hrambo gradiva, digitizacija in integrirano zatiranje škodljivcev (IPM). Kljub temu so podatki iz začetka 2020-ih pokazali nadaljnjo nestabilnost z znatnimi nihanji temperature in vlažnosti. Zato je bil nameščen popolnoma avtomatiziran sistem za nadzor klime, z zasilnim napajanjem in fotovoltaično podporo, ki je uspešno stabiliziral pogoje ter zagotovil dolgoročno ohranjanje in uporabnost arhivskih dokumentov. V prizadevanju za zmanjšanje ogljičnega odtisa arhiva je bil hkrati nameščen tudi fotovoltaični sistem.

Ključne besede:

podnebne spremembe, ohranjanje okolja, klimatizacija, trajnost

Climate change directly impacts the future security of cultural resources. Cultural heritage, and archives in particular, are increasingly at risk of damage from climate-related hazards and triggers. Archives and cultural institutions are vulnerable to climate change threats such as humidity, sea-level rise, storm surge, and flooding, all of which are exacerbated by rising temperatures and increased precipitation (Mazurczyk et al, 2018, p. 111). Archives preserve historical records that are crucial for legal matters, administrative accountability, the scientific community, and documentary cultural heritage. Therefore, if archival records are lost due to extreme weather events, long-term changes in temperature and humidity, and other factors, their absence will severely hinder socio-cultural and economic reconstruction efforts (Gordon-Clark, 2011, pp. 53–54). As a result, archives must take appropriate measures to address changing climatic conditions.

However, archives must not only ask themselves how to protect their cultural heritage, but also critically examine their own contribution to climate change. As Benjamin Kram pointed out, this question is not without a certain irony: on the one hand, archives are legally mandated to preserve historical records selected for permanent preservation, thus of archival value, for future generations. On the other hand, this task will become increasingly difficult to fulfil due to fundamental changes in living conditions resulting from climate change, and because current archiving practices rely heavily on fossil fuels and are therefore partly responsible for this development (Kram, 2023, p. 90). That leaves archives caught in the middle. They must find a way to integrate sustainability and resilience into their work to both reduce their institutions' contributions to climate change and protect their archival holdings from climate-related threats (Tansey, 2015, p. 56). It is necessary to develop sustainable solutions, i.e., developments that meet the needs of the present without compromising the ability of future generations to meet their own needs (Abbey, 2012, pp. 91–92). These questions have been and continue to be a crucial part of the preservation planning strategies at the Carinthian Regional Archives since the new building was completed in 1996. Given the particularly significant impact of climate change in the Alps-Adriatic region on Carinthia's cultural heritage, especially over the past two decades, the question arises: how "green" can the preservation of archival records be?

1 Climate change in the Alps-Adriatic region, with special considerations of the Klagenfurt Basin

The Alps-Adriatic region (mainly Slovenia, northern Italy, Carinthia, and parts of Styria, Burgenland, and Croatia) is characterized by a transitional climate influenced by Mediterranean conditions. Typical for these regions are warm summers, mild yet sunny winters that nonetheless contain areas with reliable snowfall, and compared to the rest of Austria, higher levels of precipitation in late summer and autumn (Wohlschlägl and Hofmann-Schneller, 2001, p. 13). According to the Köppen-Geiger climate classification, the most used method for classifying climates, Carinthia belongs to the so-called "Cfb climate type"[1]. That means the valley and basin areas, such as Klagenfurt, home to the Carinthian Regional Archives, have a temperate, fully humid climate with warm summers. The core areas of this climate zone include large parts of Central and Western Europe (Kottek et al., 2006, pp. 260–261). Within Austria, Carinthia, together with southeastern Styria and southwestern Burgenland, is classified as part of the so-called

[1] *This category applies when the average temperature of the coldest month is above -3°C and the average temperature of the warmest month is below 22°C. At least four months have average temperatures above 10°C (Kottek et al., 2006, p. 260).*

“Illyrian climate zone”. Carinthia is thus the only inner-alpine region in Austria that is not considered part of the “Alpine”, but rather the “Illyrian climate zone” (Wohlschlägl and Hofmann-Schneller, 2001, p. 13). This combination of Alpine and Mediterranean influences is responsible for Carinthia’s distinctive climate. It is, among other factors, influenced by its sheltered location south of the Central Alps, which results in Carinthia having the highest total sunshine duration of all Austrian federal states. Despite this shielding effect of the surrounding mountain ranges, which is more severe in winter than in summer, there are no inner-alpine arid areas in Carinthia (Wakonigg, 2000, pp. 247–248). Overall, the climate in Carinthia, particularly in the Klagenfurt Basin, is characterized by a significant contrast between overcast, relatively dry winters and warm summers, rich in both sunshine and precipitation, with most rainfall occurring in the form of thunderstorms (Wakonigg, 2000, p. 256).

A comparison between today’s climate, based on the “normal period”, which, according to the World Meteorological Organization (WMO), lasted from 1991 to 2020, and the recommended “reference period” (1961–1990) reveals that climate parameters have changed significantly. If one compares today’s climate – based on the 1991–2020 reference period as defined by the World Meteorological Organization (WMO) – with the recommended reference period (1961–1990), climate values have changed significantly. Since the mid-1980s, a steady rise in temperatures has set in, with a slight intensification in the 2000s and continuing to this day. In the Klagenfurt Basin, this temperature rise is mostly noticeable in summer and mid-winter, whereas temperature changes have been less significant in late winter, parts of spring, and early autumn (Strauß, 2022, p. 65). Based on the average air temperature of the coldest month of the year, which is most likely January, temperatures in Carinthia have increased since the 1960s by approximately 1.8–2.3°C in winter and by about 0.5°C in late summer. That means that until around 1990 the region exhibited a boreal climate, i. e., a year-round humid “Dfb-climate” (Jank, 2026). With rising temperatures since the 1980s, precipitation levels declined until the early 2000s but have increased over the past two decades. With an annual amount of approximately 1.013,3 mm, precipitation levels almost reached those of the 1950s and 1960s, although their distribution has shifted from winter to spring and autumn (GeoSphere Austria). Another climatic key variable has changed significantly – the annual number of hours of sunshine. Compared with the “normal period” (1961–1990), this number has increased by 9.3%, from 1,877 to 2,052.5 hours. The increase in hours of sunshine is even more pronounced during the winter months: in December, the average number rose from 53 to 67.8 hours (an increase of 27.9%), in January from 72 to 94.5 hours (an increase of 31.3%), and in February from 113 to 135.5 hours, which represents an increase of 19.6% (Jank, 2026).

