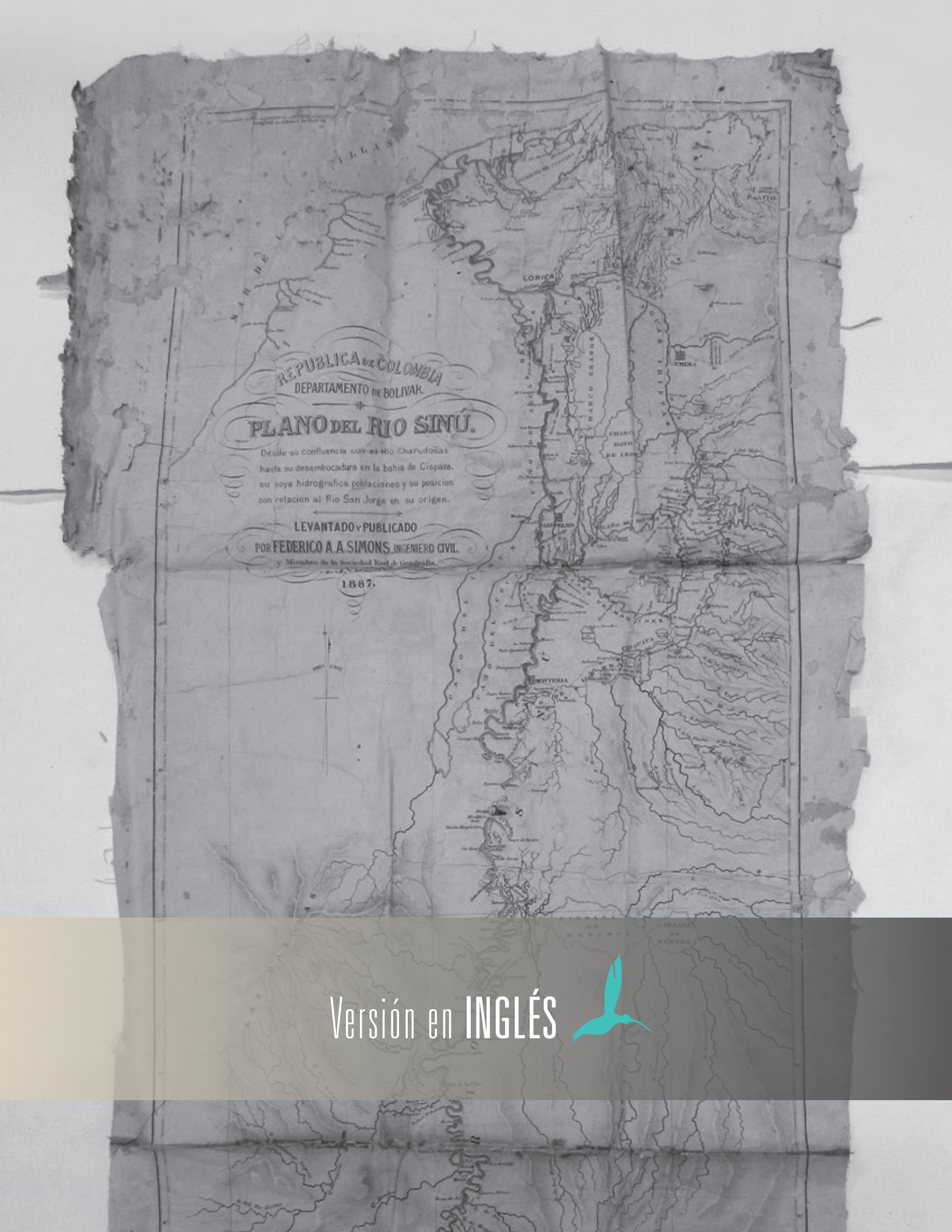

Versión en **INGLÉS**

Restoration of a work on paper by implementing and adapting Japanese materials and methods. Case Study: Restoration of the Sinú River map

