Guidelines for Conservation and Restoration of Historical Archaeological Heritage

Patricia Frazzi[1]

Introduction

Although the conservation and restoration of materials from archaeological land excavations on should be the realm of professional restorers, there is a reality which goes beyond this ideal.

The inclusion of conservation specialists in archaeological projects in Argentina is an issue often considered in theory, but there is a long way to go for the activity to be systematized, due to both the luck of knowledge in the local archaeological world and financial requirements.

There are different criteria for the intervention in the materials in question. Direct intervention such as reconstruction of artifacts and consolidations can be debated, but any decision must be justified and supported by a theoretical framework. Indirect actions, including preventive conservation[2] are not in question. All materials studies must be preserved taking into account their heritage value and their uniqueness as bearers of information.

This paper will not offer recipes or commercial brands, only basic guidelines to aid in the conservation of historical archaeological heritage.

In order to work with archaeological remains we must first become acquainted with the basic criteria for archaeological conservation, which are as follows:

1- Preventive conservation must be applied in all stages the archaeological materials go through: excavation, moving or shipping, laboratory, storage and exhibition.
2- Respect for the original object.

[1] Graduate Degree in Conservation and Restoration of Cultural Heritage (IUNA). In charge of the Conservation and Restoration Area at the Centre for Urban Archaeology, IAA, FADU, UBA, and of the Conservation and Restoration of Urban Archaeological Heritage Area at the DGPatelH, Buenos Aires City Government.

[2] Preventive conservation includes the operations that use all possible means, external to the objects, to guarantee their appropriate conservation and maintenance.

3- Protection of information.
4- Minimum intervention.
5- Methodologies and materials used must be reversible and safe (already tested and stable).

To apply these concepts to preventive conservation we must bear in mind the risk factors that might modify the structure of the materials, such as environment, pest control, transportation, packaging, storage, handling, mounting and display, security, changing of format for records, and be ready for contingency response.

Respecting the original refers to the value of archaeological elements as cultural heritage. This concept is linked to the information these elements contain, their raw material, manufacture, anthropic activity and post-depositional marks, etc.

Minimum intervention is based upon the two previous concepts. The less an object is handled, the better. Interventions are justified in cases of structural instability or with the aim of gathering further information for research purposes or for educational purposes.

Each intervention has its methodology, a certain sequence of steps, and specific times which must be kept in order to obtain the desired results. The materials used, such as wrappings and adhesives, among others, must be appropriate to the conservation of historical archaeological elements. As a general rule, they must be inert and compatible and, when in doubt, it is better to consult a professional restorer.

Below we will present basic guidelines to keep in mind when handling materials from excavations. Three main divisions are proposed: *in situ*, laboratory and storage.

In situ

- The objective of a conservator is to minimize the post-excavation impact suffered by objects when they are removed from the ground, and to take a series of preventive measures to delay the physical and environmental effects which lead to their deterioration.
- Before the excavation, the environment must be assessed, both above and below ground. Working in wet contexts is different from working in dry, cold or warm ones. The soil must be evaluated as to pH, salinity and physical structure.
- Conservation tasks *in situ* must be included within the general budget.

- Avoid abrupt changes in temperature and relative humidity (do not dry objects out in the sun).
- Organic materials are more vulnerable to deterioration factors.
- When objects are made up of more than one raw material, preventive measures must protect the material that is most sensitive to deterioration factors.
- When the context contains soluble salts, the objects must be desalinated.
- The tools used must not leave marks, both during extraction and during cleaning. The tool chosen must be softer than the raw material of the object to be extracted.
- If consolidation prior to extraction should be required, a photographic record must be taken and the possibility of later analyses must be considered.
- Block extraction allows consolidation to be carried out in the laboratory.
- Temporary packaging is carried out according to the raw material and the conditions of preservation[3]. It is convenient to separate bones from other organic matter and to keep in mind that hard and sharp objects may leave marks on softer ones. Metals generally cause stains and must be packed according to type to prevent galvanic corrosion, especially in wet contexts.
- It is convenient to use a double polyethylene bag, and to place the written tag between the two, as well as to identify the outer bag with a permanent marker.
- Consider the use of a padded protective wrapping or a non-flexible, rigid one, according to the case.
- Organic objects must be ventilated within the packaging. In wet contexts the humidity must be kept to prevent deformation of anisotropic materials. This is why we recommend wrapping them together with the sediment and adding ethylic alcohol to prevent the growth of fungi.
- When organic samples are taken for Carbon14 analyses, they must be wrapped in foil and then in a sealed bag avoiding touching them with your hands, to prevent possible contamination.
- The temporary storage space must fulfil the essential requirements for the preservation of the objects. It must be roofed and not be subject to abrupt changes of temperature and humidity. It is convenient to keep the boxes away from the floor, to use safe shelves, medium-sized boxes of medium weight and to make sure they are easily identifiable. The efficiency of the window and door casings, the electrical wiring and the safety of both the objects and the site must be checked. It is essential to keep things in order and oversee access to the materials.