During this period of climate change, the new building of the Carinthian Regional Archives was constructed. At the time, the construction plans were based on precipitation-rich winters and warm, relatively dry summers. In the future, a further rise in temperature of up to 4.2°C along with an approximately 8% increase in average annual precipitation in Carinthia is expected (Chimani et al., 2016, pp. 5–8).

2 The new construction of the Carinthian Regional Archives

2.1 The path to the new archive

The Carinthian Regional Archives was established in 1904 as an independent, academically managed institution. As part of this process, the archival holdings of the autonomous provincial administration were merged with the collections of the "Carinthian Historical Society" (Geschichtsverein für Kärnten) since 1844. The archive was originally located in the Landhaus in Klagenfurt. However, from the very beginning, this accommodation was characterized by a lack of space. Within a few years of its establishment, the archive was no longer able to adequately fulfill its legal duty to continuously acquire archival records. In the 1970s, therefore, several discussions began regarding how to provide the Regional Archives with new spatial capacity. The proposals included, e.g., the adaptation of an existing historic building. In December 1988, the Carinthian state government finally approved the construction of a new archival building (Wadl, 1999, pp. 342–343).

Subsequently, the search for a suitable site commenced. Of the 16 locations evaluated for suitability, the site of the former firefighting school in the St. Ruprechter Straße was chosen. In parallel with the search for an appropriate location, a comprehensive "space and functional program" was developed during the preliminary planning phase. This was carried out in collaboration between the Carinthian Regional Archives, Department 5 (Culture) and Department 16 L (Building Construction). This program was based on international literature on archival buildings and took into account the specific requirements of the Carinthian Regional Archives. This formed the basis for the architectural competition launched in June 1991 (Webernig and Müller, 1996, p. 34). The specifications stated that, in addition to minimizing window areas in the archival storage facilities, the usage of air conditioning should be avoided wherever possible, and that particular attention should be paid to the thermal and humid performance of the new building. These requirements were mainly based on the anticipated high operating costs. A total of 26 projects were submitted, though many failed to meet the space and functional program specifications. In January 1992, following a recommendation by the Carinthian Regional Archives, the state government decided to award the contract to the project submitted by architects Horst Aichernig and Edwin Pinteritsch. According to the jury, the project demonstrated a high level of quality in urban planning, functionality, architectural design, and economic efficiency, and met the requirements of the space and functional program in an exemplary manner (Wadl, 1999, pp. 343–344). The design of the archival storage facilities was based on the building of the Historical Archive of the City of Cologne. An underlying principle of the 1971-built design was to protect archival records from fluctuations in weather and climate while creating a balanced room climate. This was a move away from the contemporary popularity of air conditioning. It was planned as a self-regulating solution that needed only little additional climate technology. As the "Cologne Model", the building became a model for many later archive buildings internationally (Sagstetter, 2004, pp. 328–329). It aimed to achieve optimal environmental conditions for archival records, according to the standards of the time[2]. To avoid an artificial climate control system, the storage facilities were constructed according to the following principles: 50 cm of solid brick, 10 cm of thermal insulation boards, a 5 cm rear ventilation space, and a 4 cm natural stone façade made of locally sourced Krastaler marble. Prestressing cables were incorporated into the floor slabs, thereby minimizing the number of load-bearing columns. In addition, 940 m^3 of supply and exhaust air ducts were installed to mechanically draw air from the rear ventilation

[2] *The standard was 50% ± 5% at a room temperature of 18°C ± 2°C.*

zone of the northern façade and discharge it via the south façade, thereby ensuring continuous airflow through the storage facilities. This system was controlled electronically and operated automatically only under climatically suitable conditions (Webernig and Müller, 1996, pp. 27–28). Temperature, as well as relative and absolute humidity, were continuously monitored by four sensors on each storage level and one external sensor. In winter, the temperature was regulated by a heating circuit that covered all the storage floors. However, the inability to control or regulate individual storage facilities separately led to the first problems shortly after construction was completed: the uppermost floors responded more rapidly to external climatic changes than the ground and first floors (Wadl, 1999, pp. 349–351). As a result, sufficient climatic stability could not be achieved during winter.

Although initial concerns that the “Cologne Model” could not be easily transferred to other regions with different climatic conditions without difficulty were discussed during the planning phase of the Carinthian Regional Archives, it was ultimately concluded that the model would function effectively wherever it was implemented consistently (Rumschöttel, 1991, p. 263). Furthermore, during construction, attempts were made to adapt the “Cologne Model” to the environmental conditions prevailing in the Alpine-Adriatic region, particularly in the Klagenfurt Basin (Wadl, 1999, pp. 349–351).

Based on these considerations, the municipal authorities of Klagenfurt granted building permission in February 1993. Construction commenced with the groundbreaking ceremony on 6 July 1993 (Webernig and Müller, 1996, p. 36). The new building was completed on 10 October. The total floor areas amount to 6,900 m², including the underground garage and all circulation areas. Of this, approximately 4,000 m² are allocated to storage and intermediate archival facilities, 750 m² to public areas, 350 m² to academic and research spaces (including the library), 200 m² to workshops, and only 150 m² to administrative offices in the narrower sense. The estimated total construction costs, including all fixed and movable furnishings, amounted to 185 million Austrian schillings, and were ultimately kept around 10 percent below this figure (Wadl, 1999, p. 344).

2.2 Climatic Changes and their impact on indoor environmental conditions

The design of the new building was based on the climatic conditions of the 1980s, characterized by very warm, above all dry, summers, as well as cold winters with comparatively higher precipitation. As described in the previous chapter, climate analyses indicate that from around 1980 onwards, the changes that have characterized the climate to this day began to emerge – a general increase and redistribution of both temperature and precipitation (Auer et al., 2010). However, this trend was not yet foreseeable during the planning and construction phases. A comparison of the periods 1970–1991 (relevant to the construction phase) and 1997–2024 clearly illustrates these changes: average temperatures increased significantly, particularly during winter and into spring, while average precipitation declined considerably. In contrast, summer months exhibited an above-average increase in precipitation. This development was accompanied by a general upturn in sunshine hours from late winter through late autumn (HISTALP).

