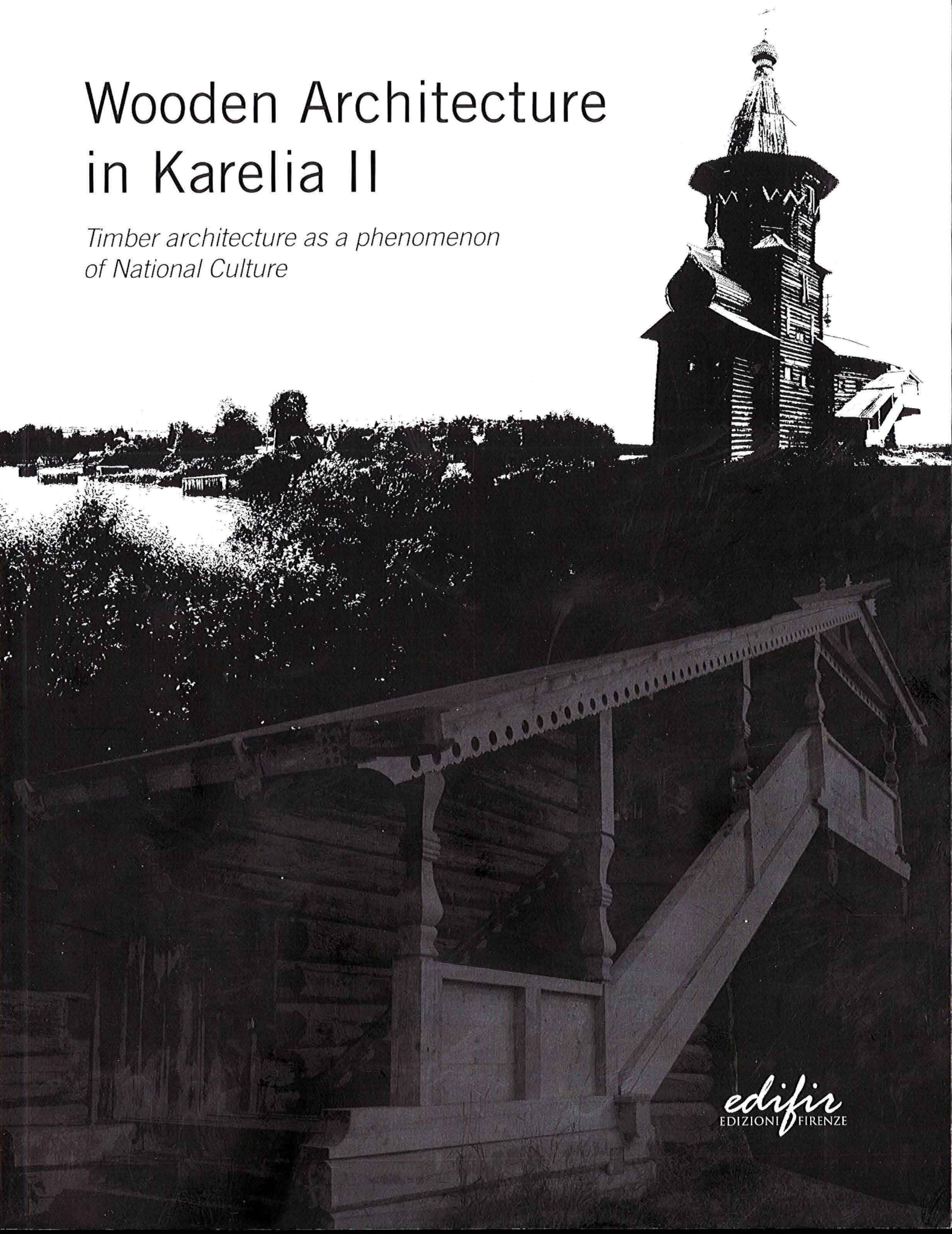


Wooden Architecture in Karelia II

*Timber architecture as a phenomenon
of National Culture*



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Wooden architecture in Karelia II

Timber Architecture as a Phenomenon of National Culture



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Деревянное зодчество в Карелии II
Деревянное зодчество как феномен национальной культуры

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**ANDREA CAMILLI**

Was born in Rome, in 1966, and studied in Rome University, participating in the activities of the roman School of Classical Topography. He participated to several research campaigns in Italy (Especially in South Etruria, Rome, Abruzzo and Piemonte) and abroad (Great Britain, Austria). Since 1999 works in Tuscany as State officer for Archaeology of Saturnia and Populonia areas. Since 2001 directs the Cantiere delle Navi Antiche di Pisa and the connected Centro di Restauro del Legno Bagnato. He published papers about roman ceramic studies, topography and landscape archaeology of central Italy, and coordinates the researches in Populonia Area (in collaboration with the Universities of Roma "La Sapienza", Milano, Roma III, Pisa, Siena, Firenze, L'Aquila). After Pisa discoveries he works in naval and maritime archaeology, particularly in coastal changes problems and harbours, in methodology of archaeological research in wetlands, and in conservation of wet organic finds.

