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Diagnosis of Environmental Conditions in the Conservation of Information Units

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Abstract

In the present investigation a diagnosis of the conservation of academic information units is made through the analysis of 6 data capture points located in the infrastructure where the documents are kept. The variables of temperature and humidity are analyzed, by means of 8 daily captures during 3 months, with the purpose that the values are within the guidelines of the General Archive of the nation in Colombia, and allow to design and to execute the suitable plans for their conservation.

Keywords: Preservation of documents, academic records, archival preservation.

I. INTRODUCTION

The conservation of documents is a very important task in institutions and companies. According to the nature of the institutions must maintain and protect all documentation physically, which generates high volumes of information, occupying important spaces. Where you must maintain the appropriate specifications for protection, and some of the variables to consider are temperature and humidity.

When talking about conservation, the terms of preservation and restoration are referenced, where the first is materialized on the prevention, permanence and deterioration of documents [1] and becomes one of the drawbacks as the volume of documents grow.

In Colombia the General Archive of the Nation is in charge of regulating the conditions of the sites destined to conserve the archives, within the documentary material there are specifications and fluctuations of temperature and humidity for 3 types of documentary material: Paper support, Color photography - black and white, Recordings [2]. There is a gap in the regulations when the material to be preserved has quite large supports, which implies a different study of how the guidelines for its preservation should be specified [3], and there is no clear legislation on the documents to be protected. Countries such as Cuba maintain legislation on the importance and the documents that should be preserved [4]. In Spain they have been working for years with the rules for the construction of these infrastructures, in such a way that once the construction is finished it complies with the legal norms, and it is not necessary later a diagnosis to adapt it as a general archive, analyzing the importance of digital preservation [5]. The volumes of information are so large that institutions such as the Ministry of Education in Colombia have had to create preservation plans to protect all the information [6]. Also the National Institute for the Deaf (INSOR) [7], including public service companies [8], [9], municipalities [10] and private companies. The important thing is to adopt a plan for conservation, as long as it complies with the regulations of law and thus avoid the restoration of documents either manually or mechanically [11].

In recent years, constant work has focused on the digitization of information [12], [13], which has made it possible to reduce the volume of archives, protect and deliver information in a timely manner. But as a rule, physical documents must continue to be preserved as support for the different procedures carried out in the institutions.

In this article a diagnosis of the environment is made based on the temperature and humidity of the headquarters where the physical files of academic records of students of the university are kept, based on the basis that the city of Ocaña is selected, where the diagnosis can serve for all companies and institutions to have similar climatic conditions in the buildings, the capture of measures is performed at the University Francisco de Paula Santander Ocaña and the new headquarters of admissions, to design a set of rules aimed at the preservation of the documentation found in the archives.

II. METHODOLOGY

The process of organization and transfer to the new office and in turn the digitization of the historical archive of the University began in March 2021, at first the transfer was made from its old office located in the mansion, to the administrative building, where its conditions are more spacious, after making this transfer proceeded to organize by careers and their respective code the history of each student, taking into account a chronological order from youngest to oldest, merging active and inactive students in the same place, and leaving aside the academic histories of those already graduated (Figure 1 and 2).

By means of a plan, a location was given to each of the files in the new structure of the Admissions, Registration and Control file, organizing them by careers and by corridors, giving a numbering to each column, row and box of each shelf where

the academic histories are located, in order to obtain an easier location.

Fig. 1. Old archive.

Marking of the aisles and shelves from the outside to have a more practical location of the file for the management of the office staff, in the same way each shelf was marked by rows and columns on the inside for the subsequent location in the software where the location of each file will be given (Figure 2).

After this, 3 wooden shelves were moved from the office of the mansion to the administrative building, where the academic histories of the graduates were placed, taking into account their chronological order of coding regardless of their graduation date.

Fig. 2. Material to be protected.

The shelf corresponding to the graduates was also marked by rows and columns, in order to have its location by means of the software, with its respective box number (Figure 3).

It was determined that the maximum number of files per box would be 35, this in order to avoid the deterioration of the same with the manipulation that occurs in the consultation and filing of new documents to each one.

Fig. 3. Organization of documents.

We began with the organization and foliation of correspondence from previous years, which is organized in pink folders, with a cover page identifying its contents, date and number of pages.

