2023 World Wood Day Online Symposium &

The Fifth IUFRO Forest Products Culture Colloquium

ABSTRACT BOOKLET

March 21st-22nd (UTC)

2023 World Wood Day Online Symposium &

The Fifth IUFRO Forest Products Culture Colloquium

Date: 21-22 March, 2023

Theme

Wood in Cultural Heritage

Understanding wood as cultural heritage requires wood science and technology research into the material properties of these wood species (including non-wood counterparts), usually concerning their anatomical, physical and chemical characteristics in comparison with sound counterpart materials. Research also focuses on best material conservation/protection practices to enhance their service life (biological durability, abiotic durability). Furthermore, exploring the relationship between wood cultural heritage and the humanities, social sciences and associated behavioral sciences is crucial to strengthen our appreciation on sustaining interest in conservation of wood and non-wood artefacts. Our history of forest resource exploitation and trade, and rectification of damages to improve resources for the future needs to be considered. Such interdisciplinary studies would also include protecting/reviving/conserving relevant traditional woodworking/non-wood processing skills, securing wood and non-wood resource sustainability (ie. sustainable forests) for material production, and educational requirements for wood cultural knowledge. Overall as forests and long-lived forest products recognizably play crucial roles in climate change mitigation by carbon sequestration benefits, reinforcing wood and non-wood forest-based materials for cultural heritage uses will support the need for increased global forest cover with increased use of sustainable wood products as opposed to greenhouse gas-based materials.

Topics

1. Historical Utilization/Trade and Cultural Values of Wood and Non-Wood Forest Products
2. Construction and Buildings Including Wood Durability and Protection Needs
3. Movable Building Components, Furniture, Musical Instruments, Artifacts and Design
4. Education in Understanding Forest Products Culture
5. Challenges and Opportunities for Historical, Contemporary and Future Wood and Non-Wood Forest Products Culture
6. Relationship Between the Humanities, Social Sciences, Behavioral Sciences and Wood Cultural Heritage
7. Related Forest Management, Craftsmanship, Traditional Wood Processing/Wood Working Experiences
8. Forest History and Ancient Forests
9. Archaeological Wood as a (Pre)Historical Archive
10. Wood Products and Wood Biotechnology (IAWS Special Session)

CATALOGUE

2023 World Wood Day Online Symposium Program

Date: 21st-22nd March (UTC)

Tuesday, 21st March 2023		
TIME	SUBJECT	SPEAKER
08:00-08:30	Welcome and Opening Remarks Group Photo	Dr. Andrew Wong, IWCS Honorary Coordinator for Malaysia and Southeast Asia Prof. Yoon Soo Kim, President of International Academy of Wood Science (IAWS) Dr. Yafang Yin, Executive Secretary of International Association of Wood Anatomists (IAWA) Dr. Pekka Saranpää, Coordinator of IUFRO Division 5 Forest Products Dr. Elisabeth Johann, Coordinator of IUFRO Unit 9.03.02 Forest Culture Dr. Jürgen Kusmin, Forest Department, Estonian State Forest Management Centre (RMK) Dr. Michael Grabner, University of Natural Resources and Life Sciences, Vienna (BOKU) / Editor in Chief of International Journal of Culture (IJWC) Dr. Marta Domínguez Delmás, The Autonomous University of Barcelona; University of Amsterdam / Guest Editor Representative of IJWC Special Issue
	Topic 1: Historical Utilization/Trade and Cultural Values of Wood and Non-Wood Forest Products Chair: Dr. Michael Grabner, Senior Scientist, University of Natural Resources and Life Sciences, Vienna (BOKU) / Editor in Chief of International Journal of Culture (IJWC)	
08:30-08:50	Structural System of Historical Log Architecture	Kaori FUJITA*, Mone TSUYUKI, Yoshihiro FUKUSHIMA, Ya-sufumi UEKITA The University of Tokyo
08:50-09:10	Landmark Classics in the Cultural History of Shira-Wood Utensil	Guang-jie Zhao & Chao Li Beijing Forestry University / Zhejiang Sci-Tech University
09:10-09:30	Nanmu (Phoebe sp.) in Archaeological Discovery: Architec-tural Materials in Burials and Long- distance Transport in Pre-imperial and Early Imperial China	Chenghao Li Institute of Cultural Relics and Archaeology of Shandong
09:30-09:50	Punta Prima Project (Formentera, Spain) From Trees to Ships: Timber, Cultural Interaction, and Climate in the Early Roman Empire	Enrique Aragón Núñez University of Almeria
09:50-10:10	Geographical Distribution of the Top Prioritized Plant Species in the Forests Over Limestone of Samar Island Natural Park, Philippines	Marne G. Origenes*, Inocencio E. Buot, Jr. and Ren Divien R. Obeña University of the Philippines Los Baños
10:10-10:25	Coffee Break	
10:25-10:45	Fate of China Fir	Congcong Ren Beijing University of Civil Engineering and Architecture
10:45-11:05	Experiences of Wood Identification on Cultural Heritage: from Aboriginal Artifacts to Fine Cabinetry	Flavio Ruffinatto University of Turin - DISAFA
11:05-11:25	Illumination of the Past and the Future – Prinkipo Orphanage	F. Digdem Tuncer Istanbul University-Cerrahpasa, Faculty of Forestry
11:25-11:45	From Forests to the Cabinet. A look Through the Biographies of the Gunayala Carvings located in the Världskulturmuseet	Nuria Romero Vidal Universidade de Santiago de Compostela
11:45-12:05	The Great Difference in Wood Selection of the Eastern and Western Himalayas	Mechtild Mertz French National Centre for Scientific Research - CNRS
12:05-13:05	Lunch	
	Topic 4: Education in Understanding Forest Products Culture Chair: Dr. Pekka Saranpää, Principal Scientist, Forest products and biorefinery, Natural Resources Institute Finland / Coordinator of IUFRO Division 5 Forest Products	
13:05-13:25	SWST Student Chapters as A Means of Deepening Aspects Related to Wood Culture	Francesco Negro*, Tamara França, Eric Hansen, Victoria Herian and Luis Yermán DISAFA, University of Torino

	Topic 6: Relationship Between the Humanities, Social Sciences, Behavioral Sciences and Wood Cultural Heritage	
13:25-13:55	Forest and Shipbuilding in Historiography: State of the Art and Some Research Questions	Ana Crespo Solana Consejo Superior de Investigaciones Científicas (CSIC)/ Spanish National Research Council
13:55-14:15	Ethnobotanical Study of Woody Plant Species in Lake Danao Forest Landscape, Ormoc Leyte, Philippines	Anne Frances V. Buhay*, Arturo E. Pasa, Shaina Mae S. Figueroa, Inocencio E. Buot Jr. Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños
14:15-14:35	Sweet Impressions: Carved Wooden Confectionery Molds	Julia Harrison Penland School of Craft
14:35-14:55	Exhibition of the 13th c. Wooden Building from the Vilnius Castles as a Window to the Prehistory of the Rise of the City	Rūtilė Pukienė National Museum – Palace of the Grand Dukes of Lithuania
14:55-15:05	Gendered Perspective on Forests over Limestone's Ecosystem Services and Conservation Actions in Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS), Guiuan, Eastern Samar, Philippines	Noba F. Hilvano* & Ren Divien R. Obeña Eastern Samar State University
15:05-15:20	Coffee Break	
	Topic 2: Construction and Buildings Including Wood Durability, Protection and Conservation Needs Chair: Dr. Marie-France Thévenon, Unité de Recherches BioWooEB, CIRAD / Coordinator of IUFRO Research Unit 5.03.00 Wood Protection	
15:20-15:40	Wooden Roofing: Split Shingles versus Sawn Boards	Michael Grabner*, Sebastian Nemestothy, Elisabeth Wächter University of Natural Resources and Life Sciences, BOKU, Vienna, Austria
15:40-16:00	Natural Durability of Indian Timbers Towards Microtermes *obesi Holmgren* with Special Reference to Artocarpus Species	Upasna Sharma Forest Research Institute (FRI), Dehradun, India
16:00-16:20	Envelope Treatment of Wood with a New Generation Wood Preservative based on Vegetal Extracts-Cypermethrin Components against Destructive Termites	Daouia Messaoudi and Andrew H.H. Wong Groupe Berkem, R&D Laboratories/ International Research Group on Wood Protection (IRGWP), International Wood Culture Society
16:20-16:40	Wood Conservation Technology and Cultural Inheritance in the Restoration of Chinese Ancient Buildings	Yujie Han China Wood Protection Industry Association
16:40-17:00	Development of Natural Plant Based Photostabalisers as Coatings for the Wooden Surface	Laqshika Patiyal Dr. Y.S Parmar University of Horticulture and Forestry, Nauni Solan

Wednesday, 22nd March 2023		
TIME	**SUBJECT**	**SPEAKER**
	Topic 9: Archaeological wood as a (Pre)Historical Archive Chair: Prof. Raquel Piqué Huerta, Department of Prehistory / Archaeobotany Laboratory, The Autonomous University of Barcelona	
08:00-08:30	New Approaches to Iron Age Woodcrafts: the Case Study of Northern Iberia	María Martín Seijo Universidad de Cantabria
08:30-08:50	Burned Wood as a Cultural Marker? Archaeological Charcoal and Early Societies of the Great Basin	Liard Aurélie Université Côte d'Azur, CNRS UMR 7264 CEPAM, Nice, France
08:50-09:10	Shining a Light on the Past: Improved Chronology for Aotearoa-New Zealand Using Tree-Ring Based Radiocarbon and Stable Isotope Science	Gretel Boswijk*, N. Loader, A. Hogg, L. Schwendenmann, D. Johns Te Kura Matai Taiao School of Environment, Waipapa Taumata Rau, The University of Auckland
09:10-09:30	Wood Management and Arboriculture Practices in the IESSO's (S. II bC - VI aD) and VILAUBA's (s. I bD - VII aD) Settlements	Eva Maria López Castillo*, Oriol López-Bultó, Anna Berrocal Barberà, Raquel Piqué Huerta, Pere Castanyer, Joaquim Pera, Esther Rodri-go Department of Prehistory, UAB
09:30-09:50	Contributions of Stable Isotope Dendrochronology to Dendro-archaeological Studies of Architectural Timbers from the Rising Whale Site, Northwest Alaska (10th-12th centuries)	Juliette TAÏEB*, Valérie DAUX, Claire ALIX Univ. Paris 1 Panthéon-Sorbonne / UMR 7041 ArScAn – Archéologies en-vironnementales, CNRS
09:50-10:05	Coffee Break	

	Topic 7: Related Forest Management, Craftsmanship, Traditional Wood Processing/Wood Working Experiences Chair: Dr. Marta Domínguez Delmás, Guest Researcher, The Autonomous University of Barcelona; University of Amsterdam / Guest Editor Representative of IJWC Special Issue	
10:05-10:25	The Neolithic Woodworker. Understanding Material Culture and Environment in the Pre-Historic Age	Mark Griffiths Independent
10:25-10:45	Factors Influencing Vegetation Structure in Forests over Lime-stone in Guiuan Marine Resource Protected Landscape and Sea-scape, Samar Island, Philippines	Ren Divien R. Obeña* & Inocencio E. Buot Jr. University of the Philippines Los Baños
10:45-10:55	The Wonder Pest: Suitability of Paper Mulberry for Furniture, Handmade Paper, and Briquette	Juliust T. Pelegrina Department of Sciencean Technology- Forest Products Research and Development Institute
	Topic 8: Forest History and Ancient Forests	
10:55-11:15	History of Wood Anatomy Research in India	Sangeeta Gupta Wood Anatomy Discipline, Forest Research Institute, Dehradun-248006, INDIA
11:15-11:35	Fire, Water, Wood: The Entanglements of Forestry and Maritimity in the South Carolina Lowcountry	Sara Rich Coastal Carolina University
11:35-12:35	Lunch	
	Topic 3: Moveable Building Components, Furniture, Musical Instruments, Artefacts and Design Chair	
12:35-12:55	Bamboo Species Used in the Bamboo Musical Instruments of Selected Indigenous Peoples (IPs) in the Philippines	Jennifer M. Conda Dpt. of Science and Technology – Forest Products Research and Development Institute (DOST-FPRDI)
12:55-13:15	Combining Woodworking Features, Tree Rings, DNA and Radiocarbon to Reveal the Production Time and Place of a Historic Foot Cuff from the Rijksmuseum Collections (Amsterdam, the Netherlands)	Marta Domínguez-Delmás The Autonomous University of Barcelona / University of Amsterdam
	Topic 5: Challenges and Opportunities for Historical, Contemporary and Future Wood and Non-Wood Forest Products Culture	
13:15-13:45	Connecting Forest Products to the Forest	Cynthia (Cindi) D. West Northern Research Station & Forest Products Laboratory
13:45-14:05	Going Native: Challenges and Opportunities in Philippine Native Tree Species Utilization	Karl Abelard Villegas* & Consuelo DL Habito University of the Philippines Open University
14:05-14:25	Harnessing *Allaeanthus luzonicus* (Blanco) Fern.-Vill. – A Phenocalendar-Based Production for Household Food Sufficiency in Northern Philippines	Menisa A. Antonio*, Evangeline S. Galacgac & Rodel T. Utrera Mariano Marcos State University
14:25-14:45	Earthfast Posts and Timber-Framing in Late Medieval Flanders. An Archaeological and Building Historical Study of Urban Housing Between 1200 and 1500	Lennert Lapeere Ghent University, Department of Archaeology (Historical Archaeology Research Group of NW Europe)
14:45-15:00	Coffee Break	
	Topic 10: Wood Products and Wood Biotechnology (IAWS Special Session) Prof. Stavros Avramidis, Department of Wood Science The University of British Columbia / Vice President of International Academy of Wood Science	
15:00-15:20	Application and Preparation of Nanocellulose-based Nanozyme Using Metal or Carbon Nanomaterials	Seung-Hwan Lee Division of Wood and Paper Science, Kangwon National University
15:20-15:40	Cross-laminated Bamboo and Timber (CLBT)	Yan Xiao Zhejiang University, ZJU-UIUC Joint Institute
15:40-16:00	How to Measure and Predict Wood Cutting Force Precisely?	Ondrej Dvoracek Wood K plus – Kompetenzzentrum Holz GmbH
16:00-16:20	Functional Anatomical Traits to Assess the Impact of Environmental Changes on Species Vulnerability and Wood Properties	Veronica De Micco University of Naples Federico II, Dept. Agricultural Sciences

16:20-16:35	Coffee Break	
16:35-16:55	An Investigation into the Effect of Durability Treatment on Adhesive Bonding of Eucalyptus Grandis Wood	Adefemi Adebisi Alade University of Idaho
16:55-17:15	Adhesion Mechanisms in PVC/Wood-Fiber Composites	Laurent Matuana School of Packaging, Michigan State University
17:15-17:35	Updating the Concept of Juvenile Wood, in a New Conceptual Framework	Rowland Burdon Scion (New Zealand Forest Research Institute Ltd)
17:35-17:55	Tailored Mesoporous Structures of Lignin-Derived Nano-Carbons	Lu Yu Oak Ridge National Laboratory

Abstract

Historical Utilization/Trade and Cultural Values of Wood and Non-Wood Forest Products

Structural System of Historical Log Architecture

Kaori FUJITA[1*], Mone TSUYUKI[2], Yoshihiro FUKUSHIMA[3] and Yasufumi UEKITA[4]

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Abstract

Log architecture has been one prototype of traditional timber structure in many regions rich in forest resources. The authors have been operating on-site investigation on historical log architecture in Japan and East European countries for the past seven years. Through multiple onsite investigation it has been identified that there are similarities as well as many difference amongst these historical log architectures. The most prominent difference is in the shape of the log sections. The sectional shapes of the historical log architecture are round, square, or rectangular. But in Japan log architecture using triangular section (pentagonal or hexagonal section to be precise) logs are found. The logs used in these "triangular log architecture (*azekura* in Japanese)" are stacked on top of each other with the ridge line facing outside and the flat surface to the inside constituting a distinct exterior wall. Many of these "triangular log architecture" are of cultural value. There are 43 "triangular log architecture" in Japan constructed before the mid-19th century, and out of these 37 are designated as cultural properties by the national or local government. The oldest date back to the 8th century, and many of these buildings are used as treasure house to keep precious objects within temples or shrines.