PAOLA PUMA

Was born in Naples on november 30th 1963. After completing her education, she graduated in Architecture in Florence in 1990 and in 1995 achieved PHD in Architecture and environment survey and drawing. She works in the field of architectural relief and survey mapping with documentation activities about modern and ancient architecture. She directed several documentation projects such "Modern Town Centre of Florence survey and mapping" and took part in the direction of the projects "Michelangelo 3d project". Since 2006, after the starting of collaboration with Tuscany Office for Archaeology, she began to work in archaeology documentation and surveys applied to museum design purposes. Senior researcher, she took up service at Florence University, in Architectural Planning Department and teaches Architectural survey.

ESMERALDA REMOTTI

Has achieved in 1990 the Diploma of Degree in Letters with Archaeological address at the University of the Studies in Rome "La Sapienza" and in 1995 she is specialized at the National School of Archaeology (Prehistory and Protohistory), at the same University. Besides she has acquired, from 1999 to 2006, a specialization in the management of the computer system GIS (Geographical Information Systems). She has gone improving her experience of stratigraphical and micro stratigraphical excavation in prehistoric and historic archaeological sites from 2000 on the problems inherent waterlogged environments and the recovery, the documentation and the maintenance of wet organic finds. She has full time collaborated since 2004 to the Yard of the Ancient Ships in Pisa San Rossore, coordinating the operations of stratigraphical excavation, documentation and first conservative aid of the finds. Within the same Yard, the dott. Remotti is currently involved in a pilot project of documentation of the mobile finds of organic nature, and of their microstratigraphic excavation, through the use of Laser Scanners high technologies of tall precision.

Dismounting, conserving, displaying ships; activity of Centro di Restauro del Legno Bagnato di Pisa

The discovery of Pisa in 1998 ships brought to the necessity of creating a centre for the conservation of wet wood; since 2005 the centre is keeping on a program of research in documentation and conservation techniques, while the conservation processes are keeping on. The centre soon became a focal point for national conservation of wet wood themes, being asked for international consulting too.

The paper will focus on the several ship conservation experiences, particularly on:

- Technologies for conservation of wet wood between reversibility and stability
- Preliminar sampling and analysis protocol
- Technologies of scientific documentation before/during dismounting complex structures
- Choices of display and environmental conservation strategy
- Didactic and formation of operators in conservation.

Разборка, сохранение, демонстрация деревянных кораблей; деятельность центра по реставрации древесины

Подвергшейся воздействию воды в г. ПИЗА. В 1998 г. в городе Пиза были найдены старые корабли, и тогда возникла необходимость создания центра по реставрации древесины, подвергшейся воздействию воды. С 2005 г. в центре проводится программа исследований, направленная на поиск оптимальной методики сохранения, и при этом продолжают процессы консервации. В скором времени в центре сосредоточились все работы по сохранению предметов из древесины, подвергшейся воздействию воды; опыт стал востребован и в других странах мира.

В данной работе основное внимание уделяется опыту сохранения нескольких кораблей и в особенности следующие моменты:

- технологии сохранения увлажненной древесины в диапазоне устойчивости и обратимости процесса;
- предварительные пробы и составление протокола анализа;
- выбор способа показа предметов и охрана окружающей среды;
- общие принципы; создание предприятий по сохранению древесины, подвергшейся воздействию воды.

Smotaggio, conservazione e musealizzazione di reperti nautici: le attività del Centro di Restauro del Legno Bagnato di Pisa

Fino dal 1998, scavi nell'area di San Rossore a Pisa hanno portato alla luce i resti di un letto fossile del fiume nel quale, a causa di violente e saltuarie alluvioni, erano affondate più di 30 barche e navi. Le imbarcazioni, databili dal II a.C. al VII secolo d.C., erano davvero in buone condizioni ma emerse immediatamente il profilarsi di un imponente sforzo per progettare e iniziare un organico programma di conservazione. La scoperta delle "Navi di Pisa" nel 1998 portò così alla necessità di creare un centro per la conservazione del legno bagnato e sin dal 1995, il Centro per il Restauro del legno bagnato - CRLB è impegnato in programmi di ricerca sulle tecniche di documentazione e conservazione mentre proseguono e sono tuttora in corso i processi di conservazione dei reperti. Il CRLB è diventato presto un centro di eccellenza nazionale per le tematiche della conservazione del legno bagnato, con richieste di consulenze sugli stessi problemi e partenariato scientifico anche dall'estero. Il contributo qui presentato affronta due temi principali inerenti le differenti esperienze di conservazione delle Navi di Pisa:

- la prossima apertura del Museo delle Navi antiche di Pisa - MNAP
- l'attività del Centro di Restauro del Legno Bagnato - CRLB di Pisa.