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Abstract
In this article, the restoration process of a work of art on paper is described, it is part of the historical map library belonging to the Archivo General de la Nación of Colombia (AGN). Processes carried out by the Grupo de Conservación y Restauración del Patrimonio Documental through the implementation and adaptation of the techniques and materials that are the result of the knowledge gained in the International Course on Paper Conservation in Latin America: Meeting East, in which the AGN had the chance to participate in 2016. The knowledge, instructions, and teachings learned in the mentioned course have been shared and put into practice by the entity's work team, this has allowed us to reinforce our knowledge in favor of the Colombian documental heritage conservation. At the AGN, we have been optimizing the traditional processes on the conservation of graphic and documentary heritage through new techniques and materials, being more aware of our work and with the application of efficient treatments. These aspects have helped with resources management and treatments times.

Keywords
Support; graphic technique; conservation; restoration; deterioration; processing.

The Archivo General de la Nación of Colombia[1] (AGN) is the entity responsible for formulating and leading the Archives and document management policy in the national territory, a reference for public management to safeguard and disseminate documentary heritage as a tool for transparency and access to public information.[2] The Documentary Heritage Conservation and Restoration Group, as part of the Heritage Management Division, is responsible for implementing the Integrated conservation system for the entity's collection through preventive conservation and conservation-restoration actions.

After I participated in the International Course on Paper Conservation in Latin America: Meeting East in 2016, and to disseminate the knowledge acquired in this important training to the work team, at AGN we managed the acquisition of inputs, such as *mitzubake, noribake*, and *nadebake* brushes, *norikoshi* (sieves), and wheat starch, materials typical of Japanese work techniques, and others from the knowledge of the masters of Iberoamerica, such as Sontara®; materials, and techniques that when implemented have enabled us to question and reevaluate concepts and practices for the benefit of our discipline and the protection of Colombia's documentary heritage.

One of the cases in which the learned techniques have been implemented is a map of the Sinú River; the work is part of eight maps that represent the limits between the departments of Antioquia, Bolívar, Cundinamarca, and Boyacá in Colombia. These maps were initially folded and sewn to a bundle from 1918, although their dates are earlier (figure 1). In addition, each of them has different characteristics in terms of their support, their technique of preparation, and their condition.

Figure 1. Tomo XI. 1.918 Archivo Legislativo del Congreso. Sección República, AGN. Limits of Antioquia, Bolívar, Cundinamarca and Boyacá. *Image: Martha Cárdenas, ©AGN, 2020.*

[1] General Archive of the Nation of Colombia (note from the translator).

[2] Mission of the AGN: https://www.archivogeneral.gov.co/Conozcanos/mision-vision

Identification of the work

- Title: Sinú River map.
- Author: Raised and published by Federico A. A. Simons.
- Graphic technique: Lithography mounted on industrially manufactured support of smooth texture, natural color, and very thin; graphic technique with black ink and blue and sepia colors.
- Date: 1887
- Dimensions: 100 × 46 cm (length × width)
- Related elements: lined paper map, sewn to a bundle, is one of eight maps that represent limits between some departments of the country.
- Caliber:
  - 0.533 mm (set: paper-cloth)
  - 0.112 mm (original support-paper)
  - 0.421 mm (cloth)
- Formal description: Planimetric representation of the Sinú River, from its confluence with the Charudosas River to its mouth in the bay of Cispata, including its drainage basin, populated places, and its position to San Jorge River at its origin.

Condition

As mentioned above, the plan is part of eight maps, all with very different characteristics, dates, and conditions, which were folded and sewn to a bundle, using overcasting, and attached to the spine with animal glue.

Lining was used on the plan of the Sinú River. This treatment was possibly made after the drawing and was done to give stability to the paper and add it to the bundle, given its great fragility due to structural deficiencies caused by insects, surface abrasion, tears, and wear of the support, especially in the folding areas or lines. These factors, along with the manipulation of the unit, increased the damage. To this was added:

1. Surface and consistent dirt (front and back).
2. Plan deformation caused by folds and lack of adhesion to the second support (cloth), a deformation to which the considerable difference in the caliber of the cloth and the original paper, 0.421 mm, and 0.112 mm, respectively, also contributes (figure 2).
3. Deep tears (figure 3).
4. Structural and information deficiencies caused by insect attacks (figure 4).
5. Surface abrasion of the support compromises the graphic technique in some areas, possibly caused by silverfish (figure 5).
6. Spot stains of excrement, oxidation, and adhesive residues (figure 6).
7. Embrittlement and deficiencies of support in areas of folds or creases (figure 7).