[3] There are three conditions of preservation: G (Good), F (Fair), P (Poor). Good means complete, solid, ready to exhibit, well restored or incomplete but safe. Fair is unstable, compromised, weakened or not suitable for exhibition. Poor means it presents structural problems, disintegration or exfoliation and cannot be manipulated.

In situ laboratory inside a tent, site Teyú Cuaré, Misiones, Argentina, 2015.

Laboratory

Conservation and restoration tasks within the laboratory include the cleaning of fragments, interdisciplinary studies, consolidation, disinfection, reassembly of parts, adherence, gap fillings and reconstruction, labelling and documentation. In any of these options the concepts of preventive conservation must be prioritized and when in doubt a qualified conservator-restorer should be consulted.

Cleaning

Cleaning of artifacts has generally been a task performed by archaeologists directly or under the supervision of an archaeologist. Henceforth we recommend it be carried out by a specialist, since it is an irreversible and risky intervention.

- Before cleaning, the piece must be examined and a diagnosis of the condition of preservation must be decided, considering the raw material and the context of provenance.
- Cleaning consists in removing the dirt hindering the reading of the object.
- It is not an activity associated with the concept of hygiene, nor one intended to restore the piece to its original condition.

- Examination should be geared to finding remains associated to the object, such as food, concretions or other organic remains).
- It is important to respect marks of origin, of utilization, of post-depositional processes, and to ensure no new marks are caused that might lead to erroneous interpretations.
- Cleaning can be dry or wet. Considering the context and the condition of preservation of the piece, the most appropriate type of cleaning should be selected. Dry cleaning is carried out with soft brushes, bamboo sticks and scalpels. Wet cleaning can use tap water or distilled water, solvents with different polarities, acid or alkaline solutions. Desalination and electrolysis are also cleaning systems.

A quite frequent mistake in cleaning with water is to clean it partially, for instance, when the surface of a pottery shard is cleaned, but not its substrata. In these cases, the piece is more difficult to identify and in all possibility, the process will have to be repeated and this will be detrimental to the condition of preservation of the fragment.

Choosing the appropriate system of cleaning entails assessing many possibilities, having knowledge of physical and chemical structures and of the reactions between the cleansing product and the fragment to be cleaned.

Dry cleaning of a spoon, site Aduana de Taylor, Centre for Urban Archaeology, IAA, FADU, UBA, 2018.

Interdisciplinary studies

Interdisciplinary studies are common both for archaeologists and for restorers. They may be necessary at any stage the objects go through and they are always a positive contribution in any project.

The most common ones are those that date or identify samples, and they require knowledge of the procedure of extraction and preparation.

There are many professional services that contribute to the study of sites and materials. It is important to acknowledge our limitations and, within the possibilities offered by the budgetary resources, to seek help from specialists in different areas. Within the non-conventional contributions, we can mention management, diffusion and visual links, among others.

Consolidation

When the structure of a material is at risk, consolidation is an option in order to restore its physical integrity.

- It is an irreversible intervention.
- Bone and wood specimens are the most frequently consolidated materials.
- The consolidating substance must penetrate the whole structure and, where possible, it must not change the surface's appearance.
- Adhesives suitable to conservation, compatible with the material, in a low concentration and with good penetration, may be used.