Laivojen purkaminen, säilyttäminen ja esittely kuuluu "Centro di Restauro del Legno Bagnato di Pisan" toimintaan

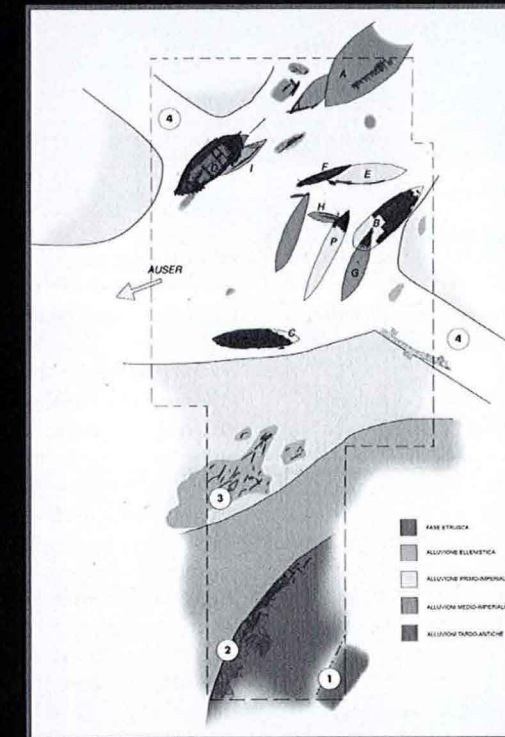
Vuodesta 1998 asti kaivaukset Pisan San Rossoren alueella ovat tuoneet esiin jäänteitä joessa olevasta fossiilista, johon rajujen satunnaisten tulvien johdosta uppoutui yli 30 laivaa ja venettä. Vuosilta 200 eK - 700 jK olevat alukset olivat todellakin hyvässä kunnossa, kunnes valtavan voiman saatteena alkoi niiden luonnollinen säilytys. Pisan laivojen löytäminen vuonna 1998 toi tarpeelliseksi kehittää märkäpuun säilytyspaikan ja vuodesta 1995 il Centro per il Restauro del legno bagnato -CRBD (Märkäpuun restaurointikeskus) on huolehtinut asiakirjoista ja säilytyksestä. Löydösten säilöäminen on edelleen työn alla. CRBD:sta tuli pian märkäpuun säilytyksessä kansallisesti erinomainen laitos. CRBD saa sekä neuvonanto- että tieteellisiä yhteistyöpyyntöjä myös ulkomailta.

Tämä raportti kohtaa kaksi pääaihetta liittyen erilaisiin kokemuksiin Pisan alusten säilytyksessä:

- Museo delle Navi antiche di Pisa:n (Pisan Vanhojen Laivojen Museo) avaus
- Centro di Restauro del Legno Bagnato:n toiminta.

Dismounting, Conserving, Displaying Ships; the MNAP - Museo delle Navi Antiche di Pisa and the Activity of Centro di Restauro del Legno Bagnato di Pisa

Andrea Camilli, Paola Puma, Esmeralda Remotti



1. PLAN OF THE EXCAVATION WITH ITS MAIN PHASES IN EVIDENCE (RED - ETRUSCAN PHASE; ORANGE - HELLENISTIC FLOOD; YELLOW - EARLY IMPERIAL PHASE; BLUE - MIDDLE EMPIRE PHASES; CYANO - LATE ANTIQUITY FLOODS)

Since 1998, excavations in Pisa S. Rossore area, brought to light the remains of a fossil river bed, in which, due to occasional violent floods, sank more than 30 boats and ships. The boats, datable from II century b.C. to VII century A.D., were in remarkable good condition, and needed a strong effort to project and start a full conservation program.

The discovery of Pisa in 1998 ships brought to the necessity of creating a centre for the conservation of wet wood; since 2005 the centre is keeping on a program of research in documentation and conservation techniques, while the conservation processes are keeping on.

The centre soon became a focal point for national conservation of wet wood themes, being asked for international consulting too.

The paper will focus on two main subjects about the several ship conservation experiences, particularly on:

- the next opening in Pisa of Museo delle Navi antiche (September 2009);
- the activity of Centro di Restauro del Legno Bagnato in Pisa.

The Displaying former wet wood: the Museo delle Navi antiche project

In the first part of the paper the aim is to underline the necessity of a precise idea of exhibition and museographic project before starting conservation processes. Treatments in fact, in the last tendencies of archaeological conservation theory, need to be calibrated to the ultimate destination of the object.

The Museo delle Navi Antiche project¹ was born comparing different aims: the big economic effort of wet wood conservation, the necessity of using an historical building with its particularities, and the will of obtaining a full modern museum in concept.

The settlement strategy of the museum has been targeted on three main points:

- the museum is part of a three-party route that foresees the museum visit also of the Cantiere delle Navi Antiche - CNAP and of the Centro di Restauro del Legno Bagnato-CRLB;
- for sustainable environment reasons, the museum could not be housed in a new specially built building but had to be housed in an



2. SHIP D (LEFT) FOUND UPSIDE DOWN; SHIP C (RIGHT), UNDER EXCAVATION

existing to-be-restored historical building, later located in the building of the ancient Medici arsenals of the town of Pisa²;

- the restoration method of the ships had to be compatible with the environment of conservation: without performing huge and complex works of conditioning on such large scale.

The true and actual planning strategy instead revolves on a clearly identified supporting idea: the choice of a museum strongly centered on the exceptional pisan discoveries that makes an introduction to the theme of the navigation, a *Museum of the Ships of Pisa* rather than another *Museum of the Navigation*.