The distinct triangular section result in highly complex joints at the corners. But the information of the shape of joint is not well known. The result of

literature survey of the joint used in log architecture by the authors is presented, together with their structural system. Finally, the similarity and difference of historical log architecture are discussed based on multiple examples from Japan, Ukraine and Poland together with the possible preservation methodologies.

Nanmu (Phoebe sp.) in Archaeological Discovery: Architectural Materials in Burials and Long- distance Transport in Pre-imperial and Early Imperial China

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Abstract

The extensive use of wood in burials is a unique and longstanding tradition in China. During pre-imperial (770-222 BCE) and early imperial (221 BCE-25 CE) China, the coffin and chamber in a tomb could consume a great amount of wood. These wooden architectural structures became increasingly sophisticated during the early empire period, with the tomb of Empress Dowager Ding, dating back to the Western Han dynasty (5 BCE), being the most representative example. The tomb, located in what is now Shandong province in northern China, is the only empress-level tomb that has been excavated in China. The finds in this tomb include a thousand tons of finely processed wooden components that have been well-preserved due to the long-term waterlogged condition. Through anatomical observation and analysis, we identified nearly a hundred tons of Nanmu (*Phoebe sp.*), a precious tree species transported from south China. Based on this discovery, we further collected all the published archaeological remains of Nan-

mu from prehistory to the Western Han dynasty to understand the extensive burial use and long-distance transport of this wooden material. Our research indicates that the transport of Nanmu began during the Western Han dynasty and that consumers of Phoebe Nanmu included the ruling class and wealthy people without nobility. This suggests that Nanmu became a new material expression of social identity in the Western Han period, with the ruling class using large quantities of Nanmu in tombs to demonstrate their noble status and wealthy people purchasing Nanmu as luxury goods to show their wealth through the imitation of nobility symbols.

The Great Difference in Wood Selection of the Eastern and Western Himalayas

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Abstract

Temples and their wood species had been studied and microscopically identified in the Eastern and Western Himalayas. The Eastern Himalayas are under the influence of the monsoon, that bring a lot of heavy rain periodically. Whereas the Western Himalayas are considered a dessert area with little rain. In both areas the wood of Buddhist temples were studied microscopically. The temples were under the influence of Tibet and Tibetan Buddhism. Tibetan Buddhism evolved as a form of Māhāyāna Buddhism. It thus preserved many Indian Buddhist tantric elements.

As for the Eastern Himalayas Mechtild Mertz investigated five temples and

one vernacular house in the Indian country of Sikkim in order to understand, which wood species were used, as for the Western Himalayas she studied the wood species also of five temples, two stupas and three vernacular houses.

In Sikkim, twenty wood species were identified, while in the Western Himalayas, or Ladakh area along the Indus River, only four wood species were identified. Wood samples were collected from main pillars and important beams from each building. In the case of Sikkim in the Eastern Himalayas, 2700-3200 mm of annual rainfall is normal, while in the Western Himalayas, along the Indus basin, the annual rainfall is up to 100 mm.

The areas in Sikkim range from tropical, temperate to alpine vegetation, as Ladakh is a more dessert-like, cold area. Most buildings are in Ladakh's capital Leh, that is around 3500 m high; the tree species identified are *Michelia doltsopa* similar to *Magnolia* sp, *Shorea robusta*, and *Picea* sp.

In the Western Himalayas, along the Indus River, the main wood species identified are *Populus* sp. and *Salix* sp.

For more information, please look at:

- Mertz, M. "Wood Identification of Ancient Temple Structures in Ladakh, Located in the Western Himalayas". International Journal of Wood Culture, 2021, 1 (1), pp.3-27.
- Mertz M., Gupta S., Yutaka H., De Azevedo P., Sugiyama J. "WOOD SELECTION OF ANCIENT TEMPLES IN THE SIKKIM HIMALAYAS", IAWA Journal, 2014, 35 (4), pp. 444-462.

Punta Prima Project (Formentera, Spain) From Trees to Ships: Timber, Cultural Interaction, and Climate in the Early Roman Empire

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Abstract

The Roman Empire expanded its influences across the Mediterranean Sea by establishing a wide network of trade routes. In this system, ships and boats were essential conveyors of natural resources, manufactured products, and cultural aspects, connecting various communities and societies. Seagoing vessels represented the technological avant-garde of their times. Wood was the primary material used to build them, and timber, next to the traded goods and technological ideas, was a pillar sustaining the growth and dominance of the Roman Empire. The proposed paper is part of Punta Prima Project. The shipwreck dated to the 2nd century B.C. located off the coast of Formentera (Spain) is an object of studies on trade routes and cultural contacts, adding greatly to the material culture database, but also the knowledge about the naval architecture (the presence of hull remains was confirmed, which is not that common for the aforementioned area). What is more, the research is concerned with the methods of in situ preservation and the topic of maritime dynamics, affecting the underwater cultural heritage. Underwater archaeological sites are importantly providing the organic material for studies, including the aforementioned timber, which allows for multiple analysis, and, effectively, inferences in the matter of wood supply, shipbuilding, and climate. Modern comprehensive shipwreck studies can only be addressed with a multidisciplinary approach, that combines archaeology not only with history, but, equally importantly, with natural sciences, and pays equal attention to research and public outreach.

Geographical Distribution of the Top Prioritized Plant Species in the Forests Over Limestone of Samar Island Natural Park, Philippines

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Abstract

Forest resources in Samar Island Natural Park (SINP) are depleting, especially the commercially marketable products identified as the most exploited resources in the protected area. The continuous trend will have a negative impact on SINP's floral diversity and hence, ecosystem services. Information on plant species distribution exposed in such risk is helpful in identifying appropriate management schemes for the conservation of flora in SINP. Hence, this study was carried out to map the distribution of the top prioritized plant species in SINP's forests over limestone, and to provide a true picture and status of the top prioritized plant species (PPS). The CONserve-KAIGANGAN Program, on its second phase of implementation, ranked plant species in SINP based on its localized conservation priority index (LCPI) to come up with the conservation prioritized plants (CPP). The CCP categorized as high priority level were geotagged and mapped using QGIS. The geographic distribution of the prioritized plants in the Philippines was determined 3 using Co's Digital Flora, while the conservation status of each CPP was determined using the Updated National List of Threatened Plants (DAO 2017-11) and IUCN Red List of Threatened Species. Results revealed 27 CCP with high priority requiring strict harvesting regulations. *Shorea negrosensis* and *Hancea wenzeliana* are the only CPP abundant in SINP, while the rest have few occurrence points throughout the Philippines. Moreover, DAO 2017-11 classified nine (9) threatened CCP, while IUCN

identified 16 threatened CPP in SINP. These CPP are economically important and are used for a variety of purposes. However, many of these top CPP have little or no information about their threats, making conservation decisions difficult for policymakers. This emphasizes the importance of additional research, not only for the top CPP in SINP, but for all threatened endemic species with few occurrences in the Philippines.

Fate of China Fir

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Abstract

Ming yun is the Chinese compound word for fate. Specifically, ming (destined) refers to the inherent nature of an object, and yun (variable) refers to the transformation of time and space. Combined, the two morphemes describe the transformation of a particular object in time and space. As an extremely oriental term, it not only expands to non-human objects at the subject level but also considers temporal and spatial variations. Focusing on the fate of China fir, this study intends to narrate the history of symbiosis between China fir and humans, which spans 10,000 years. The ming of China fir is understood as its naturalness, whereas its yun denotes its changes and participation in social construction after meeting with humans. With reference to the theoretical model in Environment and Techniques (1945) by Andre Leroi-Gourhan, this study aims to elucidate the changes of external and interior milieus across periods from the perspective of the China fir and to continue observing the accumulation of environmental changes. Moreover, it describes the natural history that emerges with

communities of the species on the basis of the development of human technology. Finally, taking Shunchang County in Fujian Province, which is the centre of China fir production, as a field site, the study compares technological items made of China fir in pre-modern and global capitalist societies to examine the mechanisms of contingency and social or natural traditions.

Experiences of Wood Identification on Cultural Heritage: from Aboriginal Artifacts to Fine Cabinetry

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Abstract

The knowledge of the timber used in an artifact belonging to the cultural heritage is recognized by the Italian Standard "UNI 11161:2005. Cultural Heritage – Wooden Artefacts – Guideline for conservation, restoration and maintenance" as fundamental information for its study, conservation, and restoration. Scientific wood identification on cultural heritage is mostly performed through anatomical analysis, at the macroscopic and microscopic levels. In this contribution, the author takes the cue from different cases of study, that span from aboriginal artifacts to archaeological finds, to Italian fine cabinetry, to discuss how the type of object, its conservation status, and the context of the investigation influence the approach and the insights that can be retrieved.

Illumination of the Past and the Future – Prinkipo Orphanage

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Abstract

Büyükada Orphanage (also known as Prinkipo Palace or Büyükada Greek Orphanage) was designed and built in 1898 as a hotel building on one of the nine Islands in the Sea of Marmara (Istanbul, Turkey). When the permission to use it as a hotel could not issue, it was purchased by a benefactor and converted into an orphanage with necessary additions. The orphanage was opened as a subordinate of the Greek Patriarchate in 1903 until closed in 1964. The importance of the building is associated with being considered the largest wooden building in Europe with 50.000 m3 volume constitutes and the second largest in the world at the time of its construction. In order to illuminate the past and the future, identification of the wood samples used in various parts of the building was determined by microscopic methods. As a result of the examination of the samples taken from eight different areas, it was determined that two of the samples belonged to spruce, three to fir, and one for each sample to hard pine, oak and cedar trees. As a result of this study with wood identification, the preferences of this magnificent structure and indirectly the wooden-based structures of Istanbul's late 19th century were clarified and a basis for the restoration works was formed.

From Forests to the Cabinet. A look Through the Biographies of the Gunayala Carvings located in the Världskulturmuseet

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Abstract

The Världskulturmuseet (Museum of the World Culture) in Gothenburg (Sweden) hosts a large collection of wooden objects from Gunayala (Panama) whose origins date back to the late 19th and early 20th centuries. This collection integrates sculptures such as the nudsugana, anthropomorphic and zoomorphic carvings with their own agency used in healing rituals. These special objects have a very particular life cycle: from their birth from specific trees, their carving process, and the acquisition of agency, through their useful life to the loss of their agency and their passage to toys or objects in private or museum collections.

By addressing the information obtained through the study of several of these sculptures of the Gothenburg collection, we will deepen our understanding into the biography of these wooden sculptures focusing on their double materiality: the tree and the object. We have tried to trace a long journey from the forests where they were born to the Världskulturmuseet's deposit and permanent exhibition. To reconstruct this long-life cycle, associated ethnohistoric documentation has been revised, including correspondence, maps, drawings, and photographs during anthropological expeditions as well as the information and notes accompanying the objects. In addition to these ethnographic resources, it has been possible to register wood macroscopic and microscopic features in order to analyze the correspondences between the notes' transcriptions and the taxonomic identifications. Finally, some questions related to the carving process were also

used as a guide to trace their biographies. Going deeper into this journey is essential both to understand the complex environmental and cultural information stored in this type of carvings and propose new ways to manage indigenous heritage in ethnographic collections.

Landmark Classics in the Cultural History of Shira-Wood Utensil

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Abstract

In order to establish the status of shira-wood utensil culture in the cultural category of wood species and to further build cultural confidence in the process of promoting shira-wood culture and the healthy development of the shira-wood industry, in this paper, the natural properties of shira-wood in terms of anatomical, physical, and visual characteristics are first explained. Then the cultural characteristics of shira-wood and non-shira-wood are discussed, and their differences are compared. Finally, we systematically discuss the profound cultural connotations and exquisite techniques of the landmark classics in the cultural history of shira-wood utensil in the narrow concept from the perspectives of the shira-wood natural characteristics, the shira-wood utensil processing techniques, and cultural characteristics. The results demonstrate that: (1). Landmark classics of the shira-wood utensils show the wide range of cultural life and long cultural history of the shira-wood utensil. They involve hunting tools, palaces, temples, mausoleums, furniture, boats, musical instruments, chess sets, and other fields. (2). Landmark classics in the development of shira-wood utensil culture feature outstanding material selection, exquisite skills, and distinct cultural characteristics. (3). Shira-wood utensil culture is unique in the cultural category of various wood populations and has an irreplaceable and essential component in leading the development of wood culture forward.

KEYWORDS: Shira-wood; Utensil culture; Development process; Landmarks; Classics

Construction and Buildings Including Wood Durability and Protection Needs

Wooden Roofing: Split Shingles versus Sawn Boards

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Abstract

Wooden shingles have been known in Europe and other regions worldwide for several thousands of years. They are usually split, and according to handicraft rules, as well as historical literature, a split surface has many advantages. It is more flexible, more elastic, stronger, and less exposed to cupping than a sawn surface because no fibers have been cut. It also follows wood rays; it is more durable than a sawn surface because cut fibers absorb more moisture, creating good conditions for fungal growth.

However, because sawing is the main procedure for dividing logs into timber, sawn boards are currently used for roofing. The short life span of such roofing has often been discussed by craftsmen.

In this study, a 37-year-old roofing was evaluated to determine the important parameters of high-durability sawn boards. Results showed that the presence of juvenile wood, fiber deviations, and knots reduced the durability of these boards. Therefore, sawn boards of the same wood quality as split shingles may have the same durability.