Disinfection

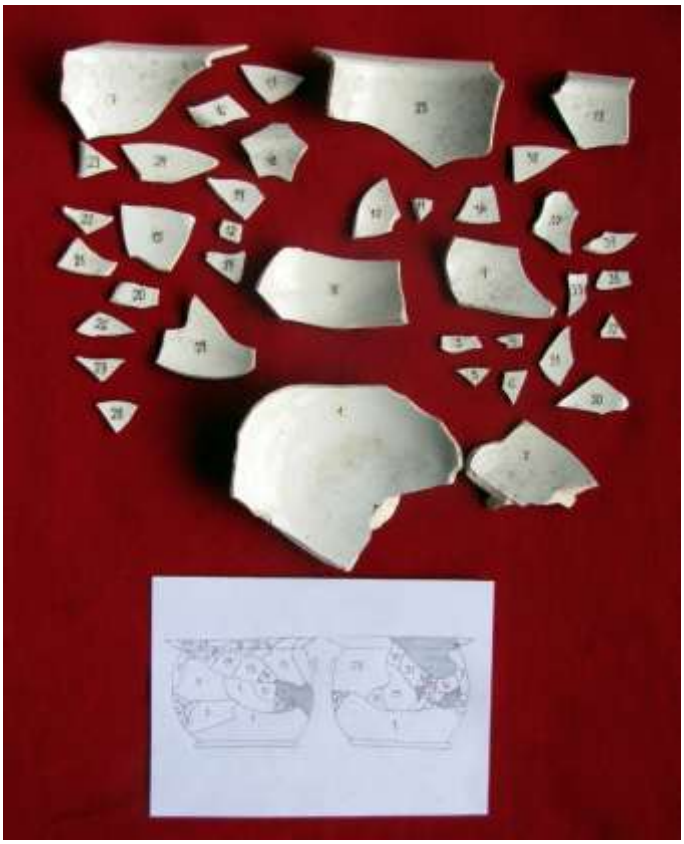
Applying biocides to spray on infected materials is another possible process taking place within the laboratory. The first thing to keep in mind when choosing a biocide is that it should be the least toxic as possible for human beings, and that it should be effective when acting on the specimen to prevent future deterioration.

- It is best to avoid disinfection by using preventive methods.
- Biocides should only be used when the techniques of passive stabilization have failed.
- Ethanol and phenol are used as general fungicides and bactericides.
- The fungus or bacterium must be identified through appropriate analyses and eliminated with a suitable product.
- The product is most effective when it enters through the gases of the solvent containing it.
- Personal protection equipment must always be used when applying the product, and the user's manual instructions must be followed.

Reassembly

After the materials have been cleaned and studied, the reassembly of fragments begins, following an ordering pattern. It is usual to begin by separating according to raw material and then adjusting the possibilities, for instance, glass, then according to colour, whether it is curved or straight and finally considering the object it belongs to.

- The fragments which coincide are joined by means of masking tape, which is a provisional arrangement as the tape deteriorates easily.
- When all the possible fragments pertaining to one specimen have been gathered, a plan of location and shape of each fragment is drawn, identifying them by number. The next step is to separate them and then start with the adherence.
- Speedy adhesions for photographic recording should not be carried out. These shoddy interventions cause deterioration of the piece because it is necessary to unglue them and join them anew, and this action is against the concept of “minimum intervention”. What usually happens in these cases is that the unions will not match, the adhesive will be placed inadequately or simply that the wrong cement will be used.
- Before disassembling the fragments, it is advisable to draw a scheme of the location and shape of each fragment, identifying them by number.



Scheme with the location and shape of each fragment of a chamber pot, Centre for Urban Archaeology, IAA, FADU, UBA.

Adhesion

When all the joint possibilities have been studied and all the fragments have been surveyed, adhesion follows.

- As a general rule, you should start from the centre and move towards the outer edges, or from bottom to top, keeping all the parts in mind so that one step does not block up the next one.
- The joining sequence can be conducted in sections or all at once. When it is done in one session, it is easier to adjust the fragments while the adhesive is still flexible.
- The more uniform the spread of the adhesive on the surface, the better the result.
- The layer must be thin so that the adhesive does not create an unwanted extra volume.
- Each adhesive has its own application procedure and drying times, which must be followed strictly and with no exceptions.