• *The Medici Arsenals*: Cosimo I Medici had the first idea of building in Pisa, around 1540, an arsenal for the ships of the powerful Tuscan fleet, that made part of a project aimed to return to Pisa the ancient splendour, which was lost after the surrender of the town to the Florentine in 1509; the construction of the *Medici Arsenals* started during the years of power of Cosimo I (1537-1574) – and was later continued by the sons Francesco I (1564-87) and Ferdinando I (1587-1609) – in the southern zone of the town, between the Bridge of the Cittadella, the church of S. Agnese and the church of S. Vito.

The arsenal, to whose accomplishment participated also Buontalenti, was articulated in eight naves 60 meters long on average, 8 meters high and about 10 meters wide based on arches leaning on pillars, with sloping roof with wooden structure.

The competition of the shipyards of Livorno and Portoferraio and a changed maritime politics, however, decreed soon its slow but inexorable decline until, in the middle of the XVIII century, under the Lorena, the building had been transformed to host the horses of the regiment of the Dragons.

With the World War II, the bombardments destroyed all the area of the Stronghold (Cittadella), causing the complete collapse of one of the sheds.

• The points of articulation of the museum rules are the following:

- the chronological contextualization: the chronological limits are those included in the sphere of the discoveries of the site, between the Etruscan phase and the late antiquity;
- the environmental contextualization: the context and its discoveries help to supply a framework of the Pisan paleoenvironment in its becoming, under the varied naturalistic, geological, geomorphological and human topography aspects;

- the Mediterranean dimension: through the discoveries we can supply a framework of the movements of heritage, people and ideas in the ancient Mediterranean sea;

- the ancient technology with special reference to the naval one, comprehensible thanks to the important discoveries of the site;

- the modern technology applied for the research and for the preservation of the heritage, comprehensible thanks to the exemplification of the innovative technologies applied in the course of the research;

- a strong educational imprint, consented by the obvious possibility of contextualizing the finds and by the typology of the available spaces.

The archaeological materials, even the most relevant ones, will come therefore placed in three different narrations, the historical and methodological one (theme areas I-III), the contextual one (IV), the functional and socio-economic one (V-VIII).

So it will be possible to place the large quantities of archaeological materials, not only like point of arrival of the information ("described" objects) and like point of development of the information ("describing" objects), but also and above all like information itself, through the reproduction of the original environments either of employment or of discovery.

The result is a museum project of considerable scale, realized on rather possibly modular supports, in order to be able to adapt and transform the exhibition with the continuing of the researches, and with a rather modest employment of technology, given the already sufficient spectacular aspect of the heritage in exhibition.

The large quantity of exposed materials will allow to support in detail, with the varied typologies of building, the theme routes (functional, typological and documentary reading), without however impoverishing the original contexts of the ships, which remain however the focal point of the museum narration.

The museum is articulated in a theme route subdivided in eight main points:

Theme Area I: A site and its environment

Theme Area II: Ports, rivers and floods

Theme Area III: Methodologies of the research

Theme Area IV: The Ships

Theme Area V: The sea trades.

Theme Area VI: The Navigation

Theme Area VII: The Life on Board

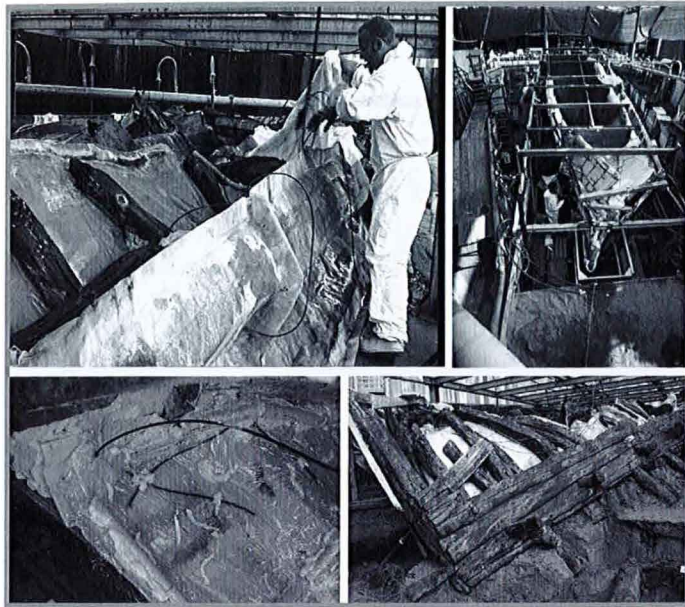
Theme Area VIII: Comparisons for the Naval Archaeology.



3. LUGGAGE WOODEN BOX, II C. A.D. (UP, LEFT); ROMAN TRANSPORT AMPHORA, II C. B. C. (UP, RIGHT); IMPERIAL CLAY LAMPS, I-II C. A.D. (DOWN, LEFT); IBERIC PRODUCTION VASE, II C. B. C. (DOWN, RIGHT)

On the basis of what gathered, it has therefore been established to proceed to a light and flexible preparation, in order to allow the enhancement of the monument-container, recovering in the disposition of the wrecks and the exposed reconstructions, the original function of arsenal, and using to advantage, in the parts that were transformed in stable, the original fragmentation of the spaces with the treatment of themes that precede and conclude the visit of the ships.