Wood Conservation Technology and Cultural Inheritance in the Restoration of Chinese Ancient Buildings

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Abstract

Chinese wooden ancient buildings are important parts of traditional wood culture, carrying rich cultural connotations and historical memories. Due to various factors, many ancient buildings have been damaged. To protect these cultural heritages, wood conservation technology and cultural inheritance in the restoration of ancient buildings have become very important. This paper introduces the wood conservation technologies applied in the restoration of ancient buildings, including traditional wood structure construction techniques and modern wood anti-corrosion, insect prevention, fire prevention and other technologies. The advantages, disadvantages, and application scope of these technologies will also be discussed, as well as prospects for future innovation. This paper emphasizes the importance of the relationship between wood conservation technology and cultural inheritance, and focuses on how wood conservation technology in the restoration of ancient buildings can be combined with cultural inheritance. It will introduce some excellent examples of cultural inheritance of Chinese wooden structure ancient buildings, including traditional wood structure construction techniques and the history and culture of restoration of Chinese ancient buildings, to promote the protection and development of cultural heritage of ancient buildings.

Envelope Treatment of Wood with a New Generation Wood Preservative based on Vegetal Extracts-Cypermethrin Components against Destructive Termites

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Abstract

Global trend in wood protection research involves developing cost-effective, environmentally acceptable wood treatment solutions for long term carbon storage in wood products (including historical wooden cultural properties) which appeals to consumer needs for such effective treated wood requiring only minimal volumes of preservative solution uptake on to the wood and thus ascertaining a low environmental impact of the treatment process. A 6-month field aboveground termite test in a termite-infested forest locality near Kuching, Sarawak/Malaysia, revealed conclusively that a new generation wood preservative (patented by Groupe Berkem, France), based in part on vegetal extracts (polyphenols) and cypermethrin components, is able to confer long term wood protection against the voracious *Coptotermes* subterranean termites that are well-known wood destroyers. Prior to termite testing, envelope-treated Malaysian hardwood kempas (*Koompassia malaccensis*) were subjected to a rigorous laboratory evaporative ageing to simulate severe long term indoor weathering of wood used aboveground, indoors. Reference evaporatively aged envelope-treated kempas employed a commercial light organic solvent (LOS) preservative containing partly permethrin. The termite test results demonstrated irrefutably that kempas without treatment was se-

verely attacked if not totally consumed by *Coptotermes curvignathus*, but was TOTALLY protected by both the new generation preservative and the reference LOS preservative despite very low surface cypermethrin and permethrin retention from these treatments. This new generation cypermethrin-based preservative therefore can offer considerable long-term anti-termitic protection to all forms of wood products, including historical wooden properties, exposed aboveground indoors. The excellent anti-termitic performance of this new generation wood preservative compares favourably with two other new generation (microemulsion-based permethrin and cypermethrin), preservatives of Groupe Berkem reported elsewhere.

Key words: wood protection, envelope treatment, pyrethroid, termite test, *Coptotermes curvignathus*, kempas

Development of Natural Plant Based Photostabalisers as Coatings for the Wooden Surface

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Abstract

Keeping in mind the sustainable development goals: Eco-friendly biodegradability, economical sustainability and cleaner production technologies have become key factors in delivering products to the market. Wood being one such material is a biopolymer known for its renewability and high aesthetic value. Wood is a biological entity and is prone to degradation by biotic as well abiotic agents. One such degradation which is of great concern

to the wood-based industries is the photodegradation of wooden surface due to UV radiation. The UV exposure leads to the discoloration of the wooden surface owing to degradation of lignin component present in the wood. In order to protect the surface wood-based industries use synthetic organic photostabalisers (HALS-Hindered Amine Light Stabiliser, hydroxyphenyl benzoate, Hydroxyphenyl benzotriazols etc.) which are bio accumulative and toxic to the environment. Hence there is need of research which focuses on development of eco-friendly coatings to the wooden surface. There are a number of plants which are known for their anti UV activity. The proposed work therefore focuses on development of natural plant based extracts to be used as potential photostabalisers. Recent studies have proven natural plant extracts (example: bark extracts from heartwood of Acacia confusa) to be used as potential photostabalisers. FTIR analysis, light fastness test using QUV accelerated weathering tester, colour analysis has shown significant results regarding photostabalization of wooden surface as compared to the synthetic photostabalisers available in the market. This cleaner technology can help prevent the accumulation of toxic affluents in to the environment and also increase the shelf life of wood to be used for multiple uses ranging from furniture to buildings.

Natural Durability of Indian timbers towards *Microtermes obesi* Holmgren with special reference to *Artocarpus* species

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Abstract

An enormous number of commercial timbers are prone to parasites due to the exudates they possess and are worth protecting. These exudates could be responsible for both susceptibility and resistivity of plants towards diseases. In plants; they are stored into cavities or ducts and are referred as secretions. We observed that an assembly of enemies are lined up to attack only wood hand samples of *Artocarpus chama* and not any other tree species that were stored in Xylarium (DDw) – Forest Research Institute, Dehradun, Uttarakhand, India. On further investigation, *Microtermes obesi* Holmgren; a termite of insect group was identified from microscopic slides and appeared as the first ever reported woody parasite on *Artocarpus chama*. Insect attack towards specific timber is attributed to its anatomical, biochemical and physiological features. The findings could be useful in wood seasoning and preservation of *Artocarpus chama* to maintain the durability of timber. A number of heartwood timbers exhibited resistance towards *Microtermes obesi*. Therefore, understanding natural insect durability of wood is critical for making sensible and wise use of wood.

Key Words: *Artocarpus chama*; termite; plant exudates; cavity & ducts; timber durability.

Movable Building Components, Furniture, Musical Instruments, Artifacts and Design

Bamboo Species Used in the Bamboo Musical Instruments of Selected Indigenous Peoples (IPs) in the Philippines

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Abstract

Bamboo musical instruments have been part of the Philippine culture. It is commonly used by ethnic groups to express their passion for music but also for festivals, cultural activities, and rituals. The evolution in the production and usage of BMIs have been documented since 1960's, however, there are limited information on the bamboo species used in BMI making. The bamboo species used by several ethnic groups namely: Bagobo-Tagabawa, Kalinga, Majukayong and T'boli tribe, have been documented and identified through field visit/survey and interviews. This will be a baseline information on the bamboo species used in BMIs making as well as search for possible alternatives.

A total of 11 bamboo species have been identified as raw materials for making BMIs. This include *Bambusa spinosa* Roxb., *B. vulgaris* Schrad. Ex. Wendl., *Dendrocalamus asper* (Schultes f.) Backer ex Heyne, D. *merrillianus* (Elmer) Elmer, *Gigantochloa atter* (Hassk.) Kurz., *G. levis* (Blanco) Merr., *Schizostachyum brachycladum* (Kurz) Kurz, *S. lima* (Blanco) Merr., *S. lumampao* (Blanco) Merr., *Phyllostachys edulis* (Carrierre) J. Houz., and *Dinochloa* sp.

The type instruments documented were classified as idiophones (27), chordophones (1), membranophones (1), and aerophones (11). The instruments were bamboo clapper, zither, scraper, jar harp, slit drum, tube drum, fiddle, one-string, bamboo rhythm stick, quill-shape tube, flute,

shaker, buzzer, and xylophones.

Some of the considerations in choosing bamboo species for BMI making were availability, diameter size, part and straightness of the pole, maturity and harvesting period.

Combining Woodworking Features, Tree Rings, DNA and Radiocarbon to Reveal the Production Time and Place of a Historic Foot Cuff from the Rijksmuseum Collections (Amsterdam, the Netherlands)

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Abstract

We present a multidisciplinary approach combining observations of woodworking features with dendrochronology, radiocarbon and DNA gen-

otyping to determine the date, provenance and manufacture process of a wooden foot cuff from the Rijksmuseum collections in Amsterdam. This type of objects can be found at museums in Europe, the Americas and Asia. Some are associated to the Spanish inquisition, others to the history of slavery, or to illustrate punishment or imprisonment methods. Despite their abundance and historical relevance as witnesses of cultural oppressive measures, there is a huge gap in knowledge about their chronology and production. In 2019, on the occasion of an exhibition about slavery, a foot cuff made of oak (*Quercus* sp.) was donated to the Rijksmuseum. The history of the object was unknown, and a team of experts was gathered to determine its potential date and origin. The tool traces and marks found on the surface of the wood are characteristic of traditional woodworking techniques that were implemented in the early 19th century and indicated that the wood was processed in fresh. The tree-ring analysis revealed that the logs originated from the same tree, but failed to return an exact date for the wood. Therefore, we resorted to DNA-genotyping and radiocarbon dating. DNA results placed the provenance of the wood in central Europe, and the radiocarbon wiggle matching, adjusted with sapwood statistics for central Europe, revealed that the tree must have been cut between 1790 and 1837 C.E. These results combined suggest that the foot cuff was produced in the early 19th century at a small rural town in central Europe, using local wood. Its association with slavery or with the Spanish inquisition has yet to be assessed.

Education in Understanding Forest Products Culture

SWST Student Chapters as a Means of Deepening Aspects Related to Wood Culture

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Abstract

The International Society of Wood Science and Technology (SWST) envisages the activation of Student Chapters at partner institutions, with the purpose of broadening student perspectives in wood science and technology. SWST Student Chapters are active through the organization of various initiatives such as site visits, meetings with professionals, and practical experiences. This is crucial for students to develop connections with industry members and initiate networks that could be useful throughout their professional career.

The presentation intends to encourage the establishment of new chapters by giving an outline of their constitution, activities, and advantages. Over the years, chapters have proven to be beneficial to students, faculty advisors and involved institutions. With reference to the 2023 World Wood Day Symposium theme, Student Chapters can also represent a valuable environment for students to deepen aspects related to 'wood in cultural heritage'. To show their possible role in this sense, the activities with a cultural

focus carried out by running chapters over time, like book reviews and seminars, are presented.

Challenges and Opportunities for Historical, Contemporary and Future Wood and Non-Wood Forest Products Culture

Harnessing *Allaeanthus luzonicus* (Blanco) Fern.-Vill. – A Pheno-calendar-Based Production for Household Food Sufficiency in Northern Philippines

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Abstract

Allaeanthus luzonicus (himbabao, birch flower) is a non-timber lesser-used tree species native to the Philippines and Sulawesi. It is notable not for its wood but for its inflorescence which is a favorite indigenous vegetable in Northern Philippines. The tree is wild-growing and flowers seasonally, hence, the edible inflorescence is available only during the regular flowering season in the months of January to March. To ensure a sustainable inflorescence supply for household consumption, an innovation leveraging on the phenological calendar of the growth and development of the tree was explored. The species' growth and development stages were first documented, and their phenology was compared under four climate types in three Provinces in Norther Philippines where the indigenous vegetable is most utilized. Climate, weather factors i.e. temperature and daylength, and biological factors i.e. tree age and variety, seemed to affect the occurrence and duration of the different phenophases. Several off-season varieties of A. *luzonicus* which flower outside the regular flowering period of January to March were also discovered.

The documented phenocalendar-based production under the four climate types in three provinces ensures year-round supply of this vegetable. In January to March, supply comes from the Province of Ilocos Norte (Type I climate), northwestern Cagayan (Type II climate), and northern Apayao (Type II & IV). In April to June, supply will come from the rest of the

towns in the Province of Cagayan which have Type III climate. In July to December (excluding August), supply will be sourced from identified off-season varieties which are either early flowering, double flowering and late flowering. In August, the vegetable requirement can be met by using frozen, freeze-dried or ready-to-cook formulations of the inflorescence. This phenocalendar-based crop production system is simple and economical, not requiring cultural interventions or chemical inputs. Mass propagation of the off-season varieties and additional planting are now promoted to accelerate the expansion of the market niche for this indigenous vegetable species.

Earthfast Posts and Timber-Framing in Late Medieval Flanders. An Archaeological and Building Historical Study of Urban housing between 1200 and 1500

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Abstract

The late medieval Flemish towns were amongst the most populated of western Europe and had a diverse built environment. Iconographic sources, such as the cityscapes on the Ghent Altarpiece (finished in 1432), show that a substantial part of the townhouses was built using timber-framing techniques. Unlike these iconographic sources, building historical and archaeological data were initially scarce and difficult to interpret. New archaeological research of the last decades combined with building historical analysis made it possible to present a first overview of the transition from earthfast

post construction to timber-framed townhouses and the use of wood in townhouses between ca. 1200 and 1500. The study area includes present-day French Flanders (Northern France), the provinces of West and East Flanders (Belgium) and Zeeland (Netherlands).

Building historical analysis of the interior wooden structure of preserved stone townhouses of Bruges and Ghent proves the importance of wood in late medieval structures. The existing wooden house fronts are carefully made and were no cheap alternative of complete stone houses but status symbols on their own. The analysis of excavated medieval houses including earthfast post, timber-framed and stone constructions in Ypres and Aalst shows the use of different materials and building techniques in between urban quarters and its evolution through time. These data compared with other excavated sites in Ninove, Ronse, Sluis and Douai gives an evolution of the appearance, building materials, and layout of urban housing but also about plot layout and orientation to the existing urban infrastructure and regional differences.

Going Native: Challenges and Opportunities in Philippine Native Tree Species Utilization

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Abstract

The utilization of Philippine forest products have been integral to the livelihood of Filipino rural communities as well as their culture and traditions. From 1960-70s, the Philippines was regarded as a major producer and ex-

porter of timber specifically the Philippine Mahogany group that belongs to the Dipterocarp family. Due to overharvesting, timber poaching and illegal logging in the natural forests, its production has substantially declined over the years. For this reason, timber and other forest products are now sourced from tree plantations and other forest production areas. Many of these forest trees are exotic species such as: *Gmelina arborea, Swietenia macrophylla, Acacia mangium, Paraserianthes falcataria* and others. With the decline in the availability of premium tree species, lesser-known native forest species are now used for timber and other forest products. Rural communities use them for light construction, furniture, novelty items, wood carving and other purposes. With about 3600 native tree species in the Philippines, of which 67% are endemic, its utilization as timber and other uses shows much potential. Tree farming, smallholder plantation and forest production have now shifted focus from exotic to native trees that are fast-growing, easy to manage and whose seeds and wildlings can be readily sourced from surrounding woodlots and natural forest stands. This could serve an alternative source of wood materials, aside from exotic species, for supporting and revitalizing the once flourishing forest-based industry in the Philippines. Despite these opportunities, the forest-based industry is fraught with challenges. From the silviculture cycle of planting to harvesting processes, national policies on planting of native trees provide disincentives and penalties that impede sustainability along forest-based supply chains. The opportunities and challenges in the utilization of Philippine native trees in addition to the identification of Philippine native trees showing great potential will be discussed in this paper.