Until mid-1998, consistently high relative humidity (RH) prevailed in the storage facilities, at times exceeding 66%. However, these figures did not reflect the standard operating conditions; they were associated with the drying phase of the archive building, which had been fully operational since 1997. External dehumidifiers were therefore

installed. Just one year later (1999), the situation changed. Relative humidity decreased continuously, particularly on the lower floors, dropping in some cases below 40% (February 1999). In addition, as previously noted, climatic conditions varied across the storage levels; the difference in relative humidity between the ground floor and the third floor reached 30% (Almberger and Zeloth, 2025, p. 40).

An evaluation of the monthly average values from the start of systematic climate monitoring (September 2013) to the end of 2024 confirmed this trend. Due to significant changes in climate conditions, there was an urgent need to act to preserve archival records, as the ventilation control system could no longer compensate for the fluctuations. The values[3] specified in the relevant standards for the storage of archival and library records, namely ISO 11799[4] and DIN 67700[5], were only rarely achieved in the storage areas of the Carinthian Regional Archives. As mentioned, the only way to adjust the indoor climate was by controlling the electronic ventilation system. This system was automatically activated under the following conditions: external temperature and humidity were lower than indoor values; external temperature was above 3°C; indoor temperature was above 16°C; and relative humidity was between 40% and 50%. Due to its dependence on numerous uncontrollable factors, its effectiveness was generally limited.

Analysis of the climate data revealed that in the two lower storage levels (ground floor and first floor), the primary issue was insufficient relative humidity. In the ground-floor archival storage, this was particularly evident during the winter months, when extreme RH values of 35.3% (2016), 33.6% (2017), 34.8% (2020), and 36.5% (2023) were recorded. While in some years the target value of 45% RH was reached during the summer months (especially August and September), in other years (2013, 2016, 2021, and 2022) it remained below 45% throughout the entire year. Temperatures in this storage fluctuated between 18.5 and 21°C throughout the year. On the first floor, both relative humidity and temperature fluctuated. During winter, temperatures occasionally failed to reach 18°C despite heating (January 2014: 16.3°C; February 2015: 17.2°C), whereas in summer they frequently exceeded 25°C, clearly surpassing the recommended limits.

Regarding relative humidity, conditions on the first floor were similar to those on the ground floor: although the target value of 45% RH was reached more frequently, it was not consistently maintained throughout the year. The average relative humidity in this storage area was approximately 40–41%. For the archival records stored here, the low humidity, in particular, posed a problem, since most of them were made of parchment. Thus, this represented a conservation concern, as such materials require a relative humidity between 50% and 60% (Glauert, 2005, p. 57). On the second and third floors, the primary issue was the temperature fluctuation. While room temperatures in the first half of the year occasionally fell below 16°C (January 2014: second floor 14.8°C; third floor 13.6°C; February 2018: third floor 15.1°C), they rose to average values above 23.5°C during the summer months. Temperatures exceeding 21°C were recorded in at least four – and in some cases five (2018–2019) – summer months. Extreme values ranged from 26.6°C (second floor, August 2018) to 27.7°C (third floor, September 2015). Although additional mobile dehumidifiers have been used on these floors since 2015,

[3] *For the storage of mixed materials: a maximum temperature of 18°C (± 2°C) or 21°C, and a relative humidity of 50% (± 5%).*

[4] *„Information and documentation – Document storage requirements for archive and library materials", actual version: ISO 11799:2024.*

[5] *„Bau von Bibliotheken und Archiven – Anforderungen und Empfehlungen für die Planung", announced by the DIN.*

relative humidity during the summer months has often still exceeded 55% (July 2022: second floor 58.2%; third floor 57.2%). During the summer period (June to early September), these devices extracted an average of 300–500 liters of water from the air. From the perspective of archival preservation, not only the individual extreme values but, above all, the lack of climatic stability was problematic. The fluctuation limits specified in DIN 67700 (±1°C and ±3% relative humidity) could only be met in exceptional cases (Glauert, 2018).

3 Preservation Programs in the Carinthian Regional Archives

With a total staff of 20 employees, including 15 full-time positions, the Carinthian Regional Archives is among the smaller state archives in Austria and accordingly operates with more limited financial resources. In light of anticipated climatic developments in the Alpe–Adria region, efforts have been made to mitigate the impacts of climate change in storage facilities using simple, cost-effective measures wherever possible.

3.1 Professionalization of the Restoration Workshop

An important measure was already implemented during the construction of the new building: the establishment of a dedicated restoration workshop. Of the total usable floor space of 6,900 m², approximately 200 m² are allocated to workshop facilities, including the conservation workshop with its laboratory, the bookbinding workshop, and the quarantine area (Wadl, 1999, p. 344). Compared to the former premises in the Landhaus, these new facilities represented a substantial improvement. Conservation works no longer had to be carried out directly within the storage areas; it could instead be performed in a designated space.

The basic equipment of the new workshop included a hydraulic press, bookbinding presses of various sizes, hot-stamping tools, materials for seal production and repair, bookbinding supplies, cutting machines, a light table, and a paper-washing machine. In 2021, following the retirement of the former head of the restoration workshop, an academically trained paper conservator was appointed for the first time. Furthermore, the laboratory equipment was expanded to include a safety workbench for the dry cleaning of predominantly mold-infested records. These measures led to a significant professionalization of preservation management established in 2017.

3.2 Integrated Pest Management (IPM) and associated Measures

In the context of advancing globalization, increasingly intensive intercontinental trade flows, and global climate change resulting in milder winters in Central Europe, new demands are placed on IPM programs, facing more challenges at shorter intervals. Synanthropic and cosmopolitan pest species, as well as invasive neobiota, are increasingly shaping a globally homogenized IPM landscape. Furthermore, rising average annual temperatures enable insect pests to complete their generation cycles more quickly and achieve higher feeding rates (Landsberger, 2023, p. 116).

At the Carinthian Regional Archives, pest management measures were first implemented in early 2018. Comprehensive insect monitoring was introduced across all storage areas, holding areas, processing and cataloging rooms, and publicly accessible areas of the archive. Initially, so-called S-Traps – and, from 2025 onward, ECOTRAP

traps – were used. These traps were inspected weekly using a monitoring list developed in accordance with the DIN EN 16790. The results indicated minimal pest presence, with most insects found in staff offices and cataloging areas. Most captured insects consisted of *Ctenolepisma longicaudatum* resp. paper silverfish, harmless small beetles, and flies. The monitoring program, carried out every two years in subsequent years, yielded similar results. As a result, pest management efforts were concentrated on areas with higher pest incidence, particularly holding and processing areas. Enhanced pest monitoring was implemented in situations involving large acquisitions of administrative documents, relocation of archival holdings, or prolonged periods of internal work involving constant comings and goings, which elevated the risk of introducing pests. Based on the initial monitoring results, a dedicated quarantine zone was established in the accession resp. delivery area. All newly acquired archival records are stored there for at least 1 month. This quarantine station is surrounded by highly adhesive tape barriers, and materials are stored on specially procured cleanroom plastic pallets with closed lids.