Figure 2. Deformation of the plan of the work. *Image: Martha Cárdenas, ©AGN, 2020.*

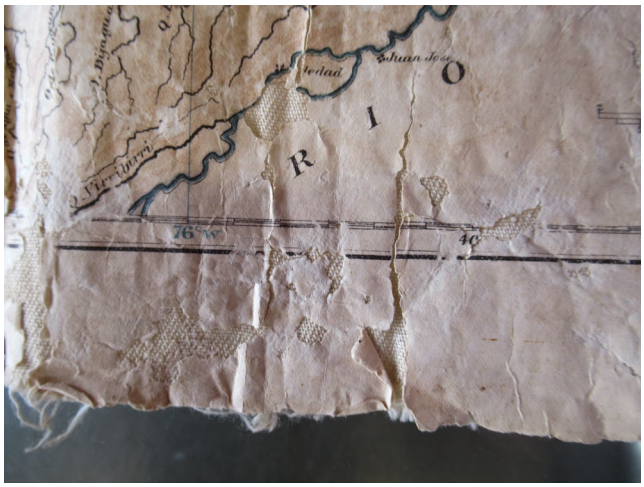

Figure 3. Tears. *Image: Martha Cárdenas, ©AGN, 2020.*

Figure 4. Structural and information deficiencies caused by insect attacks. *Image: Martha Cárdenas, ©AGN, 2020.*

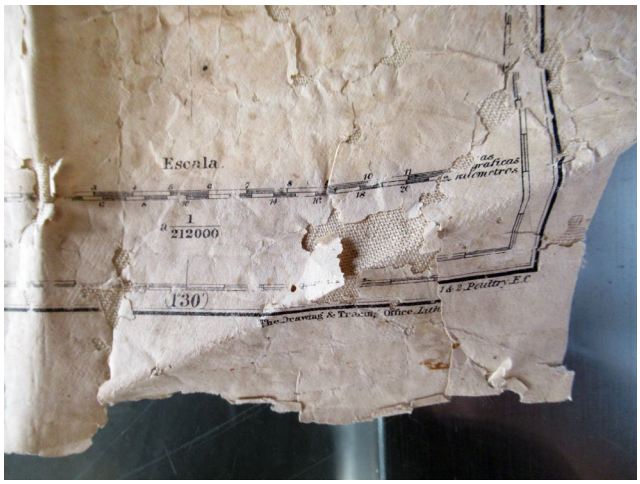

Figure 5. Surface abrasion of the support.
Image: Martha Cárdenas, ©AGN, 2020.

Figure 6. Spot stains.
Image: Martha Cárdenas, ©AGN, 2020.

Figure 7. Wear of the support in folding areas or lines.
Image: Martha Cárdenas, ©AGN, 2020.

Analysis and preliminary tests

Stability tests of the graphic technique and solubility of the cloth adhesive were carried out using different solvents, as well as evaluations of the degree of acidity (pH) of the work, the following results were obtained:

- Solubility of inks and pigments with a negative result for water.
- Solubility of the cloth adhesive with a positive result for water.
- Evaluation of the degree of acidity of the support: average initial pH 5.2

According to those results and the condition of the work described above, the criteria for its treatment was established, the following processes were proposed prioritizing the minimum intervention. These processes were aimed at eliminating the lining as one of the factors of deterioration of the work and making a folding to ensure the structural recovery of the support and improve its aesthetic presentation.

Restoration processes

Separation of the work from the bundle

The plan was extracted from the unit (bundle), with the prior cutting of the sewing threads and humidification to mechanically remove the adhesive (animal glue) from the spine using a spatula.

Dry cleaning

It was carried out with a brush to remove surface dirt on the front and back of the work.