On the recommendation of the visit made by Icontec in the first half of the year 2021 and in order to optimal conservation of academic records and prevent damage to it, the environmental management system (SIGA) was requested a study on the temperature and humidity that should be in the file of Admissions, Registration and Control in order to prevent deterioration. Taking into account the points stipulated by the (SIGA) for taking temperature and awaiting the results, is taking a temperature and humidity control which is taken at 6 points, making the taking of such measures in the morning and another in the afternoon, taking the record of these readings digitally in a spreadsheet of Google drive, associated with the email account of Admissions registration and control.

Fig, 4. New file.

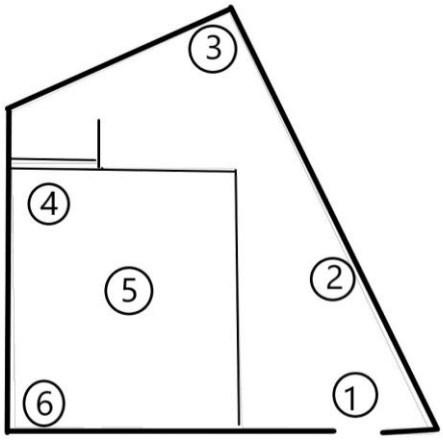


Fig. 5. Humidity and temperature capture points.

We received a response from SIGA on October 08, 2021 where they sent us a report with the design of a monitoring system and control of temperature and humidity which was socialized by the people in charge and concluded to implement the recommended devices for the preservation of documents based on the regulations stipulated by the General Archive of the Nation.

To carry out the diagnosis, 6 points are taken, at 8 different times of the day, during 3 months. Finally, 10 days are selected due to the homogeneity of the data, which are used to provide a diagnosis of the file (Figure 5).

III. RESULTS

Temperatures and humidity were taken from the first day of September until October 12. The information is taken at 8 different times and the averages vary according to the points, as shown in table 1. From this it can be determined that the temperature remains constant between 24 and 25 degrees, while the average humidity does vary, with an abrupt change in the middle of the day but rising considerably as night approaches (Figure 6).

Table 1. Temperature and humidity day 1.

TIME		7:30AM	8:30AM	10:30AM	11:30AM	12M	2:30PM	3:30PM	5:00PM
POINT 1	TEMPERATURE	24	24.3	24.2	24.7	24.6	24.1	24	24.4
	HUMIDITY	74%	73%	70%	71%	71%	66%	73%	76%
POINT 2	TEMPERATURE	23.9	24.2	24.2	24.7	24.7	24.2	24.2	24.4
	HUMIDITY	75%	73%	73%	72%	72%	68%	73%	77%
POINT 3	TEMPERATURE	24.2	24	24.3	24.2	24.3	24.2	24.2	24.6
	HUMIDITY	74%	73%	72%	74%	73%	68%	73%	77%
POINT 4	TEMPERATURE	24.4	24.3	24.3	24.4	24.5	24.4	24.4	24.7
	HUMIDITY	73%	73%	72%	73%	73%	70%	71%	75%
POINT 5	TEMPERATURE	24.3	24	24.4	24.8	24.9	24.5	24.7	24.7
	HUMIDITY	73%	73%	72%	73%	73%	73%	71%	74%
ITEM 6	TEMPERATURE	24	23.9	24.4	24.9	24.9	24.7	24.9	24.9
	HUMIDITY	73%	74%	73%	73%	73%	65%	70%	75%

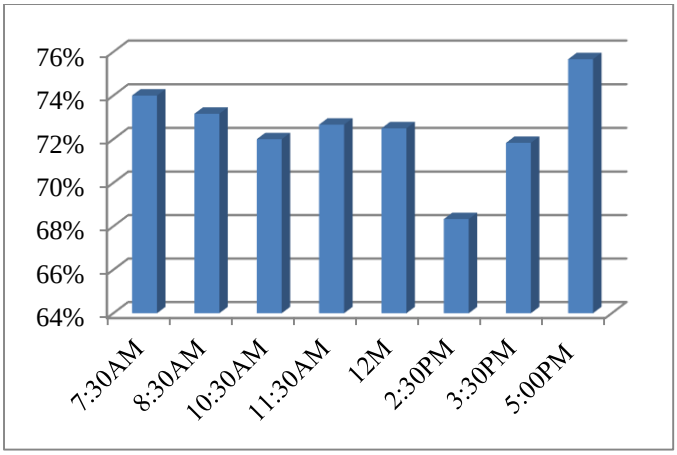


Fig. 6. Average humidity on day 1.

Measurements for day 2 maintained humidity without much variation, with averages between 73 and 74 percent, and temperature remained constant with those captured on day 1 (Table 2). Most importantly, humidity has remained constant even into the afternoon (Figure 7).