Another component of IPM has been training (new) staff on proper handling of archival records. Based on the mentioned DIN EN 16790[6], a "Guideline on improving occupational safety and pest prevention" was developed. It defines organizational measures such as the use of personal protective equipment (i.e., DIN EN 420[7]), the prohibition of plants and food in areas where archival records are handled or stored, and quarantine procedures for newly acquired documents. It also establishes cleaning protocols for archival records, workspaces, and storage areas in accordance with TRBA 240[8]. Regarding these cleaning measures, two vacuum cleaners equipped with HEPA filters were acquired. The guideline's content was then communicated during staff training sessions. The objectives of this guideline include reducing ingestion of microbiological substances, minimizing pest food sources by properly cleaning and handling archival records, and maintaining stable climatic conditions in storage facilities through minimally invasive cleaning procedures.

3.3 Disaster planning and training

A crucial measure for climate protection of Carinthian cultural heritage was the development of a suitable disaster plan in 2021. Although the Carinthian Regional Archives, due to its location, is not significantly exposed to risks such as flooding or wildfires, the disaster plan forms the core of our preservation planning strategy. Institutional disaster-response plans and decisions about processing materials are easier to implement, can be done at the local level and are based on existing guidelines (Tansey, 2015, p. 46). The disaster plan includes an assessment of risks related to the building (e.g., flood risk, likelihood of break-ins, alarm systems, etc.), an emergency response workflow (alert chains, requests for external assistance such as emergency networks, providing of emergency kits, retrieval of archival records, transport logistics to alternative storage locations), a salvage and evacuation plan (including mapped locations of transport boxes and prioritization criteria based on archival value categories, etc.), as well as a directory of relevant institutions, companies, and aid organizations. The appendix contains instructions for the initial care of damaged archival records. In 2022, the plan was expanded to include recommendations for blackout scenarios. The

[6] *„Conservation of cultural heritage – Integrated pest management (IPM) for protection of cultural heritage", announced by the DIN.*

[7] *„Schutzhandschuhe – Allgemeine Anforderungen und Prüfverfahren", announced by the DIN.*

[8] *„Protective measures for activities involving microbially contaminated archival materials", announced by the Federal Ministry of Labor and Social Affairs (BMAS) in the Joint Ministerial Gazette (GMBl.)*

disaster plan is complemented by a fire protection plan specifically developed for the archive.

To ensure preparedness, a one-day emergency exercise was held in summer 2025 in cooperation with the professional fire brigade of Klagenfurt. The aim was to address the requirements of (supra-)regional disaster scenarios or incidents. Visual aids developed by the Carinthian Regional Archives, such as color-coded action plans based on the archives' floor plans, were used during the exercise.

3.4 Digitization projects

To preserve particularly „valuable“ or historically significant archival holdings, the Carinthian Regional Archives regularly undertakes digitization projects. These include, e.g., the manuscripts from the fonds „Allgemeine Handschriftenreihe” or the “Geschichtsvereins-Handschriftensammlung“, which date from before 1600, as well as approximately 18.000 charters, the chronicles of Carinthian police stations, which are an important source for researchers, and the postcard collection (current project). Digitization, as a replacement or preservation, must, however, be seen as ambivalent. In principle, digitization holds great promise as a means of preservation of archival material threatened by climate change, and even if building structures and storage conditions are improved, unique material is still at risk if there is only one copy. Digitization can be a long-term solution (Dryden, 2021, p. 390). This fits well with a long-held understanding of the purpose of archives and archivists: “use is the end of all archival effort” (as cited in Goldman, 2018, p. 278). On the other hand, the resource consumption of archives is increasing due to the steadily growing need for geo-redundant storage of digital records (Kram, 2023, p. 91). With the expansion of digital archival holdings and the still-nascent implementation of electronic records management in Carinthia, a substantial increase in carbon impact is to be expected. However, the required data centers, which include not just the servers where information is stored, but also the facilities where these servers are managed, use the least energy; analyses indicate that this is the area of the largest industry growth and that they need significant amounts of electricity to keep the servers running and maintain a cool environment (Goldman, 2018, p. 280). In storing these digital objects on servers or delivering them online, archives and libraries are using technical infrastructure that remains dependent on dirty energy (Goldman, 2018, p. 282). In view of the anticipated increase in born-digital collections, the Carinthian Regional Archives has chosen not to pursue large-scale digitization of analog holdings. In addition to environmental considerations, the immense costs of storage capacity and long-term preservation are a key factor in this decision. Carinthia therefore uses the EU’s “Digital Europe” program whenever possible and, for example, uploads its digitized archival records to the digital cultural platform Europeana, which is funded through the Connecting Europe Facility infrastructure fund. The charters are publicly accessible on the “Monasterium” website operated by the service provider ICARUS (International Center for Archival Research), which is, among others, supported by the European Union’s “Creative Europe” program. Using such platforms also provides the archive with a more cost-effective way to apply the “LOCKSS principle” – “Lots of Copies Keep Stuff Safe.” These multi-copy storage strategies are a well-established means of reducing risk in digital preservation (Dryden, 2021, p. 390).

3.4 New archive boxes and even distribution of archival holdings

Climate change affects not only archival environments but also the archival records themselves. (Kram, 2023, 91). For this reason, the Carinthian Regional Archives decided in 2023 to change its archive boxes. Most of the archival records (including medieval charters!) are stored in non–acid-free boxes made of two mm-thick rigid cardboard. At least these side-glued boxes do not require metal staples (Wadl, 1999, pp. 249–250). In 2023, due to insufficient climate stability, the archive transitioned to acid-free boxes compliant with ISO 16245:2023. This change even resulted in cost savings, as the manufacturer of the original boxes had significantly increased its prices.

Since repacking all archival records was neither feasible in terms of time nor budget, the storage space allocation was reviewed. By maintaining a consistently high occupancy rate of around 85% in the storage areas with archives boxes, both the packaging and the records themselves act as an additional climate buffer. As a result, fluctuations in the external climate have a delayed effect on the cultural heritage (Kistenich-Zerfaß, 2023, p. 96).