Removal of the second support-cloth

With the previous result of solubility of the adhesive in water, the adhesive was softened with humidity, which was achieved by leaving the work between two sheets of Sontara® previously moistened (figure 8). The surface was covered with an interlining to keep the humidity inside for the time necessary to solubilize the adhesive, approximately two hours, for which the action of the humidity on the adhesive and the possibility of separating the cloth were constantly checked. Once this was achieved, the fabric was removed and rolled up with the Sontara® at the top (figure 8), subsequently protected with an interlining as additional support for manipulation, turning the work over and releasing the Sontara® located at the bottom.

In addition to helping to soften the adhesive and remove the cloth, this process also facilitated the removal of consistent dirt and free acidity from the original support. This could be proved with the final pH value of the support 6.06 (figure 9), which was raised by about one unit compared to the initial measurement 5.2.

Removal of adhesive residues

Once the cloth was separated, the adhesive residues were removed. Due to the fragility of the support described above, and the layer of adhesive that had been applied in a very irregular manner, it was decided to carry out an immersion washing, so that the water level was only in contact with the front face of the work and made it possible to remove the adhesive by spot cleaning with a brush and rinsing with a light jet of water until the verso was completely cleaned (figure 10).

Figure 8. Removal of the second support by humidification with Sontara®.
Image: Martha Cárdenas. ©AGN, 2020.

Figure 9. Measurement of the final pH of the work.
Image: Martha Cárdenas, ©AGN, 2020.

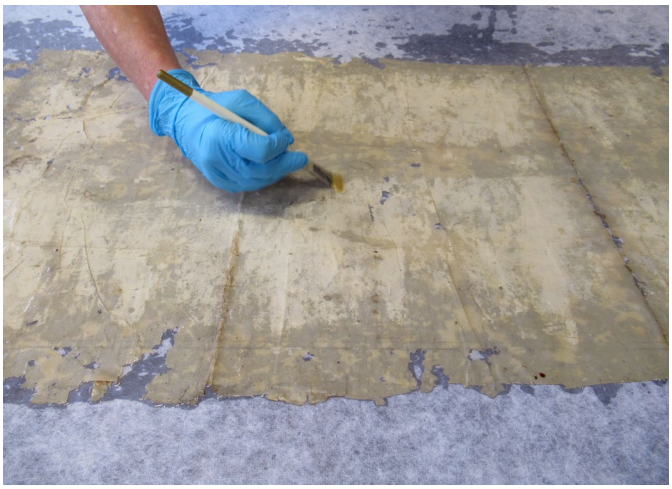

Figure 10. Washing of the work to remove adhesive residues.
Imagen: Martha Cárdenas, ©AGN, 2020.

Folding (lining) of the work

To recover the structural stability of the support, a folding (lining) was performed, using 11 g/m^2 natural color Japanese *sekishu* paper adhered with wheat starch diluted from the paste obtained in 1/3 proportion, using the technique of paste preparation learned from the Japanese masters.

We also combined and modified some of our conventional practices and procedures with the Japanese and Latin American techniques that were shared with us in the course in Mexico. Thus, we inverted the process as follows: on a rigid surface, to flatten the support, the work was placed on a 50 µm thick Mylar® film, which allowed the support to move and slide easily due to humidification, making it possible to correct the irregularities of the surface. Then, with the current humidity level, a thin, even layer of wheat starch was applied to the work with the *noribake* brush (figure 11), the Japanese paper was placed on top of this, sprinkled lightly with water before applying pressure to the assembly and adhering the two supports (figure 12).