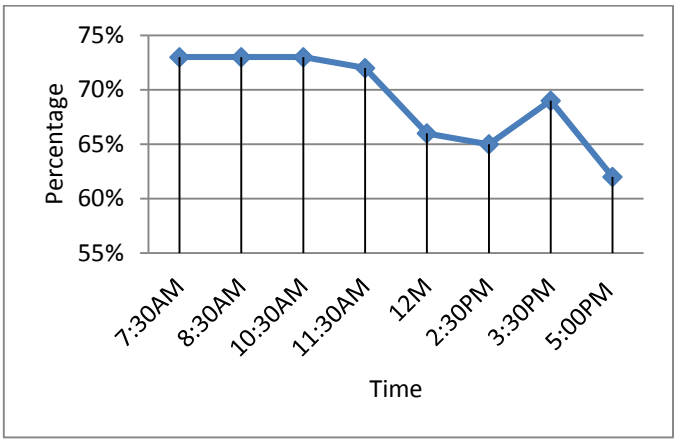


Fig. 7. Average humidity day 2.

Table 2. Temperature and humidity day 2.

TIME		7:30AM	8:30AM	9:30AM	10:30AM	11:30AM	12M	2:30PM	3:30PM	5:00PM
POINT 1	TEMPERATURE	23.8	24	24.1	24.4	24.5	24.8	24.6	24.7	24.2
	HUMIDITY	73%	72%	73%	72%	73%	73%	73%	73%	73%
POINT 2	TEMPERATURE	23.8	23.9	24	24.2	24.5	24.9	24.5	24.9	24.2
	HUMIDITY	74%	73%	73%	73%	74%	74%	74%	73%	73%
POINT 3	TEMPERATURE	23.6	23.8	23.9	24.1	24.4	24.7	24.5	24.7	24.3
	HUMIDITY	74%	74%	74%	74%	74%	74%	75%	73%	73%
ITEM 4	TEMPERATURE	23.9	23.8	24.1	24.2	24.4	24.5	24.6	24.8	24.5
	HUMIDITY	73%	74%	73%	74%	74%	74%	74%	73%	73%
POINT 5	TEMPERATURE	24	24	24.2	24.4	24.6	24.6	25.1	24.8	24.6
	HUMIDITY	73%	73%	73%	73%	74%	74%	73%	72%	72%
ITEM 6	TEMPERATURE	23.8	23.8	24.3	24.4	24.7	24.7	24.9	24.7	24.6
	HUMIDITY	73%	74%	73%	74%	75%	75%	73%	71%	72%

In order to observe the most drastic changes, we show the capture of measurements for day 4, which begin with high humidity and low temperatures, the humidity changes are highest at points 1 and 2 with 66%, and at point 6 it drops to 57% (Table 3).

A quite pronounced change in humidity can be observed with high values in the morning and low values in the afternoon, which is different from the measurements captured on day 1 and 2, these humidity changes are almost 20%, therefore they can seriously affect the conservation of the documents.

Table 3. Temperature and humidity day 4.

TIME		7:30AM	8:30AM	9:30AM	11:30AM	12M	2:30PM	3:30PM	5:00PM
POINT 1	TEMPERATURE	22.4	23.1	23.8	24.3	24	24	24.2	24
	HUMIDITY	72%	73%	72%	70%	63%	64%	66%	66%
POINT 2	TEMPERATURE	22.5	23	23.6	24.4	23.9	24.4	24.2	24.1
	HUMIDITY	73%	73%	72%	72%	66%	64%	69%	65%
POINT 3	TEMPERATURE	22.5	23.2	23.6	23.8	23.8	24.2	23.7	24
	HUMIDITY	73%	73%	73%	74%	65%	62%	73%	64%
ITEM 4	TEMPERATURE	22.8	23.4	23.7	24	23.8	24.1	23.8	26.4
	HUMIDITY	74%	73%	73%	73%	69%	70%	70%	63%
POINT 5	TEMPERATURE	22.9	23.7	23.8	23.8	24	24.5	24.3	25.8
	HUMIDITY	73%	72%	72%	72%	67%	65%	68%	58%
ITEM 6	TEMPERATURE	23	23.6	23.6	24	23.9	24.4	24.4	25.4
	HUMIDITY	72%	72%	73%	69%	64%	64%	66%	57%

When analyzing day 10, it is observed quite high humidity results in the schedule of 5 pm, with which the documents may deteriorate in the evening hours, that is where the system should work with a humidifier or dehumidifier. Temperatures remain constant with minor ranges between +1 and -1, so the important variable is humidity.