3.5 Ideas that weren’t realized

At the beginning of the 2020s, it became evident that climate stability in archival storage facilities had become an increasingly serious problem. The measures taken so far, along with the available technical systems of air regulation, were no longer sufficient to adequately compensate for the strong seasonal fluctuations. For this reason, the Carinthian Regional Archives began to explore various possible solutions. The main considerations were practical feasibility and workload, costs, and long-term benefit, with the aim of finding a durable solution.

One possible approach would have been **the redistribution of archival records according to (carrier) materials**. The archive's holdings are essentially stored “chronologically” from bottom to top. This means that the ground floor houses the oldest records, primarily consisting of parchment and rag paper. The first floor contains large parts of the image collections (photographs, postcards, plans, etc.), the charter collection, and the most frequently consulted records of the archives – the land registers. Records stored on the second and third floors become progressively more recent and consist of – aside from older municipal archives – mainly “modern” paper (ranging from wood pulp and carbon-copy paper to today’s standard paper). Given the humidity conditions, it would have made sense to move all parchment and rag paper materials to the upper floors, since they are more flexible in both temperature (2°C–18°C ± 2°C) and relative humidity (50%–60% ± 3%). Paper-based and photographic materials, on the other hand, would have needed to be moved to the lower floors due to their drier and more temperature-stable conditions. However, this approach would have posed significant challenges – not only due to the immense workload and reduced accessibility, but also to the storage infrastructure. The mobile shelving units were designed specifically for the archive during its construction: the shelving system was based on three box depths (35, 40, and 45 cm), along with charter boxes developed for different historical periods. Each shelf can accommodate six such boxes (arranged three by two stacked) (Wadl, 1999, pp. 249–250). Changing this setup afterward would have been very expensive – or in many cases, technically impossible.

Another consideration was installing **mobile humidifiers** on the ground and first floors, along with **additional dehumidifiers** on the second and third floors. While this approach would have allowed for better control of relative humidity, temperature issues

would still have remained unresolved. This solution was only implemented in the reading room. The low relative humidity on the ground floor affected not only the storage facilities but also the reading room. Due to its smaller size, a mobile humidifier was enough to solve the problem there. In combination with a new air-conditioning system, this now also prevents fluctuations in temperature and humidity between the storage areas and the reading room. In addition to these approaches, a **conventional air-conditioning system without humidification or dehumidification** was also considered. However, this would have led to a similar issue, as only one aspect of the indoor climate – temperature – could have been controlled.

Ultimately, it became clear that installing a decentralized climate control system with humidification, dehumidification, and ventilation capabilities was the best long-term solution – although it was by far the most expensive option. It offers the best way to ensure the long-term preservation and usability of Carinthia's archival and cultural heritage.

3.6 The installation of the air conditioning system

On May 22, 2023, the Carinthian State Government approved the installation of an air-conditioning system in the Carinthian Regional Archives. Funding was provided through multiple sources ("Länderinvestitionspaket Kärnten" for public cultural institutions, from the budget of Department 14 – arts and culture, global budgets reserved for culture and science, and from the organization's own resources[9] (Land Kärnten, RS 22.5.2023, TOP 6–7). The outcome of the joint consultations with experts was a hybrid system. The existing archive structures had to be utilized and combined with decentralized climate-control units on each floor. This involved incorporating the existing building fabric to ensure the most energy-efficient use of the air conditioning, providing individual control options for temperature and humidity on all floors, continuing to use the existing technical infrastructure for ventilation, utilizing spatial resources, and minimizing structural intervention. The intention was to have a "back-up" system for those periods when the building substance alone was insufficient. (Almberger and Zeloth, 2025, pp. 45–46).

Following construction planning, implementation began in June 2024. Archival materials were partially relocated to ensure protection during construction. During this time, every effort was made to maintain access to the most frequently used records. Once the construction site areas had been cleared, protective measures were implemented at the end of June 2024. To protect the archive materials as effectively as possible, the following measures were taken: enclosure of work areas where the drilling for the service ducts and connections took place, shielding of shelving units and additional cleaning of the construction site areas.

The construction work was carried out in accordance with a fire safety plan. These safety measures required that all fire-hazardous activities (soldering, welding, etc.) be carried out outside the archive. No fire-related work took place in the archive storage facilities themselves. To prevent false fire alarms, the detector groups in the relevant areas of the worksites were switched off in consultation with the fire brigade Klagenfurt for the duration of the work.

[9] *The Carinthian Regional Archives is an independent public-law institution and is therefore permitted to generate its own revenue, for example, through book sales, reproductions, commissioned work, or flea markets (LGBl. Nr. 40/1997 [K-LAG], § 4.1).*



Picture 1: Shielding of shelving units during the installation of the ventilation ducts, July 2024 (K. Almberger)

For climate control, a compact air-handling unit with an integrated heat pump was installed on each floor of the storage facilities to supply and exhaust air. These high-efficiency systems, including fresh air intake, are generally designed to ensure stable indoor conditions of approximately 20°C and a relative humidity of 45–55%. Uniform air distribution within the rooms is achieved either through the existing ventilation ducts or via new textile air diffusers. In each storage room, two air-conditioning cabinets are installed to support the ventilation systems, ensuring that, on days with extreme external humidity (very humid or very dry) or extreme outdoor temperatures, the specified indoor conditions can still be maintained. These air-conditioning cabinets enable cooling of the storage areas in summer by connecting to a central chiller installed in the existing technical room. Their design allows for both humidification and dehumidification of the indoor air, depending on operational requirements. In the outdoor area, a dry cooling system was installed, serving to pre-cool the incoming air (Almberger and Zeloth, 2025, p. 46).



Picture 2: Installation of the dry cooler, 18 September 2024 (K. Almberger)

The installation of the air conditioning system incurred not only substantial costs during the procurement and construction phases, but also anticipated ongoing expenses – particularly during the summer months – that significantly increased the archive's operating costs. Moreover, increased resource consumption altered the carbon footprint of the Carinthian Regional Archives. (Kram, 2023, p. 91). To counteract this development, the archive implemented additional measures: switching to LED lighting in all building areas (resulting in approximately 50% savings in electrical energy since 2015), thermal refurbishment of the flat roofs, and the introduction of an optimized heating management system. Another major project in this context was the installation of a photovoltaic system, whose electricity is used exclusively for the Carinthian Regional Archives. The system, with a nominal capacity of 59 kW, was installed on the building's flat roofs in the summer of 2023 and commissioned in September 2023. It represents one of the largest photovoltaic installations in the city center of Klagenfurt and, under standard operating conditions (i.e., without active air conditioning), exceeds the archive's energy demand by a factor of six to seven. The surplus energy is fed into the public grid,

and the resulting revenues benefit the Carinthian Regional Archives (Almberger and Zeloth, 2025, pp. 45–47).