At the same time the routes will be organized in order to allow pauses, planning small interruptions moving to relax rooms, true and actual studios with small theme libraries where the iconographical repertory of the museum will be repeated, and to the projection halls, that will deepen the different themes of the museum "story". The isolation of the divided bays with the sheds, dark, allusive, with an illumination coming from the windows and from spotlights fixed

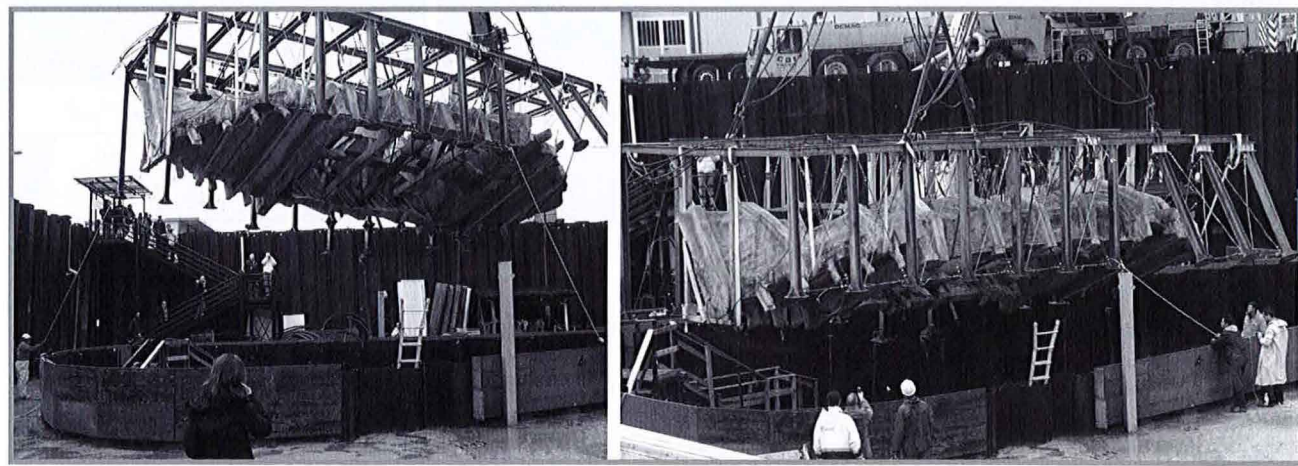


4. CONSTRUCTING GLASS-FIBER BOX FOR SHIP D (UP, LEFT); SHIP C BEFORE LIFTING FROM ON SITE LOCATION (UP, RIGHT); INSIDE WATER-PLUMBING FOR MAINTENANCE OF SHIP D (DOWN, LEFT); THE PROW OF SHIP D ON SITE DURING CLEANING OPERATIONS (DOWN, RIGHT)

on walls and gratings, will favour the concentration on the route and on the treated themes, while the free bays, more properly connected to the original function of ships recovering, with their more lighting will allow the contextualization of the most relevant finds of the museum, the ships.

- *Accessibility to the disabled:* the route, being almost totally plain, is entirely accessible to the disabled. In the same manner the controls of the interactive instruments will be, compatible to the applied technology, located at accessible heights and positions. Some subsections will be immediately supplied with facilities for the unsighted, in the form of a specially studied small route.

- *Museum and Public routes:* the museum route is spacious and extremely articulated and will allow to spend, to highly cautious visitors, a complete visit in around 6/8 hours.



5. UPLIFTING SHIP D IN 2006

In the preliminary studies four different targets were identified:

- (F) *Familiar Target*, private tourists, groups of 3-6 persons
- (S) *School Target*, groups of 15-60 persons
- (W) *"Week-end" Target*, groups of 1-2 persons
- (T) *Scholar/Scientific Target*, groups of 1 person/groups.