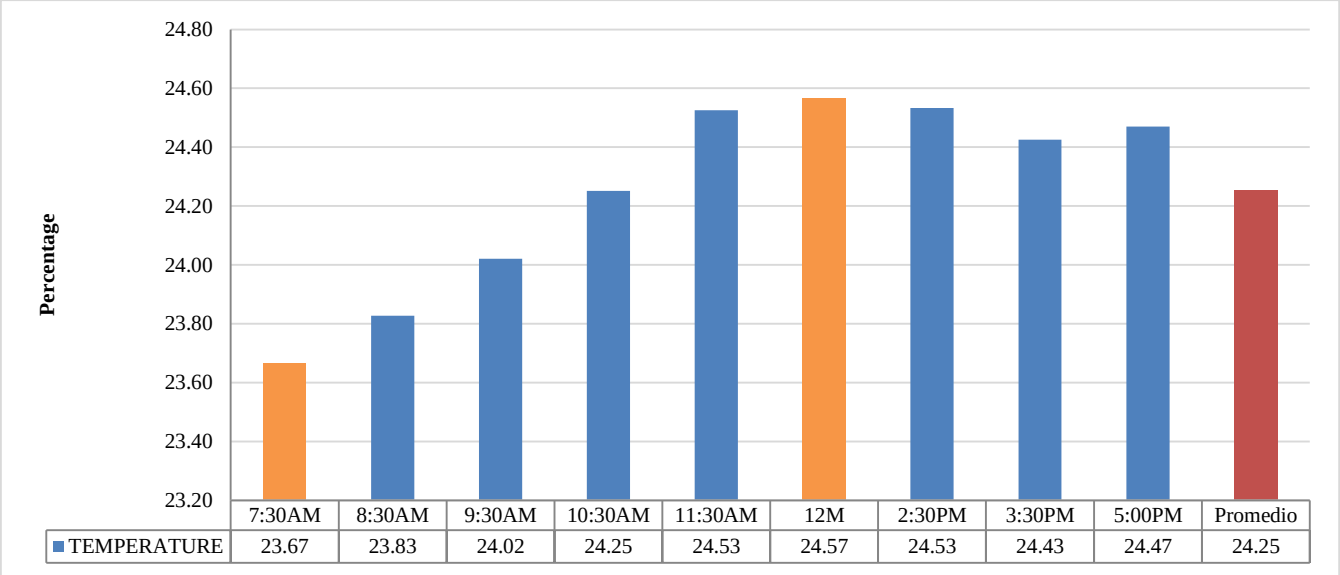
By looking at the humidity values, a dehumidifier can help to regulate the values and thus increase the protection of all files (Table 4). During daylight hours, the system could be adjusted in case it lasts more than one hour with humidity values below 40 or above 60 percent.

Table 4. Temperature and humidity day 10.

TIME		7:30AM	8:30AM	9:30AM	10:30AM	11:30AM	12M	2:30PM	3:30PM	5:00PM
POINT 1	TEMPERATURE	23.9	23.8	24.3	24.4	24.7	24.8	24.5	24.6	24.4
	HUMIDITY	73%	73%	71%	73%	72%	72%	73%	71%	70%
POINT 2	TEMPERATURE	23.6	23.9	23.9	24.2	24.7	24.8	24.6	24.7	24.5
	HUMIDITY	73%	73%	73%	73%	73%	73%	74%	73%	70%
POINT 3	TEMPERATURE	23.6	23.6	24	24	24.4	24.5	24.5	24.6	24.5
	HUMIDITY	74%	74%	74%	74%	74%	74%	76%	70%	69%
POINT 4	TEMPERATURE	23.7	24	24	24.2	24.5	24.5	24.7	24.8	24.5
	HUMIDITY	74%	73%	73%	73%	74%	74%	74%	75%	70%
POINT 5	TEMPERATURE	23.8	24	24.1	24.1	24.7	24.7	24.6	24.7	24.6
	HUMIDITY	73%	72%	74%	74%	73%	73%	74%	70%	70%
ITEM 6	TEMPERATURE	23.7	24	24.1	24.1	25.1	25.1	24.9	24.8	24.6
	HUMIDITY	73%	72%	74%	74%	72%	72%	73%	69%	71%