In total, the investment costs for the air-conditioning system, including the photovoltaic installation, amounted to € 1,132,524.78, of which € 79,822.68 were financed from the archives' own reserves (Land Kärnten, RS 22.5.2023, TOP 7.3–7.4).

4 And just like that... One and a half years of air conditioning

The newly installed air-conditioning system was commissioned at the beginning of November 2024. Following an initial test phase, stable temperature and humidity levels were achieved in all storage facilities for the first time by mid-December 2024. Accordingly, target values of 21°C and 50% relative humidity were defined for all archival storage facilities. The system is programmed to activate automatically when the temperature goes beyond 21°C, begin humidification at an RH of 45%, and dehumidify at RH values above 55%. In principle, the system can heat the storage areas to temperatures above 18°C; however, due to high energy consumption, this option is avoided wherever possible. In such cases, the existing radiators, which remained functional in all storage facilities, are used instead. The testing phase, during which manual calibrations to the climate parameters were required, continued until September 2025, allowing the system to be evaluated across all seasons.

Since then, temperatures in the storage facilities have remained consistently between 18.6 and 19.4°C. The relative humidity ranges from 47% to 48% on the ground floor and from 48.5% to 49.5% in the remaining storage facilities. As a result, significant improvement in climatic stability, particularly, was achieved within a short period of time. In particular, the lower two floors reached constant humidity levels above 45% for the first time. On the second and third floors, winter temperatures increased to approximately 19°C, exceeding previously recorded levels by 2 to 3°C. Furthermore, the installation of the air-conditioning system resulted in a significant reduction in climatic fluctuations within the storage facilities. Variability levels now lie within the limits specified by DIN 67700, thereby assuring optimal conditions for the long-term preservation of archival records.

Until now, the air-conditioning system (resp. the cooling mode) has been required only on a limited number of days, totalling 213 operating hours since commissioning. That is equivalent to approximately 35 working days. This is made possible by the newly installed, highly effective supply-and-exhaust air fans. These are in operation, particularly on the third floor (1,047 and 610 operating hours for supply and extract air, respectively). As ventilation requires less energy than cooling, the overall increase in electricity consumption remains marginal compared to previous years.

In 2024, the photovoltaic system installed on the roof of the Carinthian State Archives generated 65.82 MWh, while total consumption was 55.62 MWh. This corresponds to an average self-sufficiency rate of 54%. In 2025, the figures were similar (generation: 67.9 MWh; consumption: 50.13 MWh; average self-sufficiency: 55%). Under normal operating conditions, the Carinthian Regional Archives consumes between 100 and 190 kWh of electricity per day (autumn, winter, spring), and between 120 and 220 kWh during the summer months. On those days when the air-conditioning system operated at full capacity (primarily in June and July). peak consumption reached up to 390 kWh. As climate change progresses, maintaining current self-sufficiency levels above 50% may become increasingly challenging.



Picture 3: View of the photovoltaic system on the roof of the Carinthian Regional Archives, 2026 (K. Almberger)

5 What about Sustainability?

The question remains – how “green” can and must archives and archival buildings be? The installation of an air-conditioning system has, to some extent, set back the Carinthian Regional Archives. However, measures such as installing a photovoltaic system, continuing to use the existing building structure, and implementing additional or alternative preservation strategies have been undertaken to minimize the increase in the institution’s carbon footprint. Given the extensive storage facilities, the even distribution of archival records, the climatic inertia that large quantities of paper offer, and the still excellent structural condition of the archive building – originally designed as a passive building – we’re hoping that the current climatic standards can be maintained for a few more years.

In the interest of sustainability, “broader” target values – specifically about the temperatures – were selected for the storage facilities. According to ISO 11799:2017, archival records are stored at an “adequate” temperature under these conditions. The cold storage range (0–8°C), which in ISO 11799:2017 is described as „excellent”, is, because of the substantial energy requirements involved, not even achieved in the film archive, storage for highly sensitive audio-visual archival records. Selecting a wider temperature range prevents the air conditioning system from running continuously. These considerations ought also to account for the use of archival records in the reading room. Despite progress in digitizing analog archive material for use and preservation, consulting original documents remains the standard practice for a large proportion of holdings. Under these conditions, cold storage poses challenges due to the considerable temperature differences between storage facilities and reading rooms during retrieval, consultation, and reshelving. If such temperature fluctuations become too pronounced, controlled acclimatization processes must be implemented (Kistenich-Zerfaß, 2023, 97). With the transition of Carinthian administrative departments to electronic records

management, the requirements for long-term digital preservation, and the anticipated climatic changes in the Alps-Adriatic region, the Carinthian Regional Archives will once again face major challenges. Yet, as Friedrich Hölderlin expressed in his poem “Patmos”: “Where there is danger, there also grows what saves.” (Hölderlin, 2015, p. 802).

6 Sources and literature

Abbey, H. N. (2012). The green Archivist: A primer for adopting affordable environmentally sustainable, and socially responsible archival management practices. *Archival Issues 34*(2), 91–115. Midwest Archives Conference.

Almberger, K., Zeloth, T. (2025). Archiv und Klimawandel. Die neue Klimatisierung im Kärntner Landesarchiv. *Scrinium. Zeitschrift des Verbandes Österreichischer Archivarinnen und Archivare 79*, 37–53. VÖA.

Auer, I., Böhm, R., Hofstätter, M., Türk, K. (Eds.) (2010). *Langzeitklima Kärnten. Langjährige Zeitreihen und Zukunftsszenarien für das Bundesland Kärnten. Abschlussbericht der Abteilung Klimaforschung der Zentralanstalt für Meteorologie und Geodynamik vom 31.10.2010*. ZAMG.

Chimani, B., Heinrich, G., Hofstätter, M., Kerschbaumer, M., Kienberger, S., Leuprecht, A., Lexer, A., Peßenteiner, S., Poetsch, M. S., Salzmann, M., Spiekerman, R., Switanek, M. and Truhetz, H. (2016*). ÖKS 15 Klimafactsheet. Klimaszenarien für das Bundesland Kärnten bis 2100*. https://klimaszenarien.at/wp-content/uploads/2025/06/Factsheet-Kaernten.pdf.