Characteristics to take into account when choosing adhesives:

- They must be colourless, light and show good adhesive properties in low concentrations.
- The union must be stable and long lasting.
- They must be reversible and resistant to contraction and expansion, as well as to the effects of heat, light and biological attack.
- They must maintain permeability to gases such as oxygen, steam, solvents and other volatile substances.
- The shrinking of the layer when dry must be low so that the adhesive covers all of the joints and so that no tensions are created later.
- They must be stable in time and compatible with the material to be joined.
- They must be more flexible than the substratum so that they can absorb possible tensions.
- Toxicity and flammability must be low and they must entail little risk in their handling.

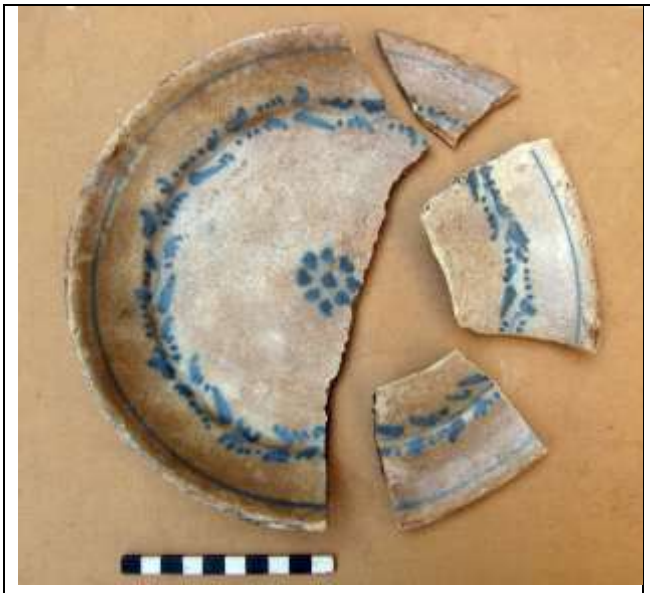
Reconstruction and gap fillings

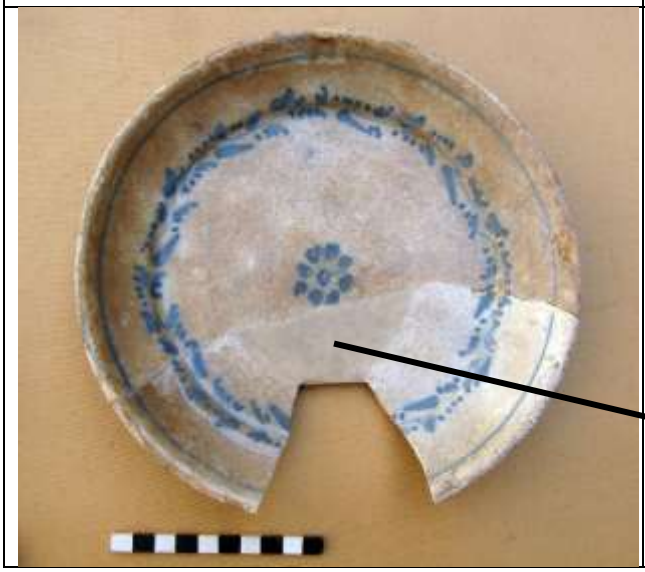
Gap fillings include reconstruction of volume and of colour. Both interventions require theoretical knowledge and manual skill.

The basic methodologies and materials used will be explained but we recommend the task be carried out by a qualified professional. It is better to store together loose fragments than to attempt flawed adhesions or gap fillings.

- Gap fillings are only carried out when there is structural instability in the object, or to improve the visual perception of a typology or when the specimen will be on display.
- When filling a volumetric gap a whole part equal to that which must be filled must be taken as reference, in order to use it as a basis for the mould.
- There must be no speculation as to shapes if there is no clear material or documentary data regarding the original shape, since it would be a historical falsehood.
- The material used in the filling must be reversible, softer than the original, chemically inert and compatible with the object's raw material.
- The colour reconstruction "should not be seen" if it leads to acknowledging in it an autonomous expressive value; it must be framed under the limits of a method and arbitrary personal solutions must not be resorted to.
- When a colour is sought, we must not think of what is known, but we must consider rather an abstraction of the area dealt with in order to examine the local tonalities.
- The reconstruction can be coloured with unsaturated pigments to bring it close to the colour base of the original piece.
- It is advisable to reach a neutral colour through broken colour transparencies.