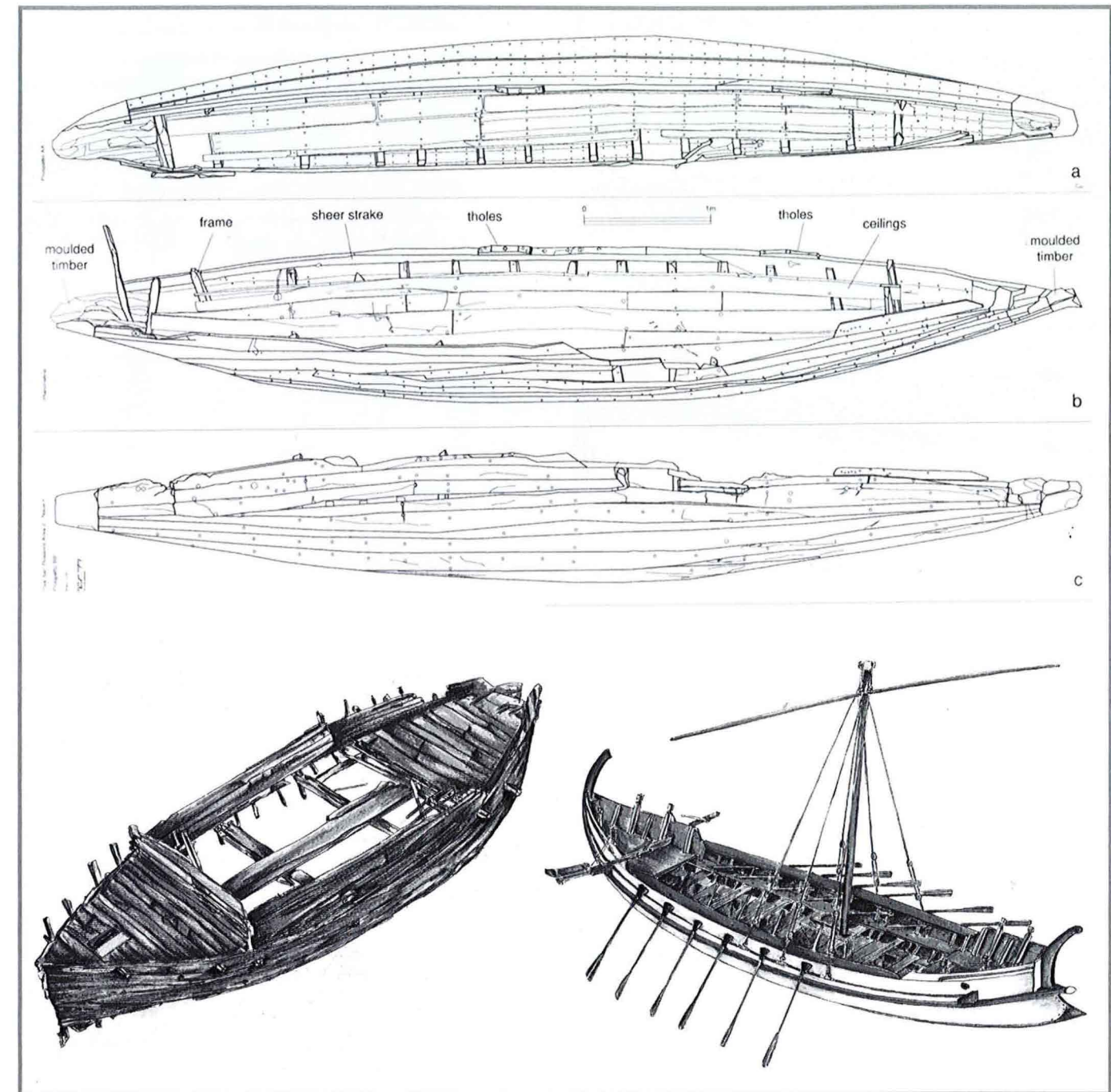
The high scientific value is associated therefore to a strong multilevel educational and popular component, forming the specificity of this museum, all comprehensive of all the aspects of the ancient navigation of the classic age, from the historical ones to the technological, through articulated graphical, textual, multimedia and interactive communication systems.

- *Communication systems:* the texts of the panels or wall screens/totem will be extremely reduced, edited with caution to the expository simplicity and designed according to the general Communication project, including banners, signals internal/external, informative materials, web site web etc.

Dismounting, conserving, displaying ships: the activity of Centro di Restauro del legno bagnato in Pisa

Cantiere delle Navi Antiche di Pisa started in 1998 after the unsuspected discovery of a wide archaeological complex near the S. Rossore railway station, in Pisa. The research started as a rescue excavation, bringing soon to the light a serious amount of various ages shipwrecks. The understanding of the real size of the archaeological context caused the abandoning of the former rescue methods, the planning of a detailed project and the long time planning for the ending of the excavations. The site is a unique context under many aspects. In short, it consists of a thick group of sandy or clayish riverbeds, mixed up with complex clay and sand layers of flood origin. In these flood layers, dated from II century B.C. to at least VII century A.D., lay the remains of at least 30 boats, fully preserved (at least 9) or fragmentary. The ground composition and the presence of waters, filtered by the sandy layers, allowed a remarkable conservation for organic finds, being bigger boats or smaller objects (board tools, ropes, baskets, leather, amphorae contains etc.).

The site can be interpreted as a wide river bed, probably the former bed of the Serchio river, in its crossing with one of the canals of



6. SURVEY OF BOAT F, II C. A.D. (UP), RENDERING OF SHIP D, VI-VII C. A.D. (DOWN, LEFT), RECONSTRUCTION OF SHIP C, BEGINNING OF THE I C. A.D. (DOWN, RIGHT)

the centuriated roman land. Not far from the city walls. The slow flowing of the waters, due to the crossing of the streams, generated a deposit area in which were collected sediments and waste brought by the river. The dramatic floods of Arno river (at least 6 were identified in a range of 9 centuries) brought here the wrecks to sink, some of them still with their cargo.