Relationship Between the Humanities, Social Sciences, Behavioral Sciences and Wood Cultural Heritage

Forest and Shipbuilding in Historiography: State of the Art and Some Research Questions

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Abstract

Fernand Braudel describes the development of timber trade and supply as one of the most important chapters in the integration of the northern regions of Europe and of European consumption chains. Likewise, other historians argue that timber made the processes of accumulation in world history possible, directly or indirectly. The need for timber for shipbuilding was paramount in this historiographical framework. These studies have been notably enriched thanks to the increase in interdisciplinary analyses by introducing interesting perspectives from historical ecology and dendroarchaeology. Nevertheless, a truly interdisciplinary and collaborative investigation still demands answers to questions raised by the role of wood as a commodity and as a natural resource related to the industrial and technological development of Early Modern centuries. This presentation will try to clarify what these questions might be and the research problems that are still latent in such interdisciplinary projects.

Ethnobotanical Study of Woody Plant Species in Lake Danao Forest Landscape, Ormoc Leyte, Philippines

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Abstract

Ethnobotanical survey was conducted in a small village of Danao within the Lake Danao Forest Landscape, to identify woody plant species commonly used by the local people. A total of 10 informants were individually interviewed using a semi-structured questionnaire. A total of 7 woody species representing 7 families were documented. The uses of woody plants were identified as timber, fuelwood, and industrial compounds. The most common use of the species was timber as construction materials for furniture production. Other uses noted were medicine, source of seedlings and feeds for wild boars. Conservation activities were also present in the village since it is within the boundaries of the protected area. However, the locals were still able to consume the natural resources. Therefore, there is a need for strict protection and regulation of harvesting of woody plant species in the forest. It is recommended that the local government designate a specific land where locals could harvest resources outside the protected area. It is also recommended to improve and strengthen the local participation on the conservation and protection of woody plant species in Lake Danao Forest Landscape.

Sweet Impressions: Carved Wooden Confectionery Molds

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Abstract

For hundreds of years and in dozens of cultures, carved wooden molds have been used to give form to food. Historically, a large proportion of these molds have been associated with sweet foods such as Middle Eastern *maamoul*, European *marzipan*, Korean *dasik* and *tteok*, Chinese *yue bing*, German *springerle*, and the New Year's cakes enjoyed in Colonial America. The popularity and relative scarcity of sweet flavors led to the widespread use of sweet foods to demonstrate such abstract concepts as empathy, hospitality, and privilege; molds could both add to a confection's visual appeal and amplify its intended meaning.

Correctly chosen and prepared, wood is an ideal material for the job: food-safe, easily acquired, workable, durable, and reparable. Carved molds offer confectionery makers a range of interrelated advantages, including the imparting of visual detail, consistent portioning of expensive ingredients, and enabling faster or higher-volume production.

The carving of wooden confectionery molds is simultaneously straightforward and complicated, demanding considerable technical and conceptual abilities. While many molds survive today, little has been recorded or written about the specific techniques used to produce them. My aim with this project is to delve more deeply into the technical, conceptual, and aesthetic aspects of confectionery mold carving by examining and contrasting the practices of contemporary mold carvers. This phase of my ongoing research focuses on South Korea and Japan.

Exhibition of the 13th c. Wooden Building from the Vilnius Castles as a Window to the Prehistory of the Rise of the City

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Abstract

On the occasion of the 700th anniversary of the city of Vilnius the exhibition „The Dawn of Gediminas' City. The Oldest Preserved Wooden Building in Vilnius and its Most Unique Artefacts" (25 January–25 June 2023) was organised at the National Museum – Palace of the Grand Dukes of Lithuania. The exhibition displays preserved fragments of a wooden building (a barn) with a stave cellar which contained very rare wooden finds like a polychromed saddle-tree made from maple and lime wood, a pair of carved hames of a horse collar from maple wood, a ritual oak wood staff, carved with cosmic and plant motifs, etc. Uniquely crafted leather artefacts like a saddle pad and a pair of red shoes, as well as a golden ring, decorated with a plant motif, shed even more light on the contemporary lifestyle.

The area of the building was barely larger than 10 square metres. Nevertheless, it consisted of two spaces and was of a complex construction combining a log-built part with the cellar and a frame-based part. Mainly young pine trees had been used for the logs, however quite old and thick pines had been selected to produce the planks. The building was dendrochronologically dated to 1282 AD. It was situated at the foot of the Upper Castle Hill next to the Lower Castle and belonged to the period when intense building on the foothill commenced. This building phase predates the first mention of the „royal" city of Vilnius in the letters by Gediminas, the monarch of Lithuania (1316–1341), written in 1323, and reveals the context of the capital city's origins.

The featured material cultural heritage, supplemented with background texts, artistically animated 3D reconstruction of the building and interpretation of the contemporary motifs, provides a material link to this prehistory.

Gendered Perspective on Forests over Limestone's Ecosystem Services and Conservation Actions in Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS), Guiuan, Eastern Samar, Philippines

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Abstract

Conservation of forest over limestone, a unique and fragile ecosystem, is critical to ensure its sustainability. A survey was conducted to determine the gendered perspective about the forest over limestone, the importance of its ecosystem services, and conservation actions in Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS), Guiuan, Eastern Samar, Philippines. About 541 men and women of barangays Pagnamitan, Ngolos, Baras, and Sulangan, Guiuan, Eastern Samar participated. Both men (3%) and women (2%) in GMRPLS were involved in the conservation of forests over limestone, e.g., policymaking, awareness campaigns, tree planting, and other activities. Also, about 8% of women (W) and 7% of men (M) were interested in participating in conservation actions. The men and women (90%) in GMRPLS were slightly to very well familiar (M=92%, W=90%) and aware (M=94%, W=92%) of FOL. The men (96%) and women (94%) were also slightly to very well aware that the forest over limestone is protected

by law and managed by an agency. Also, the men and women considered the ecosystem services of forests over limestone critical, e.g., protection against typhoons, water, fresh air, and wildlife habitat. Conservation actions such as conducting forest information dissemination, participating in conservation programs, planting seedlings, and enacting a localized biodiversity conservation strategy specific to forests over limestone were recommended by the men and women in GMRPLS. Forest regulation and governance of all concerned are necessary to ensure the forests over limestone's sustainability and the continued enjoyment of the communities of its ecosystem services. Moreover, the study suggests extension activities, e.g., information and education campaigns in these barangays, to increase their awareness and appreciation of forests over limestone and encourage their engagement in conservation of this resources.

Related Forest Management, Craftsmanship, Traditional Wood Processing/Wood Working Experiences

The Neolithic Woodworker. Understanding Material Culture and Environment in the Pre-Historic Age

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Abstract

Our brief was a simple one, build a reproduction of a Neolithic roundhouse on a Natural England site, using timber and materials sourced in the landscape. Without historical evidence to draw on, no Prehistoric settlement has been discovered in this location, we approached the build as if our team of volunteers were Neolithic settlers constructing a dwelling here for the first time. The Roundhouse design was based on archaeological evidence from other sites in northern Europe. A cone of Silver Birch poles would be jointed to a 1.5-meter high circular wall. The 3-meter diameter wall was constructed using 15cm diameter Birch logs connected by Willow wattle panels. The walls were to be daubed in a mixture of clay, manure and straw; the roof would be thatched in reeds.

The beautiful moorland landscape seemed perfect at first sight with its abundance of Willow, Birch and a lake for clay and reed. Our unforeseen problems started with felling the quantities of timber required, mainly using flint axes, and transporting this back site. Then the clay we intended to use collected from the banks of the lake contained a multitude of small sharp stones that cut your hands as you worked it. Even if suitable the effort involved in moving large amounts of wet clay from lakeside to site was back braking. The reeds, which had at first seemed to grow in abundance, were brittle to the point of being unworkable. It also soon became clear that the quantity required for our roof would simply take too long to harvest.

In conclusion, the theory that communities in Pre-history would simply ar-

rive in a location and construct settlements without detailed understanding of the available materials, surveying the suitably of each component was soon evidently a simplistic one, and underestimated their time learned knowledge.

Factors Influencing Vegetation Structure in Forests over Limestone in Guiuan Marine Resource Protected Landscape and Seascape, Samar Island, Philippines

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Abstract

Forests over limestone provides numerous ecosystem services to surrounding communities. In Philippines, Samar Island is known to house vast area of forests over limestone. Aside from anthropogenic disturbances in the area that makes these resources vulnerable, pressures are exacerbated due to the frequent occurrence of typhoon in the island. Hence, it is crucial to understand the vegetation ecology of the area which may provide insights in formulating appropriate conservation strategies specific to this area. This study is implemented in one of the protected areas in Samar Island, the Guiuan Marine Resource Protected Landscape and Seascape. A total of nine (9) 20m x 20m plots were established to assess the tree species (⩾1m tall). Plant abundance was recorded and computed. Soil samples were collected while climate data were obtained from the Guiuan, Eastern Samar Weather Stations. Classification analysis (cluster analysis) was done using the relative basal area of trees per plot to identify major plant communities. The canonical correspondence analysis was done to

identify the environmental variables that influence the plant data set. Results show that GUI 02 plot was the most diverse, had highest in Simpson 1-D index and Fisher's alpha, as well as highest in total number of tree species among all observed plots. The anthropogenic stresses in the area affect the species abundance in plots GUI 1 and GUI 8 plots. The results of cluster analysis shows that there three (3) vegetation clusters in the area. Canonical correspondence analysis identified that elevation and temperature as the major factors influencing the vegetation structure in GMRPLS. This study provides valuable information about the species composition and factors influencing the vegetation structure of the GMRPLS. findings of this study may serve as a baseline for developing effective conservation policies to sustainably managed protected area.

The Wonder Pest: Suitability of Paper Mulberry for Furniture, Handmade Paper, and Briquette

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Abstract

Botanically known as *Broussonetia papyrifera* L' Herit ex Vent, paper mulberry was introduced in the Philippines in 1935 specifically, in the College of Forestry and Natural Resources, Los Banos, Laguna. Due to its invasive characteristics, *Lapnis*, its local name, is now considered "pest" as it uncontrollably invades disturbed and abandoned lands. To address the problem, the basic characteristics and properties of paper mulberry were identified to establish its potential uses in furniture making, handmade paper pro-

duction and charcoal/briquette production.

Based on the physico-mechanical properties, paper mulberry falls under Class V (low strength group) and is suitable for pulp and paper, toys, match sticks, popsicle sticks, wooden boxes, and etc. where strength, hardness, and durability are not critical requirement. Using the FPRDI horizontal bandmill (Wood-Mizer LT28), lumbers were produced and lumber recovery where calculated. Its wood is easy to saw with lumber recovery of 48.82% and 32.76% for live-sawing and sawing-around method, respectively. Using FPRDI's portable solar-powered dryer with auxiliary biomass heater, paper mulberry was found out to be easy to dry as after 10 days, 50mm thick lumber attained 12% final moisture content (MC) from the initial MC of 54.93%. Prototype sample products like lectern and ottoman chair were fabricated.

For the handmade paper production, fifteen (15) sheets of 26' x 26' handmade papers can be produced from one (1) kilogram of pulp bast fibers. And for the charcoaling experiment, the proximate chemical analysis showed that paper mulberry charcoal has 5.81% ash content, heating value of 5,291.87 cal/g, 9.64% volatile combustible matter and fixed carbon amounting to 84.545%.

Forest History and Ancient Forests

History of Wood Anatomy Research in India

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Abstract

Ancient civilization of India can be traced back to about 5000 years. The people of earlier civilization had good knowledge of wood as is evident from archaeological records, but that knowledge was not based on Wood Anatomy in its present sense. Written information on wood takes us back to Puranic literature which is about 2500 years old, where wood is mentioned as a part of a plant, and then there is no information on wood and its anatomy.

In 1858 first book was published on "Timber tree" by Dr. E. Balfour containing original observations on the superficial appearance of timbers followed by J.S. Gamble's "Manual of Indian Timbers", in 1881. This book is the first systematic account of the macrostructure of the woods and contains information on properties and uses of 1450 species. **Interestingly, the information on properties and uses in this book came from the locals reflecting upon the excellent knowledge of timber characteristics prevailing during that period.**

It was during the World Wars that the wood science was recognized as a useful knowledge for conducting war efficiently as more than 600 articles made of wood were required towards its efficient utilization. This resulted in several publications by K.A. Chowdhury (1932-1956), especially for Defense and Railways. Today, In India, almost all the commercial woods have been worked out for their anatomy, properties, uses, durability etc., based on which Bureau of Indian Standards (BIS) has formulated 145 standards related to Timber.

Fire, Water, Wood: The Entanglements of Forestry and Maritimity in the South Carolina Lowcountry

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Abstract

The Lowcountry of South Carolina is defined by cypress swamps and blackwater rivers that flow into the west Atlantic Ocean. Higher ground had been graced by longleaf pine forests, a unique fire-dependent ecosystem, until the arrival of European settlers who felled 97% of these forests for agricultural and architectural – especially shipbuilding – projects. Timber barons replanted longleaf with faster-growing loblolly pines. The prescribed burning to maintain longleaf ecosystems, practiced for millennia by the ancestors of the Waccamaw Indian People, ceased and would only resume centuries later as standard wetland forestry practice. As urban development continues unchecked in this area, fire-dependent ecosystems are again threatened. By collecting samples of long-lived pines, especially remnant longleaf, this project aims to construct a local tree-ring chronology to inform the fire history of this area and advocate for the continued use of controlled burning to maintain fire-dependent ecosystems amidst increasing urbanization. At the same time, the project aims to establish a reference chronology for local pines, which can be used to date and provenance archaeological features, such as wrecked ships constructed with local pine.

It is well known that 19th c. shipbuilding devastated local longleaf forests, but archaeometric analyses of the material remains of those ships can provide a porthole into the ontological status of the forests from which they were built, and how their original ecosystems were shaped by prescribed fire. This paper presents preliminary data on this project, but ultimately, it

echoes Michael Shanks (2012) who claims that in the Anthropocene, all scientific research is archaeology. With this position in mind, this paper also aims to challenge the usual equation of material culture with artifacts, and asserts that fire scars in tree rings and entire landscapes defined by controlled burning, in addition to the usual shipwrecks and maritime archives, must also be considered as studies of material culture and what constitutes 'heritage'.