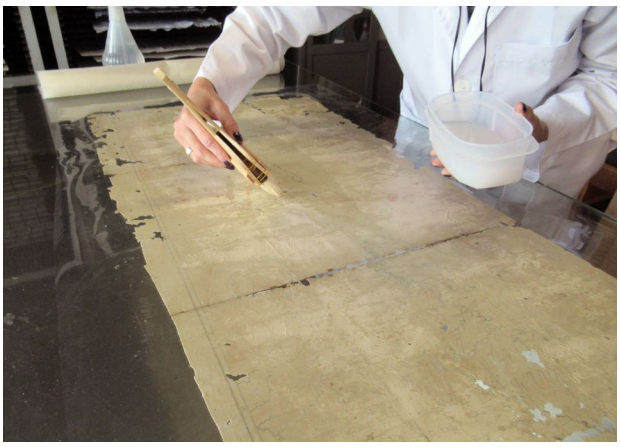

Figure 11. Recovery of the planimetry of the support and application of wheat starch. *Image: Martha Cárdenas, ©AGN, 2020.*

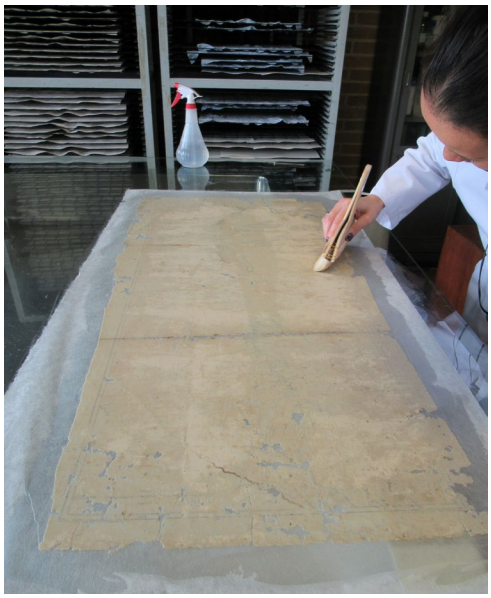

Figure 12. Adhesion of the folding paper to the work. *Image: Martha Cárdenas, ©AGN, 2020.*

Contrary to what we learned and practiced in the International Course on Paper Conservation in Latin America: Meeting East, we previously analyzed the movements to be made during the process. Due to the dimensions, it was safer for us to apply the adhesive to the work of art and manipulate the Japanese paper without adhesive, considering humidifying it superficially once placed on the map so as not to generate tensions before adhering to the two surfaces (work-folding paper).

It must be noted that the wheat starch used was processed according to the traditional technique learned from the Japanese by preparing the paste by cooking for 50 minutes and then sieved for dilution and application. The degree of fluidity of the adhesive was determined according to the need and characteristics of the supports and intervention papers.

Tension drying of the work on wooden board

We moved the map by lifting it with the Mylar® film, mentioned above, on a polished wooden board covered with a layer of water-repellent varnish. We had this surface at the entity and conditioned it to replicate the techniques of drying, simulating the Japanese *karibari* method, which promotes the drying of the works by tension. Once the map was placed on the surface with the Japanese paper in contact with the wood, the Mylar® was gradually separated to adhere the excess margin of the paper to the board (figure 13).

Figure 13. Drying of the work on a wooden board. *Image: Martha Cárdenas, ©AGN, 2020.*

Elaboration of infills in missing areas

Once the work was dry, it was separated from the board from the edges with the help of a metal spatula to ensure the stability of the support. Subsequently, the losses were reintegrated by applying infills of Japanese paper on the larger missing parts and using paper pulp on the small missing parts and fissures. 18 g/m^2 raw color Japanese *tengujo* paper was used, as well as Klucel® G 2.5 % in ethanol (96 %) as adhesive, to add less humidity as possible to the substract and to maintain its flatness (figure 14).

Figure 14. The final detail of the work after infills. *Image: Martha Cárdenas, ©AGN, 2020.*