The discovery of many organic finds, such as vegetal fibers, leather, wood, immediately brought to evidence the sudden necessity of on

site first aid and laboratory conservation. It was then necessary to develop on site techniques to preserve fragile finds in conditions mostly similar to those who preserved them for two thousands years.

It was necessary, at the same time, to prevent any damage from object who became fragile during the transportation, both in the structure of the mounted object and in the structure of the wood.

The use of fiberglass shells seemed then the best solution to these first preservation needs, to obtain a good connection between lift-



7. MUSEUM OF ANCIENT SHIPS OF PISA, RENDERING FROM MUSEUM DESIGN PROJECT

ing and ultimate conservation process. The system, schematically needs, after lying on the wooden surface a net of small silica pipes to maintain it wet³, the creation of a shell built with various layers of selected kinds of fiberglass⁴ and resins, and it has been experimented on wide wooden structures too, such as entire ships.

The experience gained on the field brought to the opportunity of creating, in connection with the site, a fully equipped conservation laboratory, with proper space and instruments for conservation of organic and inorganic finds, such as leather, wood, ceramics, metals, bones, glass.

This project brought to the creation, in 2006, of the Centro di Restauro del Legno Bagnato -CRLB⁵, nearby the site.

When the archaeological emergency ended and the site ended to be a rescue excavation, started the necessity of reconsidering all the *vexatae quaestiones* concerning wet wood treatment, both in a concrete way (involving impregnation, diagnostic, reversibility of treatment, substances to use matters) and in a more ethic and theoretical way⁶.

The solution chosen and applied was to keep on experimenting treatments (not being available an universally accepted conservation technique), and strengthening in the efforts of detailed documentation (to save at least formal shape data in case of treatment failure).

Various finds, between which the ships found, can be ordered in an exceptionally wide range of categories, in terms of wood species, conservation level, complexity of assemblages and structural morphology

of wood itself; we manage from single wooden pieces from collapsed wrecks to almost fully preserved ships (85% of the original).

The techniques applied in the CRLB are then widely different, under various aspects, and chosen singularly for any object or complex. In mechanical terms we adopt both techniques of dismantling and conserving the entire ship; we use consolidants such as polyethylene Glycole (PEG), Colophonia vehicled in Acetone and a Melaminic resin (Kauramin)⁷; wet treated objects are dried in controlled atmosphere, using liofilization or microwaves.

An important question, which can condition seriously the future museum display of the object, is the surface texture and the colour of the treated wooden objects. While traditional PEG treatments bring to dark and plastic-like surfaces, colophonia or kauramin treatments bring to light surfaces, and allow the further application of coloured waxes to reconstruct the original colour.

Credits

Andrea Camilli Director of *Cantiere delle Navi Antiche in Pisa*-CNAP and Director of *Centro di Restauro del Legno Bagnato*-CRLB; MNAP scientific project.

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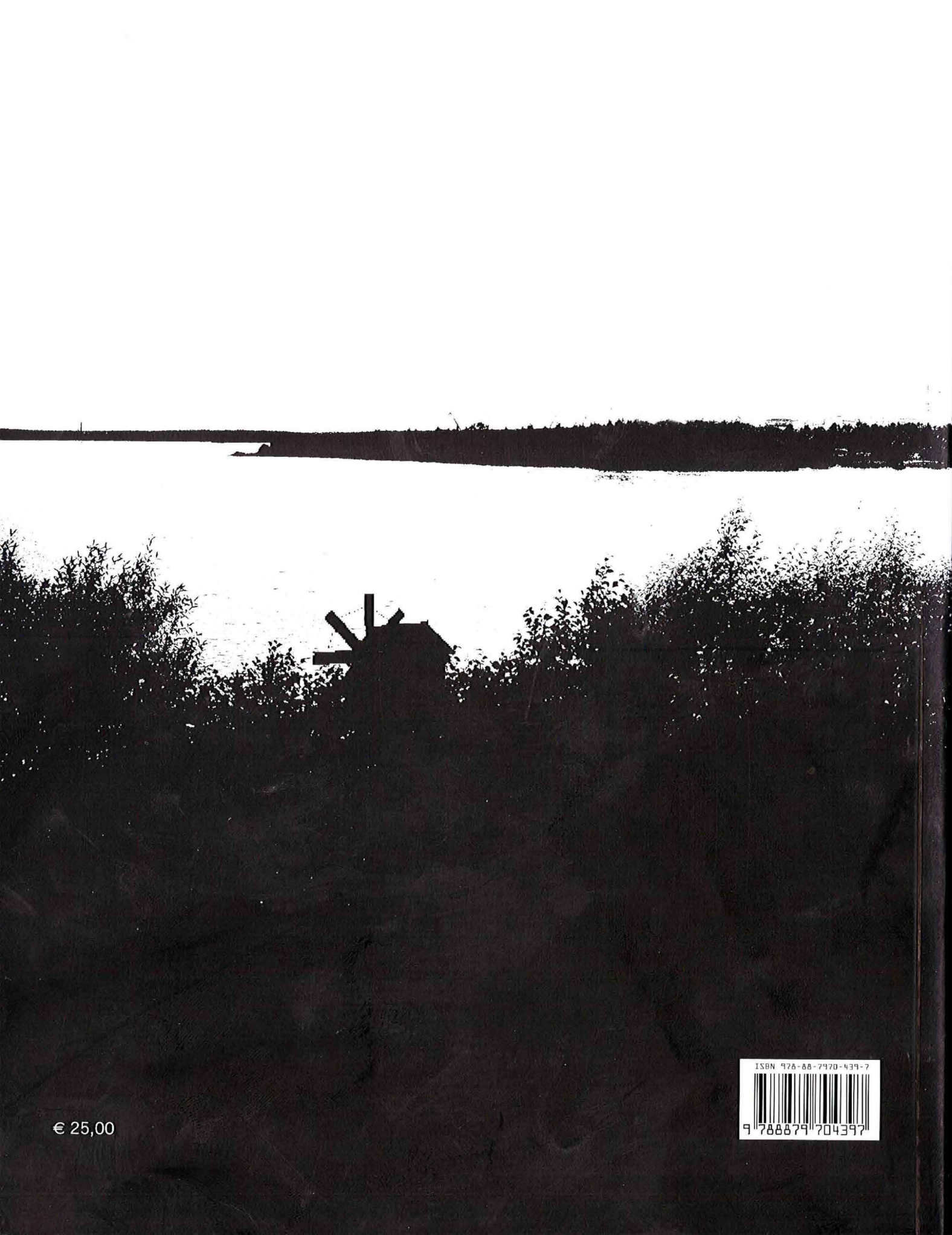
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Notes