Both cementing and gap filling are time-insuming activities that cannot be sped up, so we suggest that times be carefully organized and actions assessed before they are carried out.





Spanish plate, XVIII century, site: Bolivar 375, Buenos Aires, Argentina, 2011.
Its pieces were jointed, and a gap filling was necessary to stabilize the object.

Gap filling

Marking

A mark is made on the object to identify it.

- It must not cause deterioration.
- It must be easy to read and long lasting.
- The location depends on the shape of the object, but in general, it must be on a film-forming layer on a flat, not very visible place, which should not be in contact with handling manoeuvres or generating friction against support surfaces.
- It might be placed on a label adjoining the object.

- In the case of coins or very small objects, the mark can be placed on the container.

Documentation

Documentation is made up of two parts: Recording, as indicated by National Law 25743 for the Protection of Archaeological and Paleontological Heritage, and a technical file of conservation and restoration.

The technical file may have different layouts according to the institution, but it must identify the object and describe the treatments it has gone through, the materials used, a photographic record of the object before and after the treatment, the name of the person in charge and the date.

These documents must accompany the objects, since they provide useful information for future treatments.

Storage

Storage space for archaeological material is not a static place since it is frequently on demand by researchers. Generally, it is not built for that purpose specifically and therefore there may be problems. The three main rules to avoid them are: tidiness, cleanliness and security. Other factors to consider are:

- Easy access and vicinity to the work area.
- Temperature control, between 18 to 20° C; avoid fluctuations.
- Humidity control, 45 to 55%; avoid fluctuations.
- If there is no air conditioning system, take the necessary steps to ensure slow daily and seasonal fluctuations: eaves, double roof, double door, curtains.
- If there is air conditioning, foresee maintenance and possible power outages.
- Cleaning and prevention are the best forms of pest control.
- Prevent daylight from entering and choose lighting with low incidence of UV and infrared rays.
- La environmental conditions of the storage space are very important because conservation of the material will hinge on those factors.
- If it is new or if a place within the building can be selected, avoid locations with too much lighting or with abrupt temperature and relative humidity variations, and evaluate possible sources of humidity coming from ceilings, walls or foundations.
- Consider the outdoor environment, climate, relative position, fauna and flora.

Archaeological heritage is social property which contributes to strengthen cultural identity; therefore, the objects themselves, and the knowledge derived from them must been somehow returned to society.

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Queries directed to the web page of the Centre for Urban Archaeology http://www.iaa.fadu.uba.ar/cau/, at https://patriciafrazzi.wordpress.com/ or at frazzip@gmail.com

Bibliography

Cronyn, J. M., *The Elements of Archaeological Conservation,* Routledge, London, 2002.

Frazzi, Patricia, "Conservación preventiva para objetos arqueológicos históricos en contextos urbanos", *Estudios Ibero- Americanos*, PUCRS, v. XXVIII, n. 2, Porto Alegre, 2002, pp. 95-111.

- "Conservación y restauración en el convento de Santa Catalina de Sena", *Estudios de Arqueología Histórica*, Museo de la Ciudad de Río Grande, Tierra del Fuego, 2006, pp. 415-422.
- "Tareas de Conservación – Restauración", *El Área Fundacional de Puerto Deseado*, De los cuatro vientos, Buenos Aires, 2008, pp. 167-174.
- *Conservación y restauración de Lozas de excavaciones arqueológicas en la ciudad de Buenos Aires y su periferia*, graduate thesis, CD format, Fundación Turismo para Todos, 2009.

García Fortes, Salvador y Núria Flos Travieso, *Conservación y restauración de bienes arqueológicos,* Editorial Síntesis, Madrid, 2008.

Schneider Glantz, Renata, *Conservación in situ de materiales arqueológicos, Un manual*, Instituto Nacional de Antropología e Historia, México, 2001.

Websites

http://www.sha.org/research_resources/conservation_faqs/treatment.htm#C1
www.fadu.uba.ar/sitios/iaa/cau/secc_cau_2003_04.htm

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