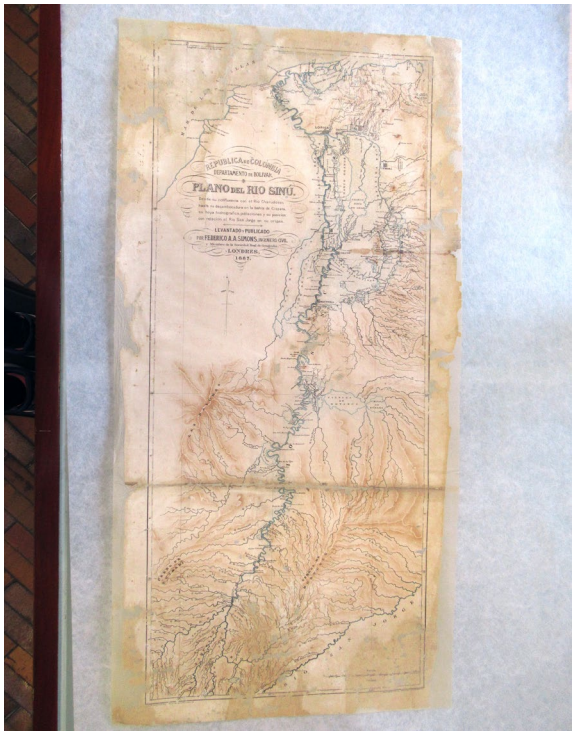

Figure 15. Work after the restoration process. *Image: Martha Cárdenas, ©AGN, 2020.*

End of the process

Finally, the restored map was protected with a folder made of neutral cardboard and stored in the library of Maps and Plans Section, where documentation of the treatment and cross-reference of possible spatial location of the map was left inside the bundle. This guarantees the permanent preservation of the different documentary heritage according to their characteristics.

Conclusions

Lining was often used in maps and plans from the moment they were created to facilitate their manipulation and transfer from one place to another. However, in this case, after analyzing the condition of the map, it is presumed that the adherence of the second support was done later to correct the deterioration. This can be supported by the evident gaps between the information since there is no continuity in many of the strokes in the joints or the torn areas.

Applying the knowledge acquired in the International Course on Paper Conservation in Latin America: Meeting East, sharing the lessons learned with the work team, acquiring Japanese materials and tools along with our resources (inputs and procedures), has encouraged us at the AGN to reevaluate and improve conventional treatments in favor of more appropriate and less invasive treatments on documentary heritage, making our work increasingly critical.

In the case of the intervention described above, the implementation of techniques such as tension drying has helped us to optimize the times of the treatments. Traditionally, these processes have been carried out by pressing between boards or glass, which implied long drying times and greater expenditure in materials, since it was necessary to periodically replace interlinings and drying cardboards.

We have also implemented wheat starch paste as an adhesive to a greater extent, with which better results have been achieved with its good adhesiveness and final presentation of the processes.

The knowledge acquired, added to the work philosophy of the Japanese and Latin masters, has contributed to generating better intervention practices within our work team. The most representative one has been to considerably reduce the increase of humidity in the lining processes, which we are currently carrying out following the methodologies learned in Mexico.

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References

Feller, R.L., y Wilt, M. (1990) *Evaluation of Cellulose Ethers for Use in Conservation*, United States, The Getty Conservation Institute (Research in Conservation, 3), available in: <https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/ethers.pdf> [accessed on January 25, 2021].

Grupo de Conservación y Restauración del Patrimonio Documental (2020) Manual de Conservación y Restauración del Patrimonio Documental. AAD-MA-02. AGN [pdf], available in: <https://intranet.archivogeneral.gov.co/sie/calidad/#eIf_I1_UFJPQ0VTT1MgTUITSU9OQUxFUy9BRE1JTkITVFJBQ0IPTiBERUwgQUNFUIZPIERPQ1VNRU5UQUwvTUFOVUFMRVM> [accesed on January 29, 2020].

Grupo de Conservación y Restauración del Patrimonio Documental (2020) Procedimiento de Conservación y Restauración. AAD-PR-05. AGN. [pdf], available in: <https://intranet.archivogeneral.gov.co/SIG/PROCESOS%20MISIONALES/ADMINISTRACION%20DEL%20ACERVO%20DOCUMENTAL/PROCEDIMIENTOS/AAD-PR-05%20CONSERVACI%C3%93N%20Y%20RESTAURACI%C3%93N.pdf> [accessed on January 29, 2020].

Matsumaru, Mito (2016) *Paste-making tips with two recipes* [blog], 20 de octubre, available in: <https://thebookandpapergathering.org/2016/10/20/paste-making-tips-with-two-recipes/> [accessed on January 29, 2021].