Archaeological Wood as a (Pre)Historical Archive

New Approaches to Iron Age Woodcrafts: the Case Study of Northern Iberia

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Abstract

Wood was the main raw material used for crafting during Iron Age in Northern Iberia (9^{th} and 2^{nd}-1^{st} centuries BCE). During this chronological period, new tools for crafting wood and new techniques of woodworking were developed or incorporated, in a context of increasing social complexity and inequality. Recent research projects focused on crafted wood has shed light on the ephemeral material culture made of wood by Iron Age communities. Obtain information about wood crafting in Southern Europe is challenging because the presence of waterlogged is absolutely exceptional, and woodcrafts are usually preserved by charring in relation to intentional or accidental fire events, or by indirect evidence. With the aim of deepen our understanding on woodworking and basketry developed during Iron Age, we have defined a methodology for studying crafted wood in this kind of contexts, integrating different kind of direct and indirect archaeological and archaeobotanical evidence, registering taxonomical and technological features with non-invasive techniques, and applying experimentation developed by artisans. The results obtained have shed light on the complexity of woodworking techniques, the diversity of morphologies and techniques, the incorporation of new technological developments and the environmental involvement of artisans during this period. Beside this, it has been possible to document the persistence on the use of specific raw materials and techniques at least since the Iron Age in this geographical area.

Burned Wood as a Cultural Marker?
Archaeological Charcoal and Early Societies of the Great Basin

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Abstract

What is the paleoethnobotanical potential of burned wood fragments from prehistoric combustion features? These biocultural markers provide direct information about the origin of wood and the environment it was taken from while their presence at archaeological sites are the result of human beliefs, choices, and practices (mostly) in connection with firewood. Nevertheless, assessing to what extent these choices are related to environmental or social parameters is a challenging endeavor, which will be illustrated here through the example of the Bonneville Estates Rockshelter (BER) site in Nevada (USA), where a systematic study of charcoal remains from Paleoindian (13,000 – 10,500 cal BP) and Early Archaic (8,200 – 4,750 cal BP) levels is currently being carried out. Being located in a cold desert, BER offers a great opportunity to investigate how the early inhabitants of North America were able to face a progressive and pronounced aridification process, which had profound impacts on wood availability. The results of the charcoal analysis and their interpretation considering other paleoenvironmental and archaeological proxies document this important environmental shift at the Pleistocene-Holocene transition. It also highlights changes in firewood acquisition modalities and complex management patterns of a set of specific taxa that were used for fuelwood as well as basketry and subsistence.

Shining a Light on the Past: Improved Chronology for Aotearoa-New Zealand Using Tree-Ring Based Radiocarbon and Stable Isotope Science

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Abstract

Preserved wooden artefacts, including houses, palisades, carvings and canoes from species such as kauri (*Agathis australis*) and matai (*Prumnopitys taxifolia*), provide valuable insights into our past. These taonga (treasures) are highly significant to Māori hapū (connected family groups) and iwi (tribes), because they provide tangible links to ancestors and places (whakapapa). Interpretation of this cultural heritage is underpinned by the accurate placement of taonga in time. However, in Aotearoa New Zealand (NZ) there is a problem of temporal resolution in archaeological dating because the two methods used to date wooden objects – radiocarbon (^{14}C) and dendrochronology – struggle to yield calendar ages constrained to a decade or single year. This is largely due to (1) radiocarbon calibration uncertainties in the last 800 years coincident with the entirety of human occupation in NZ; and (2) tree species and growth ring characteristics limiting application of classic tree-ring dating. As a result, a large proportion of NZ's cultural heritage remains poorly located in time. This lack of temporal precision impacts our ability to contextualise objects, hindering understanding of connections to other taonga, people and past societal and environmental change. Combing ring width dendrochronology, tree-ring based ^{14}C calibration and stable isotope (SI) research, this project aims to deliver advanced, accurate and precise calendar-dating of archaeological sites and wooden taonga (treasures) in Aotearoa New Zealand (NZ).

Wood Management and Arboriculture Practices in the IESSO's (S. II bC - VI aD) and VILAUBA's (s. I bD - VII aD) Settlements

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Abstract

Forest management, as a set of applied strategies, is documented through written sources and iconography in the Iberian Peninsula and more specifically in the north-east of the peninsula, based on what can be found in the different classic sources of the age. These practices could have affected different species and with different purposes: improving the production of fruit trees, providing fodder for herds, or obtaining wood of a specific shape and size, for different applications. However, direct evidence of these practices is scarce or difficult to identify in archaeological remains. The aim of this work is approach to the wood management and arboriculture practices in the antiquity and late antiquity in Northeast Iberia (from the 2nd century BC to the 7th century AD), based on the study of archaeological wood remains. Specifically, the results of the study of two sites in Catalonia, within the previously mentioned chronology, are presented, which are the sites of Iesso in Guissona (Lleida), from the Roman period and Vilauba in Camós (Girona), which covers from the Roman period to the Visigothic period. In both cases, the study focuses on the remains recovered from the interior of decommissioned water wells. The methodology used was the application of the roundwood method (Out et al.). A reference collection of cultivated, managed and unmanaged individuals of the species identified in the site has been made. The main characteristics observed in the reference

material are presented here and compared with the archaeological materials. The results obtained have made it possible to identify arboricultural practices in *Prunus* sp. and *Vitis vinifera*, in addition to possible management practices in taxa such as *Sambucus nigra* and *Salix* sp. The results are contextualized with those obtained from other archaeobotanical studies in the sites and in the historical scope of the region.

Contributions of Stable Isotope Dendrochronology to Dendroarchaeological Studies of Architectural Timbers from the Rising Whale Site, Northwest Alaska (10th-12th centuries)

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Abstract

Architectural wood remains are exceptionally well-preserved in the Birnirk and Thule coastal sites of the 2nd millennium CE of Northwestern Alaska. Along this treeless Arctic coast, wood comes as driftwood from the interior forests of Alaska. To date it using dendrochronology, it is necessary to have access to multiple reference chronologies of tree ring-width from different areas of the interior. However, apart for the Northwest Alaska chronology (1000-yr old), regional tree-ring chronologies remain too short (300-350 years) to synchronize structural wood elements from early archaeological features.

As a result, we explored the potential of stable isotope dendrochronology to annually date archaeological wood remains. The method, like in conventional dendrochronology, is based on comparing series to be dated with reference chronologies, but the compared parameter is the oxygen isotopic composition ($\delta^{18}O$) of wood cellulose. This signal has been shown to be consistent between trees at larger spatial scales than the ring-width signal.

We analyzed the $\delta^{18}O$ of tree ring cellulose in eight architectural wood samples from a Birnirk house (10^{th}-12^{th} centuries) at the Rising Whale site (KTZ-304), Northwest Alaska. Five of these wood samples had been cross-dated with the Northwest Alaska tree-ring chronology between 935 and 1157 CE, dendro-provenanced from this region and used to develop a $\delta^{18}O$ master chronology. To test the δ18O isotopic cross-dating method, we analyzed the remaining three wood of unknown geographic origin and obtained a plausible date for one of them (first ring at 1073 CE). It is now necessary to consolidate the preliminary $\delta^{18}O$ chronology of Northwest Alaska to confirm the result obtained and date other architectural timbers from regions where chronologies are too short.

Wood Products and Wood Biotechnology

(IAWS Special Session)

An Investigation into the Effect of Durability Treatment on Adhesive Bonding of *Eucalyptus Grandis* Wood

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Abstract

The use of hardwoods in structural laminated solid wood composites is still nascent with limited knowledge of its adhesive bonding properties. Likewise, wood biodeterioration concerns, particularly in tropical and subtropical environments, limit the global adoption of contemporary wood products like glued-laminated and cross-laminated timbers in building and construction applications. Two major challenges impede the integration of wood durability treatment and mass timber technology. First, size limitation for the preservation treatment process due to the large composite elements of mass timber. This makes pre-manufacture treatment the suitable option but presents another major challenge – preservative impregnation often retards adhesive bonding. Thus, this study aimed to investigate the adhesive bonding of copper azole (CA) and disodium octaborate tetrahydrate (DOT)-treated *Eucalyptus grandis* wood for the manufacture of durable solid hardwood composites. Post-impregnation, surface physicochemical properties that include wettability, free energy, pH and buffering capacity, elemental composition, and chemical functionalities of the treated *E. grandis* wood were investigated to enable fundamental knowledge for bonding process adaptation. The compatibility of the preservative chemicals and adhesive systems viz melamine-urea-formaldehyde, polyurethane, and phenol-resorcinol-formaldehyde (PRF) were also investigated. The investigated parameters include wood density, preservative concentration, mechanical pretreatment, adhesive spread rate, open and close assembly times, bonding pressure, and press duration. The performance of

the adhesive bonds in terms of bondline shear strength, wood failure, and delamination was evaluated according to EN 14080:2016 Standard for softwoods in the absence of standardization for hardwood bonding. Satisfactory mean shear strength up to 7.98 MPa with corresponding 79.25% mean wood failure and mean delamination below 5% were achieved for CA-impregnated *E. grandis* laminates. Similarly, 7.47 MPa mean shear strength with a corresponding mean wood failure of 81.96% was obtained for DOT-impregnated *E. grandis* laminates. However, DOT-impregnated laminates recorded higher mean delamination (33.57%). Pressure and mechanical pretreatment of surface planing were the most influential bonding parameters. However, above 7 MPa, the effect of the bonding pressure difference became insignificant. Pre-bonding surface planing produced laminates with the best mechanical properties – 8.18 MPa mean shear strength, 89.63% mean wood failure, and 0% mean delamination. A greener process route that excludes pre-bonding planing produced laminates with a mean shear strength of 7.66 MPa and a mean wood failure of 80.32%. However, a mean delamination of 22.07% was recorded. This study established suitable pathways that could be adopted for the manufacturing of preservative-treated *E. grandis* laminates for structural applications in tropical and subtropical climes. However, the use of DOT-impregnated, unplaned, and PRF-bonded laminates is advised under limited exterior exposure conditions considering the observed delamination.

Updating the Concept of Juvenile Wood, in a New Conceptual Framework

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Abstract

Within-tree variation in wood properties is often large, posing major problems for wood processing and utilisation. Understanding and characterising such variation are thus very important, scientifically and practically. Such variation can be addressed practically by both log segregation and processing practice for individual logs.

Widely studied are the radial variations in wood properties, physical, chemical and anatomical. Such variations are especially prominent and intensively studied in two highly domesticated pine species, *Pinus radiata* and *P. taeda*. Importantly, such variation also means that average wood properties can vary strongly, up the tree and with tree age.

The variations are typically curvilinear, approaching asymptotic values well away from the pith. However, the curves differ among properties, and somewhat variably among trees or among environments.

Such variation from the pith outwards has been widely addressed, terminologically and conceptually, as a progression form juvenile to mature wood (alternatively, corewood to outerwood). However, this conflicts sharply with the well-established botanical concept of maturation, whereby maturation level typically increases along stem axis from the root collar, with a roughly asymptotic approach to final maturation state. Moreover, pith-to-bark trajectories, according to ring number or distance from pith, can vary markedly with height above ground up for some important wood

properties.

An appropriate framework, conceptually and terminologically, is for different progressions in the radial and vertical axes: from corewood to outerwood radially, and from juvenile to mature wood up the vertical axis. However, details of progressions and wood properties involved vary considerably among tree taxa. While this framework may not be readily applicable for wood properties of some taxa, it is extremely helpful for a number of particularly important species.

Burdon et al. 2004. Juvenile versus mature wood: A new concept, orthogonal to corewood versus outerwood, with special reference to *Pinus radiata* and *P. taeda*. Forest Science 53:199-215.

Functional Anatomical Traits to Assess the Impact of Environmental Changes on Species Vulnerability and Wood Properties

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Abstract

Ongoing climate change is one of the major challenges for forestry and agriculture since it is expected to drastically modify plant growth. In recent decades, tree vulnerability and forest die-back are serious phenomena, rapidly increasing worldwide: therefore, the assessment of forest vulnerability as well as forecasting changes in tree growth are current challenges due to impacts on ecological, social and economic aspects.

Forest ecosystems in the Mediterranean region are particularly vulnerable

to climate change. The increase in the frequency and duration of extreme events, such as severe and prolonged drought periods will likely induce plastic adaptive responses in plants, thus affecting plant growth and productivity of forestry systems, and ultimately biogeochemical cycles. The potentially negative impact of environmental changes on Mediterranean forest health and productivity, would consequently alter the role played by such forests in providing key ecosystem services.

This speech highlights the key role of quantitative wood anatomy in understanding tree acclimation considering that the largest part of global vegetation biomass depends on a thin layer of cells, namely the vascular cambium, whose functioning determines the variability of wood traits. The latter have impact on tree eco-physiological behavior as well as on technological properties of wood. The speech also highlights that the study of wood formation and the interpretation of wood anatomical traits is crucial to support other more applied disciplines, including trait-based ecology, forest management, wood technology, etc.

A focus on study cases on anatomical traits of Mediterranean woods to unravel signals hidden in tree-rings that can be used as powerful tools to gain information on past growth performance of plants with intra-seasonal resolution. Understanding how the plants have reacted to past environmental changes can help understanding their plasticity and forecasting their responses to future changes, to evaluate possible consequences on ecosystems but also on wood utilization.

How to Measure and Predict Wood Cutting Force Precisely?

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Abstract

Wood machining is the most important procedure in wood utilization. From tree harvesting, through the manufacturing of lumber and furniture, to the recycling or burning of wood waste, cutting can be found at every stage of wood processing. In temperate climate zones nowadays forest composition is radicaly changing. Broad-leaved species are replacing needle-bearing plants. The novel device simplifying the complexity of wood process observation is developed to enable the detailed analysis of wood cutting. The unique worldwide device works on the principle of a rotor arm with a diameter of 4 m. Therefore, the movement of its end can be considered linear. Additionally, the rotor arm reaches an angular speed of up to 442 RPM. That corresponds to the tangential cutting velocity of 93 m·s-1. Single cut per examination is conducted during measurement. The stand-alone cut at this speed has never been performed before. The study employs oak (Quercus robur), beech (*Fagus sylvatica*), spruce (*Picea abies*), tree of heaven (*Ailanthus altissima*), paulownia (*Paulownia tomentosa*), and locust (*Robinia pseudoacacia*) wood at varying moisture content levels (0 – <32%). Uncut chip thickness (0 – 0.5 mm), cutting velocity (5 – 90 m·s-1) and cutting fibre angles (parallel to across the grain) are other factors incorporated in the study. Some tests are observed by high-speed cameras at a frame rate of 200 000 fps. Insight into the wood cutting shows that cutting velocity is the key parameter that greatly non-linearly influences cutting force. All obtained data serves as input for a mathematical model establishment for cutting force prediction. Finally, the prediction model is tested by an independent set of data. Results of the model testing show statistically significant sameness of model and test data set.

Application and Preparation of Nanocellulose-based Nanozyme Using Metal or Carbon Nanomaterials

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Abstract

Nanozymes, known as nanomaterials characteristic with enzyme-mimicking properties, have been widely explored in various applications. In contrast to natural enzymes, nanozymes exhibit a multitude of unique merits, such as ease of synthesis, low cost, high stability and high versatility. Numerous nanomaterials, including carbon, metal, metal-organic frameworks, and metal oxide nanoparticles have been identified as enzyme mimics. Among them, particularly, carbon and metal nanozymes have attracted considerable attention in enzyme-mimicking applications because of their unique optical, electrical, and catalytic capabilities. The most common drawback of these nanozymes is colloidal aggregation, poor recoverability and reusability, which are essential attributes of a catalyst. Hence, immobilizing these ultra-small nanozymes on a polymeric support is a promising approach to overcome these difficulties. As a sustainable natural polymer, nanocellulose can function best as a support for the immobilization, because of its renowned properties, such as a large surface area, biodegradability, and abundant surface functionalities. Moreover, it can be easy to make various morphological structures because of its structural flexibility.