DIN EN 420: Schutzhandschuhe - Allgemeine Anforderungen und Prüfverfahren. (2010). Deutsches Institut für Normung (DIN). DOI: https://dx.doi.org/10.31030/1532634.

DIN EN 16790: Conservation of cultural heritage - Integrated pest management (IPM) for protection of cultural heritage (German version). (2016). Deutsches Institut für Normung (DIN). DOI: https://dx.doi.org/10.31030/2405309.

DIN 67700: Bau von Bibliotheken und Archiven - Anforderungen und Empfehlungen für die Planung. (2017). Deutsches Institut für Normung (DIN). DOI: https://dx.doi.org/10.31030/2643913.

Dryden, J. (2021). Climate change, copyright, and archives. *Comma 2021*(2), 387–397. ICA. DOI: https://doi.org/10.3828/coma.2021.34.

GeoSphere Austria, Klimamittel. Available on: https://klimaportal.geosphere.at/klimamittel.html (retrieved 29.4.2026)..

Glauert, M. (2005). Klimamessung und Klimaregulierung im Archivmagazin. In: Glauert, M. and Ruhnau, S. (Eds.). *Verwahren, Sichern, Erhalten. Handreichungen zur Bestandserhaltung in Archiven (= Veröffentlichungen der brandenburgischen Landesfachstelle für Archive und öffentliche Bibliotheken 1 / Veröffentlichungen des Landesverbandes Brandenburg des Verbandes deutscher Archivarinnen und Archivare e.V. 2)*, pp. 55–72.

Glauert, M. (2018). Neue Normen zum Archivbau – ISO 11799, DIN 67700 und EN 16893. *arbido 4*. VSA. https://arbido.ch/de/artikelpdf/download.twig?entryId=7864.

Goldman, B. (2018). It’s not easy being Green(e): Digital Preservation in the Age of Climate Change. In: SAA (Ed.). *Archival Values: Essays in Honor of Mark Greene*, pp. 274–295. DOI: https://doi.org/10.26207/d5xv-r891.

Gordon-Clark, M. (2011). Paradise lost? Pacific island archives threatened by climate change. *Archival Science. International Journal on Recorded Information 12*(1), 51–67.

Historical Instrumental Climatological Surface Time Series of the greater Alpine region (HISTALP) (s. d.). HISTALP Datasets. Available on: https://www.zamg.ac.at/histalp/datasets.php (retrieved 29.4.2026).

Hölderlin, F. ([4]2015). Gedichte. http://www.zeno.org/Literatur/M/H%C3%B6lderlin,+Friedrich/Gedichte.

Jank, D. (2026). Eislauf auf den Kärntner Seen. Der Winter-Breitensport in Kärnten in Zeiten des Klimawandels, 1960 bis heute. In: Almberger, K. (Ed.). *Zur dauerhaften Aufbewahrung. Festschrift zum 60. Geburtstag von Archivdirektor Mag. Thomas Zeloth*. Verlag des Geschichtsvereins für Kärnten [scheduled for release in October 2026].

Kistenich-Zerfaß, J. (2023). „Unser Archivgebäude ist eine Diva". Möglichkeiten und Grenzen von Energieeinsparungen im Betrieb von Archivmagazinen aus Sicht des Kulturgutschutzes. *Archiv. theorie & praxis 76*(2), 95–99. Landesarchiv NRW. https://www.archive.nrw.de/sites/default/files/media/files/Archivar20232InternetmitAnzeigen.pdf.

K-LAG: Gesetz vom 30. Jänner 1997, mit dem das Kärntner Landesarchiv als Anstalt eingerichtet wird (LBGl. 40/1997). Available on: https://www.ris.bka.gv.at/geltendefassung.wxe?abfrage=lrk&gesetzesnummer=10000219 (retrieved 29.4.2026).

Kottek, M., Grieser, J., Beck C., Rudolf B. and Rubel F. (2006). World Map of the Köppen-Geiger climate classification updated. *Meteorologische Zeitschrift 15*(3), 259–263. Österreichische Gesellschaft für Meteorologie (ÖGM).

Kram, B. (2023). Archive und Klimaschutz. Herausforderungen für Archive im Zeitalter des Anthropozän. *Archiv. theorie & praxis 76*(2), 90–94. Landesarchiv NRW. https://www.archive.nrw.de/sites/default/files/media/files/Archivar20232InternetmitAnzeigen.pdf.

Land Kärnten. Regierungssitzungsprotokolle. 3. RS vom 22. Mai 2023. Available on: https://www.ktn.gv.at/Politik/Regierungssitzungsprotokolle/Protokolle-2023 (retrieved 29.4.2026).

Landsberger, B. (2023), Im Zeichen des Klimawandels – Integrated Pest Management zum Schutz for Schädlingsbefall in den Sammlungen der Stiftung preussischer Kulturbesitz. *Archiv. theorie & praxis 76*(2), 113–117. Landesarchiv NRW. https://www.archive.nrw.de/sites/default/files/media/files/Archivar20232InternetmitAnzeigen.pdf.

Mazurczyk, T., Piekielek, N., Tansey, E. and Goldman, B. (2018). American archives and climate change: Risks and adaptation. *Climate Risk Management 20*, 111–125. DOI: https://doi.org/10.1016/j.crm.2018.03.005.

Rumschöttel, H. (1991). Archivbau heute – Erfahrungen, Tendenzen, Perspektiven. *Scrinium. Zeitschrift des Verbandes Österreichischer Archivarinnen und Archivare 44/45*, 252–267. VÖA.

Sagstetter, M. R. (2004). Klimatisierungskonzepte in jüngeren Archivgebäuden in Deutschland. *Archivalische Zeitschrift 86*(1), 323–355. Staatlichen Archive Bayerns.

Strauß, B. A. (2022). *Klimaveränderungen der vergangenen Jahrzehnte am Beispiel einer Auswertung von Messdaten des Klagenfurter Beckens* [Master's thesis]. University of Graz, Department of Geography and Regional Science.

Tansey, E. (2015). Archival adaptation to climate change. *Sustainability: Science, Practice and Policy 11*(2), 45–56. DOI: https://doi.org/10.1080/15487733.2015.11908146.

TRBA 240: Protective measures for activities involving microbially contaminated archival materials. Announced by the Federal Ministry of Labor and Social Affairs (BMAS) in the Joint Ministerial Gazette (GMBl.). Available on: https://www.baua.de/EN/Service/Technical-rules/TRBA/TRBA-240 (retrieved 29.4.2026).