- ¹ General Coordinator: Mario Augusto Lolli Ghatti; scientific project: Andrea Camilli, Elisabetta Setari; scientific and exhibition path project collaboration: Angelina De Laurenzi, Alessandra Marino, Anna Patera, Paola Puma, Esmeralda Remotti; Soprintendente: F. Lo Schiavo; Conservation processes F. Fiesoli, F. Gennai; graphics and rendering: C. Ballini, A. Camilli, A. Cutruzzola, G. Degli Innocenti, I. Iacobelli, F. Paoli, M.C. Rinaldoni, M. Zanzotto; materials analysis and production techniques: Sauro Gaddi, Amedeo Cesa Bianchi, Paolo Machetti, Francesco Pippia; web design: M. Masci.
- ² Comune di Pisa, *Pisa e il Museo della Navigazione. Materiali e Percorsi per un Piano Regolatore delle Grandi Istituzioni*, Pisa, 2001; Comune di Pisa, Ecosfera S.p.A., RPA S.p.A., Ernst & Young Financial Business Advisors S.r.l., Leonardo S.r.l., *Studio di fattibilità per la riqualificazione urbanistica di aree della città di Pisa. Recupero e valorizzazione a fini turistico-ricettivi e residenziali di tre caserme nel centro di Pisa*, Pisa, 2001; Comune di Pisa, Ecosfera S.p.A., RPA S.p.A., Ernst & Young Financial Business Advisors S.r.l., *Studio di Fattibilità per la riqualificazione urbanistica di aree della città di Pisa. Primo documento operativo di sintesi sulle ipotesi di attuazione degli interventi previsti dallo studio di fattibilità*, Pisa, 2002; AA.VV., *La trasformazione delle Caserme Storiche. Valorizzazione urbana e percorsi di fattibilità*, Roma, 2004.
- ³ In maintenance and first treatment phases, washing of absorbed minerals, finds are kept under demineralized water, sometimes with added biocide.
- ⁴ Different characteristics for used fiberglass materials, such as of the percentage of the epoxy resin with which have to be evaluated for any single object, considering weight.
- ⁵ The CRLB staff worked in partnership with several UE programs, such as *Anser - Ancient Sea Routes of Mediterranean* (2004-2006), and *Rete dei Musei del Mare* (2007). The CRLB staff works as scientific consulting for main navigation museums: *MARQ* (Alicante, Spagna), *Museo Nacional de Arqueologia Maritima* (Cartagena, Spagna), *Museum für Antike Schifffahrt* (Mainz, Germania).
- ⁶ Cfr. A. CAMILLI, in Conference proceedings "La Diagnostica e la Conservazione di Manufatti Lignei: il legno bagnato": http://www.cantierenavipisa.it/Pubblicazioni_Gradus4.html
- ⁷ The process is being experimented through a collaboration with the Museum Fur Antike Schifffahrt, Mainz (Germany), whose conservation centre applied this technique for 30 years. See Markus Wittkötpe, Current developments in the preservation of archaeological wet wood with melamine/amino resins at the Romisch-Germanisches Zentralmuseum <http://www2.rgzm.de/navis/Conservation/ConservationUK.htm>. The method seems to be actually one of the best for wide dimension woods.

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IN MERITO AL RICONOSCIMENTO DI AUTORELITA' DICHIARA

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Si dichiara che il capitolo:

The displaying former wet wood: the Museo delle Navi antiche project

è stato scritto dalla candidata e che, per scelta editoriale, tale indicazione non è stata mantenuta dall'editore.

Firenze, 14 luglio 2017

In fede
Paola Puma