In our research, we have first immobilized the peroxidase mimicking Fe-doped carbon dots (FeCDs) on 2,2,6,6-tetramethylpyperidine-1-oxyl (TEMPO) oxidized cellulose nanofibrils (CNF) via physical entrapment and prepared a nanopaper. The nanopaper was applied for the smartphone based colorimetric detection of H2O2 and glucose. In other approach, pe-

roxidase mimicking Fe, N-doped carbon dots (FeNCDs) were immobilized on dialdehyde CNF (DACNF) via Schiff base reaction and reductive amination. As prepared film strips were applied for colorimetric detection of H2O2 and cholesterol. In another work, Pd nanoparticles (PdNPs) were in-situ grown on pure CNF (PCNF) via microwave method. As prepared PdNPs/PCNF exhibited excellent peroxidase and oxidase mimicking properties. Further film and foams were prepared and explored for dye degradation. As a whole, immobilization on CNF prevented these carbon and metal nanozymes from aggregation, offered easy recovery and excellent reusability.

Adhesion Mechanisms in PVC/Wood-Fiber Composites

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Abstract

Wood plastic composites (WPCs) have recently emerged as an important family of engineering materials used in applications such as decking, railings, window profiles, automotive interior parts, packaging, etc., because they combine the favorable performance and cost attributes of both wood and plastics. Effective adhesion between wood fibers and plastics is crucial for the performance of WPC products. But mixing wood and plastic is like mixing water and oil; they do not like each other. In general, the addition of polar wood fibers in a non-polar plastic matrix leads to poor interfacial adhesion between the two components due to the mixing of two dissimilar materials, and consequently, strength properties deteriorate. Surface modification of wood fibers with coupling agents is a well-known approach to

solve this incompatibility because the coupling agents convert the polar surface of wood fibers to a more non-polar one, reducing the surface energy of wood fibers so that they more closely match that of the molten polymer. The matching of fiber and polymer surface energy has been found to be an effective criterion for good adhesion in composites with polyolefins (i.e., polyethylene and polypropylene) and maleated polyolefin-treated wood fiber systems. Unlike in polyolefin-based WPCs, this well-known claim of interfacial tension matching of the two phases is not sufficient for good adhesion in PVC, the second most used plastic in the manufacture of WPCs, and wood fibers. Therefore, the concept of matching of surface energy is limited to certain filler-polymer systems and cannot be generalized. The results demonstrating that surface energy matching is a necessary but not a sufficient condition for a good adhesion in PVC based WPCs and that the adhesion of PVC to wood fibers is enhanced only when acid-base interactions (or electron donor/acceptor exchanges) exist between the two components will be presented.

Cross-laminated Bamboo and Timber (CLBT)

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Abstract

Inspired by the cross-laminated timber (CLT), and based on the experiences on glued laminated bamboo (glubam), the author developed the composites of cross laminated bamboo and timber (CLBT). This presentation provides an introduction on the development of CLBT, summarizes the authors research findings on mechanical behaviors of CLBT components and physi-

cal properties of CLBT wall panels. An analytical model based on the high-order shear deformation theory is also proposed to predict the deformation of CLBT beams and columns, and the accuracy of the model is verified by comparison with the test results. The research results show that CLBT has good mechanical properties, thermal insulation, and sound insulation comparable to CLT. The study also indicates that the mechanical properties of CLBT beams made of glubam panels and fast-growing poplar wood are no less than those of CLBT beams using SPF timber. Therefore, the development and application of the CLBT structure are hopeful of finding a new way for the rational utilization of the abundant fast-growing wood and bamboo resources. The application of biomaterials such as timber and bamboo in construction is of great significance for achieving carbon neutrality.

Tailored Mesoporous Structures of Lignin-Derived Nano-Carbons for Supercapacitors

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Abstract

ignin is produced in large quantities every year as a byproduct of the pulp and paper industry, and has attracted significant attention for its potential to be utilized for the development of valuable products. Among this, it is regarded as an excellent precursor for carbon materials due to its high carbon content. This work elucidates the process-structure-property-performance relationships between lignin and the resulted activated carbons (ACs) resulting from chemical activation meth-

ods. The electrochemical performance of the produced ACs were examined by applying as electrodes for supercapacitors. In addition to the traditional two-step chemical activation method, the updated one-step activation method was introduced, and we detailed the impact of the process conditions on the resulting ACs. The one-step method produced ACs with an ultrahigh surface area (3,207 m2 g-1) and high mesopore ratio (76%), resulting in the ultrahigh capacitance and energy density of the fabricated supercapacitors. In comparison, the two-step method produced ACs with limited surface area but high oxygen contents, leading to a hydrophilic surface. To further evaluate the economic feasibility of the one-step chemical activation method, we also conducted economic analysis. The result demonstrates that this process enabled the minimum selling price of ACs at $3,295/ton, which is cost-competitive with the commercial supercapacitor grade ACs.

Speaker Biography

Dr. Adefemi Adebisi Alade

Postdoctoral fellow, University of Idaho, Moscow, ID, USA

Dr. Adefemi A. Alade obtained a Ph.D. in Wood Product Science from Stellenbosch University, South Africa. He is an alumnus of the German Academic Exchange Service (DAAD) having spent the final year of his Ph.D. study as a DAAD scholar at the Georg-August University of Goettingen, Germany. His Ph.D. dissertation which focused on the durability treatment and adhesive bonding of Eucalyptus grandis wood earned him first place in the Ph.D. Award and Medal 2022 by the International Academy of Wood Science. He is currently a Postdoctoral Fellow in the Department of Civil and Environmental Engineering at the University of Idaho, Moscow, ID, USA. His research interests include wood composites, wood protection, waste valorization, additive manufacturing, and finite element analysis.

Dr. Menisa A. Antonio

Senior Science Research Specialist, Mariano Marcos State University, Philippines

Dr. Menisa A. Antonio is a Senior Science Research Specialist at the Mariano Marcos State University in the Philippines. She is currently finishing her PhD Botany with cognate in Agronomy at the University of Philippines Los Banos, College, Laguna, where she also finished her Master of Science in Plant Genetic Resources Conservation and Management. Her research interests include botany, plant genetic resources characterization, evaluation and conservation, crop diversity, wild plant domestication and ethno-botany. Currently, she is the lead researcher on the conservation and promotion of local crop diversity including underutilized plant species.

Ms. Liard Aurélie

Ph.D. Candidate, Université Côte d’Azur, CNRS UMR 7264 CEPAM, Nice, France

Ms. Liard Aurélie graduated from a Master in Prehistory, Paleoenvironments and Archaeosciences where I specialized in charcoal analysis. She is now in my 3rd year of PhD thesis under the direction of Isabelle Théry-Parisot and the tutoring of Auréade Henry. She studies paleoenvironments and human practices related to the fire of an archaeological sequence of Nevada (USA) dated from the end of the Pleistocene in the middle of the Holocene.

Dr. Gretel Boswijk

Associate Professor, Te Kura Matai Taiao School of Environment, Waipapa Taumata Rau The University of Auckland, New Zealand

Dr. Gretel Boswijk is an Associate Professor at Te Kauri Matai Taiao School of Environment at Waipapa Taumata Rau The University of Auckland. She has been involved in tree-ring based research since the mid-1990s, first as a student in the UK and since 2000 on returning home to Aotearoa New Zealand. She has developed kauri tree-ring chronologies for climate reconstruction and archaeological research and collaborated with radiocarbon and stable isotope scientists. She is also interested in kauri forest history.

Ms. Anne Frances V. Buhay

Data Analyst, University of the Philippines Los Baños, Philippines

Ms. Anne Frances V. Buhay is a graduate of BS Forestry with field of specialization in Environmental Forestry at the University of the Philippines Los Baños in 2015. In the same year, she received her license as a forester and has been working in various projects as a researcher at UP Los Baños. In 2020, she obtained her master's degree in Forest Resources Management. She served as a Project Research

Assistant in an EIDR-bSMART Program and currently serves as a data analyst in a research project on forest over limestone. Her research interests are watershed management, landscape ecology, biodiversity conservation and GIS application in natural resources management.

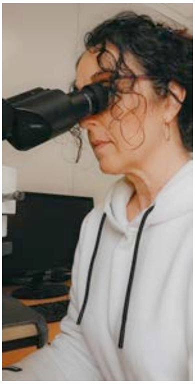
Dr. Rowland Burdon

Emeritus Scientist, Scion (New Zealand Forest Research Institute Ltd), New Zealand

Dr. Rowland Burdon from 1964 at New Zealand Forest Research Institute ("FRI" then "Forest Research" now "Scion"). BSc in Botany (New Zealand); BA in Forestry (Oxford, UK); PhD in Plant Genetics (Aberystwyth). Research activities have centred on forest genetics, tree breeding strategy and quantitative breeding methodology. Involvement in wood science arose in studying nature of variation in wood properties, their quantitative inheritance (heritabilities and inter-trait correlations), and integration of such properties into tree breeding programmes, with major involvement in Pinus radiata. Fellow also of Royal Society of New Zealand, and of New Zealand Institute of Forestry.

Ms. Eva Maria López Castillo

PhD student, Archaeology department, Universitat Autònoma de Barcelona, Spain



Currently, Ms. Eva Maria López Castillo is a PhD student, doing research in the Archaeobotany laboratory, in the Archaeology department of the Universitat Autònoma de Barcelona. She started her research last year, working on archaeobotanical dicipline, with wood remains, exploring possible evidences related with wood management and arboriculture in the roman period and the work is in process. Ms. Eva Maria López Castillo has been working as an operating nurse for a long time. She studied the Anthropology and Human Evolution degree, her master's degreeid is related to Archaeology specialisation. For combining both disciplines, she works with the university team.

Ms. Jennifer M. Conda

Senior Science Research Specialist, Department of Science and Technology – Forest Products Research and Development Institute (DOST-FPRDI), Philippines

Ms. Jennifer M. Conda is a Senior Science Research Specialist in the Department of Science and Technology – Forest Products Research and Development Institute, Philippines. Obtained a Master of Science in Botany and Bachelor of Science in Forestry in the University of the Philippines Los Baños on 2007 and 2017, respectively. Specializing in Plant Systematics and Taxonomy, she is also working as Research staff in the FPRDI Herbarium and Xylarium. The only wood depository in the Philippines that is recognized internationally and registered in Index Xylariorum (1988) under the name CLPw which stands for College, Laguna, Philippines.

She had published 2 handbooks and 9 journals (3 ISI and 6 refereed). She and other colleagues discovered and named new subspecies of Hoya in the Philippines. Recipient of various awards such as "2019 Young Scientist Achievement Award in Utilization Research in Forestry and Natural Resources", "2020 UPLB Distinguished Alumna Award for Young Forester" and "2019-2020 FPRDI Research Chair Holder". Member and Chair of various committees such as National Research Council of the Philippine (NRCP), Society of Filipino Forestry Inc. (SFFI), Forest and Natural Resources Research Society of the Philippines, Inc. (FORESPI), Biodiversity Conservation Society of the Philippines (BCSP) and Bureau of Philippine Standard: Technical Committee on Handicraft. A peer reviewer of some refereed journals local and abroad.

Prof. Veronica De Micco

Full Professor of Environmental and Applied Botany, University of Naples Federico II, Dept. Agricultural Sciences, Italy

Prof. Veronica De Micco is Full Professor of Environmental and Applied Botany at the Dept. Agricultural Sciences of the University of Naples where she is responsible of the Plant and Wood Anatomy Lab which investigates plant and wood structure, studying the evolution of plant morpho-functional traits and adaptive plasticity by analyzing the relations among plants, environmental and human factors.

She is a researcher and a teacher in quantitative wood anatomy, plant hydraulics and functional anatomy. She is responsible of Plant and Wood Anatomy Lab at UNINA. Her inspiration is: understanding the past, interpreting the present and forecasting the future. She has been involved in international cooperation through various positions such as Member of the IAWA Council and of the Management Committee of the EU COST Action STReESS – Studying Tree Responses to extreme Events: a SynthesiS and as a promoter of the Q-Net, International Network "of scholars using Quantitative Wood Anatomy (QWA) in various contexts such as archaeobotany, dendrosciences, ecophysiology, forest ecology and management, geosciences, tree biology and wood quality" (https://qwa-net.com/). She collaborates with main research groups involved in applying QWA to unravel environmental signals in false tree-rings. She produced 3 books and more than 200 publications.

RESEARCHGATE https://www.researchgate.net/profile/Veronica-Micco

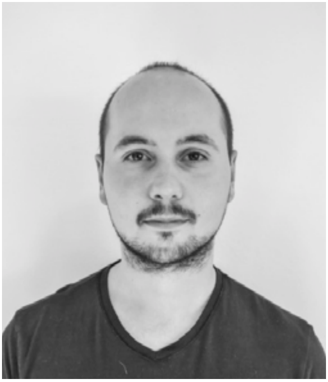
Dr. Marta Domínguez-Delmás

The Autonomous University of Barcelona / University of Amsterdam / Guest Editor Representative of IJWC Special Issue

Dr. Marta Domínguez-Delmás is a tree-ring scientists with 20 years of experience studing wood in the cultural heritage. Her research focusses on finding answers to historical questions using the wood as material evidence, and on unravelling human-environment interactions. She has worked on several international multidisciplinary projects, leading four of them as Principal Investigator. She has made important contributions to the field of dendroarchaeology, demonstrating the power of combining archival sources with tree-ring research to gain knowledge about historical sites, ancient forestry practices, and environmental dynamics, further advancing knowledge by implementing multidisciplinary approaches. Currently she is a guest researcher at the Rijksmuseum and the Amsterdam School for Historical Studies (University of Amsterdam, the Netherlands) and a Postdoctoral Research Associate at the Autonomous University of Barcelona (Spain).

Dr. Ondrej Dvoracek

Senior Researcher, Wood K plus – Kompetenzzentrum Holz GmbH, Austria



Dr. Ondrej Dvoracek is a researcher and engineer currently based in Vienna. He received PhD in Mechanical Engineering Sciences at the Graz University of Technology, Austria, in close cooperation with the University of Natural Resources and Life Sciences, Vienna, Austria. He spent his last years working as a Junior, later as a Senior, Researcher in Wood K plus, Austria, and previously as a Lecturer and Researcher at the Brno University of Technology, Czech Republic. He was a member of the Society of Wood Science and Technology and American Society of Civil Engineers. Ondrej's domain is developing devices, testing methods and mathematical models for renewable materials.