Wadl, W. (1999). Der Neubau des Kärntner Landesarchivs. Ein Erfahrungsbericht. *Scrinium. Zeitschrift des Verbandes Österreichischer Archivarinnen und Archivare 53*, 342–353. VÖA.

Wakonigg, H. (2000). „Kärnten ist anders“. Anmerkungen zu den klimatischen Besonderheiten des südlichsten Bundeslandes. In: Bahrenberg, G. and Palencsar, F. (Eds.). *Festschrift zum 60. Geburtstag von O. Univ. Prof. Dr. Martin Seger (= Klagenfurter Geographische Schriften 18)*, pp. 245–257. Institut für Geographie und Regionalforschung der Universität Klagenfurt.

Webernig, E. and Müller, D. (1996). *Das Kärntner Landesarchiv – Baubericht und Dokumentation. Bautechnische, künstlerische und historische Dokumentation zur Eröffnung des Neubaues am 10. Oktober 1996*. Verlag des Kärntner Landesarchivs.

World Meteorological Organization (WMO) (2017). WMO Guidelines on the Calculation of Climate Normals (= WMO-No. 1203). https://library.wmo.int/records/item/55797-wmo-guidelines-on-the-calculation-of-climate-normals?offset=4.

Wohlschlägl, H. and Hofmann-Schneller, M. (2006). *Durchblick 3. Geographie und Wirtschaftskunde für die 7. Schulstufe*. Westermann.

ISO 11799: Information and documentation — Document storage requirements for archive and library materials. Third Edition (2024). Geneva: ISO. https://www.iso.org/standard/82306.html.

POVZETEK

PODNEBNE SPREMEMBE V ALPSKO-JADRANSKEM PROSTORU: RAZMISLEK IN UKREPI ZA ZAŠČITO ARHIVSKEGA GRADIVA V KOROŠKEM DEŽELNEM ARHIVU – POROČILO S TERENA

MMag. Katja Almberger
Namestnica direktorja, Koroški deželni arhiv, Celovec, Avstrija
katja.almberger@ktn.gv.at

Podnebne spremembe vse bolj prepoznavamo kot grožnjo za kulturno dediščino. Na avstrijskem Koroškem so od konca 90. let prejšnjega stoletja vse bolj vidne podnebne spremembe v povezavi z vodo (spremembe temperature, padavin in vlažnosti). Gradnja nove arhivske stavbe v Celovcu, ki je bila odprta leta 1996, je temeljila na podnebnih podatkih iz 80. let prejšnjega stoletja. V omenjenem desetletju je bilo podnebje na Koroškem še zaznamovano z zelo toplimi poletji in vrsto hladnih, padavinsko bogatih zim. Stavba je bila načrtovana kot pasivna stavba po vzoru »kölnskega modela«. Ta pristop je bil odmik od takratnega trenda, ki je vključeval opremljanje arhivskih stavb s klimatskimi napravami.

Vendar pa le nekaj let po začetku obratovanja »kölnski model« zaradi spreminjajočih se vremenskih razmer kot posledice podnebnih sprememb ni več izpolnjeval svojega namena glede zaščite arhivskih dokumentov. Povprečne temperature so se od tedaj znatno zvišale, zlasti pozimi in zgodaj spomladi. V obeh letnih časih so se povprečne količine padavin opazno zmanjšale, poleti pa zvišale nad povprečje. Zato so bili sprejeti intenzivni ukrepi za zmanjšanje tveganj in škode, ki jih podnebne spremembe lahko povzročijo kulturni dediščini Koroške.

Od leta 2017 so bili ob upoštevanju pridobljenih izkušenj izvedeni ciljni ukrepi za ponovno vzpostavitev stabilnih klimatskih pogojev v arhivskih skladiščih. Med njimi so

npr. stroškovno učinkoviti ukrepi, kot so nakupi novih arhivskih škatel, izvajanje projektov digitizacije pomembnega arhivskega gradiva, snovanje odzivanja na različne nesreče, načrtovanje požarne zaščite, profesionalizacija konservatorske delavnice in vzpostavitev sistema integriranega varstva pred škodljivci, kar zagotavlja standardizirane postopke za prevzemanje in uporabo arhivskih dokumentov.

Kljub temu pa evalvacija podatkov o podnebnih spremembah v začetku 2020-ih ni pokazala bistvenega izboljšanja. Zaradi sprememb so bili arhivski fondi še vedno izpostavljeni znatnemu nihanju temperature in vlažnosti, stabilnost klimatskih pogojev ni bila več zagotovljena. Na podlagi teh rezultatov in po analizi različnih rešitev (npr. mobilni razvlažilniki in vlažilniki zraka, mobilne hladilne enote ali spremembe skladiščnih prostorov itd.) je bila sprejeta odločitev o namestitvi popolnoma avtomatiziranega sistema za nadzor klimatskih razmer. Da bi zagotovili delovanje sistema tudi v primeru izrednih razmer, je namestitev vključevala vgradnjo zasilnega generatorja električne energije in fotovoltaičnega sistema. Šlo je za poskus doseči ravnovesje med ohranjanjem zgodovinskih zapisov in trajnostnostjo. Po začetni testni fazi je prišlo do uspešne stabilizacije temperature in vlažnosti, s čimer sta bili zagotovljeni dolgoročna ohranitev in uporabnost arhivskih zapisov.

About the author:

Katja Almberger was born in 1987 in Bregenz (Vorarlberg, Austria). She studied Dutch and history as well as historical auxiliary and archival sciences at the University of Vienna. After managing various cataloguing projects, she has been employed at the Carinthian Regional Archives since 2017. In 2021, she became the deputy director of the archives. Her current responsibilities include cataloguing and appraising records from the Carinthian Provincial Government and (digital) preservation. She is also on the board of the Association of Austrian Archivists (VÖA) and is writing her doctoral thesis at the University of Klagenfurt/Celovec.

O avtorici:

Katja Almberger se je rodila leta 1987 v Bregenzu (Vorarlberg, Avstrija). Študirala je nizozemščino in zgodovino ter pomožne zgodovinske in arhivske vede na Univerzi na Dunaju. Po vodenju različnih projektov je od leta 2017 zaposlena v Koroškem deželnem arhivu. Leta 2021 je postala namestnica direktorja arhiva. Njene trenutne strokovne dejavnosti vključujejo popisovanje in vrednotenje arhivskega gradiva deželne vlade Koroške ter (digitalno) arhiviranje. Je tudi članica upravnega odbora Avstrijskega arhivskega društva (VÖA) in piše doktorsko disertacijo na Univerzi v Celovcu.