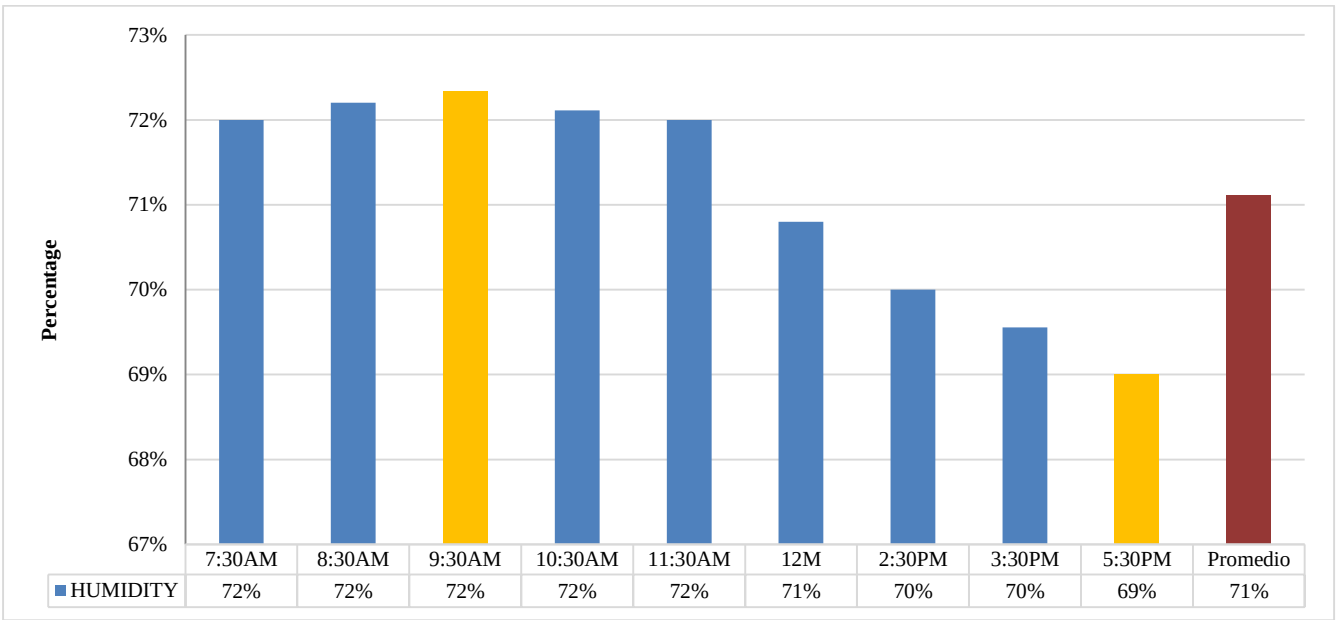
In Figure 8, we can observe the average per day of the 6 points where the temperature was captured, during the 10 days. Observing that the lowest temperature is 23.67 degrees, while the day with the highest temperature rises to 24.57 degrees. Therefore the data does not have a high variation with respect to the change in temperature. The recommended temperature for paper material by the General Archive of the Nation is 15°C to 20°C with a daily fluctuation of 4°C [2]. Therefore the fluctuation can reach 11°C or 24°C, and all temperature values are in an adequate fluctuation, therefore the temperature is in accordance with the infrastructure created.

The average temperature ranges between 69% and 72% humidity, with an overall average of 71% (Figure 9). According to the national archives, humidity should be between 45% and 60%, with a daily fluctuation of 5%. It can be stated that the humidity must be controlled because it is above the appropriate humidity range for the paper support, which will end up deteriorating the documents, which is why it is necessary to apply a system that activates a dehumidifier at the points that are outside the established range and according to the schedule after 5 p.m., where it is most necessary.



	7:30AM	8:30AM	9:30AM	10:30AM	11:30AM	12M	2:30PM	3:30PM	5:00PM	Promedio
TEMPERATURE	23.67	23.83	24.02	24.25	24.53	24.57	24.53	24.43	24.47	24.25

Fig. 8. Average temperature per hour.



	7:30AM	8:30AM	9:30AM	10:30AM	11:30AM	12M	2:30PM	3:30PM	5:30PM	Promedio
HUMIDITY	72%	72%	72%	72%	72%	71%	70%	70%	69%	71%

Fig. 9. Average humidity per hour.

IV. CONCLUSION

The results show that the temperature measurements are within the fluctuation range allowed by the General Archive of the Nation, but the humidity is high, which determines that the infrastructure must be adapted for the conservation of documents and prevent the deterioration of information. The proposed design includes the installation of a system that can be activated to reduce humidity at appropriate times. The humidity maintains a 5% of range out of the allowed and although it is little, with the time it can be the cause for the beginning of the deterioration of the files, in addition to be adapted so that it fulfills the norms imposed by the General File.

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