Dr. Kaori Fujita

Professor, Department of Architecture, Graduate School of Engineering, the University of Tokyo, Japan

Education and Career

Graduated from the University of Tokyo in 1993.

Graduated from the Graduate School of Engineering, the University of Tokyo in 1999 with the degree of Doctor of Engineering.

Assistant Professor at Tokyo Metropolitan University, October 2000.

Associate Professor at The University of Tokyo, April 2007.

Professor at The University of Tokyo, since April 2019 as of today

Field of Research

Timber engineering

Awards

- Encouragement Prize of Architectural Institute of Japan, 2003.
- 2008 IABSE Prize, The International Association for Bridge and Structural Engineering
- Education Award of Architectural Institute of Japan, 2016.

Dr. Michael Grabner

Senior Scientist, University of Natural Resources and Life Sciences, BOKU, Vienna, Austria

Dr. Michael Grabner, born 6th of October 1968, visited the Higher Technical School for Wood Technology, studied Wood Sciences and Technology at the University of Natural Resources and Life Sciences (Diploma 2002), where he finished his PhD 2005. Michael Grabner is heading the Tree Ring Lab since 1996. Due to the contact with "old wood", the scientific field of "Historical Wood Utilization" was opened. Setting up a national network in 2008 and organizing the first international meeting on "Historical Wood Utilization" in 2011; followed by meetings and excursions in 2012, 2014, 2015, 2016, 2017, 2018, 2020. He is deputy coordinator of the IUFRO group "Forest Products Culture – 5.15.00". 2019 he was organizing the WWD event in Stuebing, Austria. Since end of 2021 he is editor in chief of the International Wood Culture Journal.

Mr. Mark Griffiths

Woodworker, Researcher. England

Mr. Mark Griffiths has worked in the timber industry for the past thirty years. In this time, he has run a furniture design studio, taught and written about working with wood. For the past eight years, he has been part of a collective researching the culture of woodworking in European Pre-history.

Dr. Sangeeta Gupta

Professor and the head of Botany Division of Forest Research Institute, India

Dr. Sangeeta Gupta is Professor/Senior Scientist and Head, Botany Division at Forest Research Institute, Dehradun, India. She is having 36 years of research experience in Forestry with specialization in Wood Science and Plant Taxonomy. She has executed 14 research projects funded both in-house and by external funding agencies. 16 research scholars have been awarded Ph.D. degree under her guidance. She is teaching Forest

Managers and Post Graduate students of Wood Science & Technology since past 28 years and is National Authority for wood identification. Published 4 Reference Books and over 100 research papers in peer reviewed international and national Journals and delivered numerous oral and posters presentations in numerous international meetings. She is also managing world's renowned FRI Xylarium (DDw).

Dr. Consuelo DL Habito

Professor, University of the Philippines Open University, Philippines

Dr. Consuelo DL Habito is a Professor and Chair of the Master of Environment and Natural Resources Management (MENRM) Program at the University of the Philippines Open University (UPOU) – Faculty of Management and Development Studies since 2011. Prior to UPOU, she has been with the faculty of the Institute of Biological Sciences, College of Arts and Sciences at the University of the Philippines Los Baños (UPLB). She finished her BSc and MSc Zoology degrees at the UPLB and graduated from the University of Melbourne with a PhD in Engineering. Her research interests include watershed management and wood culture and heritage and community resilience. She has supported a network of local artisanal woodcarvers from the provinces of Ifugao, Pampanga, Laguna and Palawan by providing opportunities and spaces for learning, collaboration and competition (through woodcarving competitions and exhibits).

Ms. Yujie Han

Deputy Secretary General, China Wood Protection Industry Association, China

Ms. Yujie Han is a senior engineer, an expert member of the National Forestry and Grassland Innovation Alliance on Wood Conservation Utilization, a national qualification assessor and a national recognition assessor. Graduated from Hebei University in 2007 with a major in chemistry, she has been engaged in the research of wood, wood products quality and precious wood culture for many years, and has been responsible for organizing the construction, national recognition and qualification of the National Center of Performance Quality Inspection and Detection for Timber&Wood Products. She has organized the drafting of more than 30 national standards and industry standards such as "Rice Husk-Polyvinyl Chloride Composite"; and has organized 16 national rosewood appreciation training courses; and edited the magazine *China Wood Protection*.

Ms. Julia Harrison

Resident Artist, Penland School of Craft, United States

Ms. Julia Harrison is an artist, anthropologist, and educator based in North Carolina. As an artist, Julia specializes in small-scale woodworking; she has led workshops at craft schools across the US, including the Penland School of Craft, Haystack, and Arrowmont. For almonds 20 years, Julia's work as an anthropologist has focused on the cultural role of sweet foods; she has curated an exhibition on Asian sweets for the Wing Luke Museum of the Asian Pacific American Experience, created an online archive of interviews with confectioners and bakers, and delivered more than 100 public talks about the history and significance of fruit, sugar, and candy. All of Julia's passions intersect in her World Wood Day research on carved wooden confectionery molds.

Dr. Noba F. Hilvano

Associate professor 1, Eastern Samar State University, Philippines

Dr. Noba Hilvano works as Associate Professor in Eastern Samar State university - Salcedo Campus. She has PhD degree in Environmental Science from the University of the Philippines Los Baños, Laguna. She was the Project Leader of PREPARADO Project (Proactive, Resilient, Empowered People Adaptive to Climate Change, Risk, and Disaster Organizing) which was designed to enhance the awareness, preparedness, adaptability, and coping capacity of the community to climate change, risk, and disaster toward resilience and sustainability. Currently, she serves as Project Staff in CONserve KAIGANGAN through research collaboration between the UPLB and ESSU - Salcedo.

Mr. Lennert Lapeere

PhD Candidate, Ghent University, Department of Archaeology (Historical Archaeology Research Group of NW Europe), Belgium

Mr. Lennert Lapeere is a PhD Candidate affiliated to the Historical Archaeology Research Group of NW Europe, Department of Archaeology, Ghent University (Belgium). He studied archaeology at Ghent University between 2017 and 2021. The doctoral research focuses on the urban fabric and social topography of late medieval suburbs based on the case-study of late medieval Ypres (West-Flanders, Belgium). His fields of expertise are urban and historical archaeology, building history and urban house building traditions.

Dr. Seung-Hwan Lee

Professor, Division of Wood and Paper Science, Kangwon National University, Korea

Dr. Seung-Hwan Lee is the dean of the college of Forest and Environmental Sciences and a professor in the Division of Wood and Paper Science at Kangwon National University (Chuncheon City, Korea). He is also the director for the Institute of Forest Science and the principal investigator in charge of the Key Research Institute Program supported by the Basic Science Research Program through the

National Research Foundation of Korea funded by the Ministry of Education. He is a fellow of The Korean Academy of Science and Technology and International Academy of Wood Science. He teaches courses in Forest Bio/Nano Materials, Biorefinery, Wood Chemistry, etc. His research interest is in nanoscience for forest products (especially nanocellulose), bioenergy and biofuel, chemical modification of lignocellulosics, organosolvolysis of biomass, preparation, and characterization of novel bio-based polymers (biodegradable polymers), bio-nano composites, characterization of wood/polymer interphase.

Dr. Li Chao

Lecturer, Zhejiang Sci-tech University, China

Dr. Li Chao is a lecturer of College of Art and Design, Zhejiang Sci-Tech University. She is also a co-cultivate postdoctoral researcher of Zhejiang Sci-Tech University and DeHua TB New Decoration Material Co., Ltd. Her work has focused on wood culture and biomaterial design. She received her PhD from College of Materials Science and Technology, Beijing Forestry University in 2016.

Mr. Chenghao Li

Assistant curator, PhD candidate at Shandong University, China

Mr. Chenghao Li received the B.S. degree in Archaeology from Shandong University, China, in 2015 and the M.S. degree in History of science and technology from University of Science and Technology of China in 2018. Currently working toward the Ph.D. degree in Archaeology at Shandong University, China.

Currently working at Institute of Cultural Relics and Archaeology of Shandong, China, and dedicated to the study of archaeological wood from large-scale tomb.

Dr. Laurent Matuana

Professor and Associate Director, School of Packaging, Michigan State University, United States

Dr. Laurent Matuana is an Associate Director and a Professor of Bio-Based Composite Materials in the School of Packaging at Michigan State University. His research focuses on processing of bio-based materials, with emphasis on the use of wood resources for the development of sustainable materials for packaging, building, and other applications. He is a wood scientist who earned his Ph.D. degree from the University of

Toronto in Ontario and both his baccalaurate's and master's degrees from Laval University in Quebec City, all in Canada. He is a Fellow of the Society of Plastics Engineers (SPE) and the International Academy of Wood Science (IAWS) and an active member of four professional organizations.

Dr. Mechtild Mertz

Researcher, French National Centre for Scientific Research – CNRS, France

Dr. Mechtild Mertz is deeply interested in Japanese and Chinese wood species, performing microscopic wood identification of religious sculpture, architectural buildings, and excavated wooden remains. It is her aim to create a link between humanities and wood science.

Following her research in Japan, she also works in China and other Asian countries to understand the wood culture of religious statues, architectural building structures, and excavated wooden remains.

Dr. Daouïa Messaoudi

R&D/Regulatory/Institutional relations Director, Groupe Berkem, France

Chemical engineer (ITECH) and PhD in chemistry, **Dr. Daouïa Messaoudi** joined Groupe Berkem in 2003 where she took quickly responsibility for the laboratory of the industrial site in Gardonne (France) before taking responsibility for R&D, Regulatory Affairs and Institutional Relations within Groupe Berkem.

Dr. Francesco Negro

Assistant Professor, DISAFA, University of Torino, Italy

Dr. Francesco Negro is Associate Professor in Wood Technology at DISAFA, University of Torino, Italy. He is member of the Executive Board of Directors of the International Society of Wood Science and Technology (SWST). He is Faculty Advisor of the SWST Wood Technology Student Chapter at his Department. He mainly deals with properties, uses, development and sustainability of wood-based products.

Dr. Enrique Aragón Núñez

Lecturer, University of Almeria, Spain

Formed as archaeologist at Cadiz University (Spain) and Nantes University (France) with a MA in Research Methods of Archaeology and has a wide experience in underwater archaeology participating with relevant institutions such as DRASSM or INA. In 2016, he was granted a FURS scholarship from Flinders University to accomplish his PhD on maritime connectivity during the Early Iron Age in Western Mediterranean. **Dr. Enrique Aragón Núñez** is currently Postdoctoral Researcher in the University of Almeria and Associate Researcher at Flinders University of South Australia (Australia). He has developed a broadly multidisciplinary profile developing topics such as archaeometallurgy; maritime mobility and connectivity, cultural encounters and interaction, intertidal archaeology as well as diverse aspects of Digital Humanities such as the application of social network analysis and photogrammetry.

Ms. Ren Divien R. Obeña

Research Associate 1, University of the Philippines Los Baños, Philippines

Ms. Ren Divien R. Obeña is currently pursuing Master of Environmental Science and Management at the University of the Philippines Los Baños. Her thesis entitled "Seagrass Habitats of Cagbalete Island as a Social-Ecological System in Cagbalete Island, Mauban, Quezon Province, Philippines" aims to determine seagrass habitats' health and local fisheries' dependence on the seagrass ecosystem. Ms. Obeña is a graduate of the Polytechnic University of the Philippines under the Bachelor of Science in Biology program. She used to be Graduate Student Apprentice in UPLB under the Graduate Mentoring and Apprenticeship Program (GMAP) for 2018-2019 AY. Ms. Obena is also a currently working as University Research Associate I in a project implemented by UPLB and funded by the Department of Science and Technology through the Grants-In-Aid Program. Her exposure to this project had allowed her to diversify her ability in conducting scientific studies.

Ms. Marne G. Origenes

CIP Graduate Fellow, University of the Philippines Los Baños and Department of Science and Technology - Science Education Institute, Philippines

Ms. Marne G. Origenes earned her Bachelor of Science in Forestry with a major in Agroforestry from Mindanao State University in Naawan, Misamis Oriental. She was a licensed Forester with Honor Graduate Eligibility. Moreover, she also earned a Master of Science in Forestry major in Forest Resources Management and minor in Silviculture and Forest Influences from the University of the Philippines Los Baños, Laguna, Philippines under DOST-ASTHRDP scholarship.

Currently, Marne G. Origenes is a CIP Graduate Fellow under Department of Science and Technology - Science Education Institute Career Incentive Program deployed in the Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños. She worked in a PCAARRD-funded project entitled “Localized Conservation Strategies of Plant Resources in Forest over Limestone of Samar Island”.

Ms. Laqshika Patiyal

PhD Research Scholar, Dr. Y.S Parmar University of Horticulture and Forestry, Nauni Solan, India

Ms. Laqshika Patiyal is a B.Sc (Hons) Graduate in Forestry. She has completed her masters from Forest Research Institute, Dehradun (India) in Wood Science and Technology in the year 2019. She has worked for a year as Assistant Merchandiser in a wood based buying house in New Delhi, India.

Currently she is enrolled in the 2nd year of Doctoral program in the University of Horticulture and Forestry, Nauni Solan (India) in the Department of Forest Products and Utilization and my current research deals with the bio preservation of wood using plant extracts.

Mr. Juliust T. Pelegrina

Science Research Analyst, Department of Sciencean Technology- Forest Products Research and Development Institute, Philippines

Mr. Juliust T. Pelegrina – Science Research Analyst in the Anatomy and Forest Botany Section, Material Science Division under the Department of Science and Technology-Forest Products Research and Development Institute.

He has been involved in projects on the processing and wood quality evaluation of selected tree species, DNA barcoding, and alternative species for wood carving. Aside from basic researches, he has been an active advocate of Gender and Development principles in order to align government projects based on the issues and concerns of forest dependent communities and industries.

He received his Bachelor of Science in Forestry degree from the University of the Philippines, Los Banos in 2015.

Dr. Rūtilė Pukienė

Dendrochronologist, National Museum – Palace of the Grand Dukes of Lithuania, Lithuania

Dr. Rūtilė Pukienė is a dendrochronologist and wood anatomist with more than 30 years working in the academic and cultural heritage fields. Graduated as a forestry engineer (MEng) she obtained PhD degree in Natural Sciences (Biology) in 1997 defending a thesis on pinewood growth dynamics in a raised bog during the Subatlantic period. The field of her interest is historical wood, both preserved in natural surroundings and as cultural heritage, as well as regularities in living tree growth, dendrochronological dating of tree rings and social aspects which may be traced from scientific investigations into material heritage.

Ms. Congcong Ren

Associate Professor, Beijing University of Civil Engineering and Architecture, China

- Historian of Sciences and Technology
- MA, Peking University, Research Center of Architecture
- PhD, Tokyo University，Department of Architecture, Academy of Engineering

Ms. Congcong Ren is a historian of architecture in China and Japan, with a special interest in timber structure and carpentry, and in how technology of construction woven with ritual took part in social production in traditional society. She is now working on a project aimed to investigate Chinese wood working hand tool and its history.

Research Background

History of Sciences and Technology

History of Architecture

Heritage Conservation

Dr. Sara Rich

Assistant Professor, Coastal Carolina University, United States

Dr. Sara Rich is Assistant Professor of Honors at Coastal Carolina University. She is an art historian and maritime archaeologist, with specializations in dendrochronology and archaeological theory. Sara is Director of the Lowcountry Dendrochronology Project and Publications Manager for the Honor Frost Foundation. Her book, Cedar Forests, Cedar Ships: Allure, Lore and Metaphor in the Mediterranean Near East (Oxford: Archaeopress, 2017) thinks with object-oriented ontology to better understand the complex relationships between ancient shipbuilding and forests that supplied ships' timbers. Her latest large-scale project, Shipwreck Hauntography: Underwater Ruins and the Uncanny (Amsterdam University Press, 2021), uses artistic, scientific, and philosophical forms of inquiry to help resolve common problems in nautical archaeology and to establish a stronger interface between art and archaeology underwater. Sara is also author of a new work of creative nonfiction, Closer to Dust (Punctum, 2021), and an 'Object Lesson', Mushroom (Bloomsbury, 2023). She is co-editor of Contemporary Philosophy for Maritime Archaeology (Sidestone, 2023).

Dr. Flavio Ruffinatto

Researcher, University of Turin - DISAFA, Italy

Dr. Flavio Ruffinatto holds a master's degree in Forestry and Environmental Sciences and currently is a Researcher at the Department of Agricultural, Forestry and Food Sciences (DISAFA) of the University of Turin. Amongst his main research and professional interests are the wood identification of timber and wood products in commerce and cultural heritage, as well as diagnostics on modern wood products and historical wooden artifacts.

In the last 15 years, he has gained extensive experience teaching wood technology, wood anatomy, and wood identification to academic students and vocational training bodies. He has also taught several workshops and seminars on macroscopic and microscopic wood identification for the general public as well as professionals of the sector such as the Italian CITES enforcement authorities and the Federlegno-Arredo (Italian furniture and furnishing industries association) associates.

Dr. Maria Martin Seijo

Junior Distinguished Researcher-Beatriz Galindo, Universidad de Cantabria, Spain

The areas of research of **Dr. Maria Martin Seijo** are in Archaeology and Archaeobotany, focused on the relationships between people and plants through the study of plant remains recovered from archaeological contexts. Her work has concentrated in Europe (Spain, Portugal), America (Panama) and recently in Asia (Siria, Palestina, Taiwan) and Oceania (Mariana Islands) from Prehistory to the recent past. Dr. Maria Martin Seijo founded (2002) and managed (2014-2021) the Laboratory of Archaeobotany (USC), until she moved to UC where created a new one (2021). Her PhD Thesis (GoogleScholar: 39 cites) contributed for the first time to the study of wooden crafts from Iron Age contexts from NW Iberia. This innovative line of research applied on carbonised wooden objects and indirect evidence of perishable crafts has provided ground-breaking contributions to the perishable materiality made of plant materials (J Archaeol Sci Rep 2015, Quat Int 2016, Veg Hist Archaeobot 2020, Env Archaeol 2020). Since completing her PhD, Dr. Maria Martin Seijo have got four postdoctoral positions. The first one involved research stays in outstanding research centres in the fields of Biology (CIBIO-InBIO, UPorto, PO) and Prehistoric Archaeology (UMinho, PO). During the second postdoc, she made short research stays at CTR, University of Copenhagen (DK) and University College Dublin (IL). Her first postdoc project focused on the study of firewood procurement and wood crafting from the perspective of the chaîne-opératoire, going beyond paleoenvironmental reconstruction (2 papers in Quat Int 2017). Besides, an innovative methodological approach for studying plant macro-remains was developed by combining charcoal, seed analysis and ceramic taphonomy with the aim of reconstructing pits lifecycle (J Archaeol Sci Rep in 2017). In 2020, she got two positions in very competitive calls for individual researchers, the RETOS call mod. JIN (start: Sep 2020) and Distinguished Researcher Beatriz Galindo at UC (start: Feb 2021). During her postdocs, Dr. Maria Martin Seijo enlarged her expertise on the analysis of plant materials, from wood to plant fibres, resins, and barks. She is currently developing a project involving the study of saturated plant-based crafts from caves in northern Spain (J Archaeol Sci Rep 2022). This expertise has been also applied in a pioneered way on the study of plant-based objects recovered from tropical and subtropical areas such as Panama (J Archaeol Sci 2020 and Env Arch 2020) and Taiwan (J Archaeol Sci 2021).

Ms. Upasna Sharma

Ph. D. Research Scholar, Forest Research Institute (FRI), Dehradun, India

Ms. Upasna Sharma is pursuing Ph.D. (3rd year) in Wood Anatomy from Forest Research Institute – Dehradun, Uttarakhand, India. Her research interest area includes Plant Anatomy, Dendrochronology, Dendroclimatology, Plant Biodiversity and Ethnobotany.

Prof. Ana Crespo Solana

Professor of History, Director of Research, Consejo Superior de Investigaciones Científicas (CSIC)/ Spanish National Research Council, Spain

Prof. Ana Crespo Solana - Professor of Early Modern History, tenured Research Scientist and director of Research at the Consejo Superior de Investigaciones Científicas (CSIC) (Spanish National Research Council).

Awarded with the "Ramón y Cajal Programme" (2003-2008), Spanish National Endowments for the Humanities; Honorary Research Fellow Professor de la University of Wales Trinity Saint David (UWTSD, Reino Unido); member of the GRAN. Groupe de Recherche en Archéologie Navale, France, the CSIC Network of Heritage (PTI-PAIS: Patrimonio Abierto) and of the ArchaeologyHUB CSIC network. Since 2022 is member of the Academia Europaea.

Specialised in Early Maritime History and Archaeology: the history of Global oceanic trade in the early modern age (16th-18th centuries), with a special focus in the fields of social and economic history, maritime History of shipbuilding and the Spatial Analysis of merchant networks, maritime routes and seaports in the Atlantic world by applying Social Network Analysis (SNA) and Geographic Information system (GIS).

Invited professor and researcher in several institutions in Europe, America and Asia; and leader of several internationals and national research project funded by the EUROCORES programme of the European Science Foundation (EUROCORES); GlobalNET, funded by the Spanish Ministery of Science and Innovation (National Endowments for the Humanities), ITN coordinator of the Marie Curie ITN project ForSEAdiscovery: "Forest Resources for Iberian Empires.

Ecology and Globalization in the Age of Discovery, 16th-18th centuries"; and currently leading the research project “Ship ExMachina revisitied” (National Endowments for Humanities, Spanish Ministery of Science; “Naufragios Históricos”; the Marie Curie Individual Fellowship “ModernSHIP” (with Dr. Arnaud Cazenave de la Roche) and the Research project UnderHERITAGE.

Some relevant publications are: Crespo Solana, A.; Castro, Filipe; & Nayling, Nigel (eds.) *Heritage and the Sea. Maritime History and Archaeology of the Global Iberian World (15th-18th centuries)*, 2 vols., Springer, 2022; A. *Spatio-Temporal Narratives. Historical GIS and the Study of Global Trading Networks* (1500-1800), Cambridge Scholar Publishing, 2014; "The formation of a social Hispanic Atlantic space and the integration of merchant communities following the Treaties of Utrecht", *Culture & History Digital Journal*, 2014; with Rich et als, *Shipwrecks and Provenance in‐situ timber sampling protocols with a focus on wrecks of the Iberian shipbuilding tradition* (2017); "Wood Resources, shipbuilding and Social Environment: The Historical context of the ForSEAdiscovery Project", *Skyllis. Journal of the German Society for the Promotion of Underwater Archaeology* (2016); “Dutch Trade and Spatial integration between the Baltic and Spain, 1700-1778”, in Veluwenkamp & Scheltjens (2018); “El comercio colonial español de la Carrera de Indias: historiografía y método en el análisis de una estrategia de redes”, *Anuario de Estudios Americanos* (2018); “ForSEAdiscovery: la construcción naval y el comercio de la madera del siglo XVI al XVIII”, *PH: Boletín del Instituto Andaluz del Patrimonio Histórico* (2019); Crespo Solana, Ana, “La Historia y la Arqueología Marítima desde la consiliencia interdisciplinar y transnacional”, *Magallánica* (2019); with Marta Moreno et als, “Meat supplies at the Ribadeo I shipwreck (San Giacomo di Galizia galleon): preliminary results from three small faunal samples” *Heritage* (2022) or with Tania Casimiro et als, “The “San Giacomo di Galizia” warship galleon (1597). Building narratives through an archaeological and historical reading of the Ribadeo I shipwreck” *Heritage* (2022), among others.

Ms. Juliette Taïeb

PhD Candidate, University Paris 1 Pantheon-Sorbonne, ArScAn UMR 7041, France

Ms. Juliette Taïeb is a PhD candidate in Archaeology at University Paris 1 Pantheon-Sorbonne in Paris, France. Her doctoral research is about the dendroarchaeological analyses (dendrochronology and dendroclimatology) of Birnirk and Thule architectural wood remains from coastal sites in northern Alaska (Cape Espenberg, Pingusugruk, Birnirk and the Kobuk river sites) to refine the chronological and climatic sequence of Thule culture settlement dynamics in northwestern Alaska in the early 2nd millennium CE. Her PhD is conducted under the supervision of Claire Alix, Valérie Daux and Christophe Petit.

Dr. F. Digdem Tuncer

Assistant professor, Istanbul University-Cerrahpasa, Faculty of Forestry, Turkey

Dr. F. Digdem Tuncer was born in the late 80's, have been learning since the 90's and got her PhD during the pandemic. Since 2012, she has been conducting academic studies at Istanbul University-Cerrahpasa, Faculty of Forestry, Department of Forest Industrial Engineering. My main discipline is wood anatomy. In connection with this, she got her master's degree on the effect of wood modification methods, and her doctorate on the use of near infrared spectroscopy. In the meantime, she carried out studies on the effects of different modifications on the wood structure, the examination of historical and archaeological samples, the processing of spectroscopic data, and continue to teach at the undergraduate level.

Ms. Nuria Romero Vidal

PhD candidate, Universidade de Santiago de Compostela, Spain

Ms. Nuria Romero Vidal is a predoctoral student based at the University of Santiago de Compostela USC (Spain), being part of the GEPN (Study Group for the Prehistory of NW Iberia). Currently, she is funded by an ED481A 2021/030 Pre-Doctoral Grant of the Galician Government (Xunta de Galicia). Her research is mainly focused on the study of human-tree interaction through wooden material culture located in museum collections, combining archaeobotany and anthropology with state-of-the-art digital tools.

Mr. Karl Abelard L. Villegas

Assistant Professor, University of the Philippines Open University

Mr. Karl Abelard Villegas is an Assistant Professor under the Faculty of Management and Development Studies at the University of the Philippines Open University (UPOU). He is a professional Forester having completed his BSc in Forestry degree at the University of the Philippines Los Baños. He also finished a MSc in Resource Management at the University of Edinburgh. His research areas focus on sustainable forest management, watershed development and environmental management, biodiversity conservation, nature-based solutions, forest governance and other related disciplines. He has previously worked with the Department of Science and Technology for R&D in environmental management, as well as a researcher in World Agroforestry Center and Leiden University. He has also served as consultant to USAID, Global Affairs Canada including international organizations like the ASEAN Center for Biodiversity, Food and Agriculture Organization and the European Union Delegation in the Philippines.

Dr. Cynthia (Cindi) D. West

Station director, Northern Research Station & Forest Products Laboratory U.S. Forest Service, U.S. Department of Agriculture, USA

Dr. Cynthia D. West has 28 years of experience working across private industry, academia, and federal government in a variety of jobs to ensure sustainability of our natural resources. In February 2021 she assumed the position of Director of the Forest Products Lab and the Northern Research Station within the USDA Forest Service. She has extensive experience working across organizational boundaries to build collaboration and partnerships.

Dr. West has served in various leadership roles in USFS, including as the Director of the Office of Sustainability & Climate Change, Associate Deputy Chief for R&D, Director for Resource Use Sciences, and Deputy Station Director for USFS' Pacific Northwest Research Station in Portland. Through these leadership roles, she built a strong science-management partnership to address complex resource challenges. She also held positions in academia at Virginia Tech and Mississippi State University. She started her career, working in forest management, with Weyerhaeuser in North Carolina in timber procurement and landowner assistance.

A native of Staunton, Virginia, Dr. West holds a BS degree in Forestry Management, an MBA in Marketing and Management, and a PhD in Wood Science and Forest Products from Virginia Tech.

Dr. Yan Xiao

Professor, Zhejiang University, ZJU-UIUC Joint Institute, China

Dr. Yan Xiao is a Changjiang Distinguished Chair Professor, serving as the Program Director for Energy, Environment and Infrastructure Sciences, at Zhejiang University – University of Illinois at Urbana Champaign Joint Institute (ZJUI), Zhejiang University. Prof. Xiao received his Bachelor of Engineering degree from the Tianjin University, China, his Master and Doctor of Engineering degrees from the Kyushu University, Japan. His professional and academic experiences include research engineer at the Aoki Corporation, Tokyo, Japan, Post-doctoral fellow, Lecturer and Assistant Research Scientist at University of California, San Diego, tenured full Professor at the University of Southern California. He was previously the Dean of the Civil Engineering College at the Nanjing Tech University, and the Hunan University. Prof. Xiao serves as the editorial board member of the Journal of Constructional Steel Research. He is an elected fellow of the American Society of Civil Engineers (ASCE) and American Concrete Institute (ACI), and the International Academy of Wood Science (IAWS). He holds a Professional Engineer license in California.

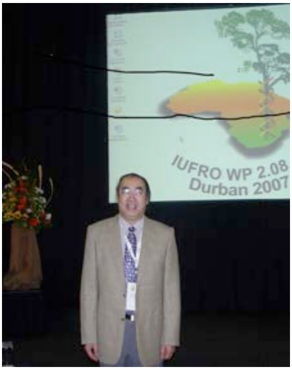
Dr. Lu Yu

Postdoctoral research associate, Oak Ridge National Laboratory, United States

Dr. Lu Yu currently is working as postdoc at Ork Ridge National Laboratory. She obtained her Ph.D. degree from the department of materials science and engineering at University of Tennessee. Her Ph.D. research focuses on biomass-derived carbon nanomaterials for electrochemical energy storage and carbon quantum dots. She also obtained a minor in computational science for conducting simulation combined with experimental results. Before the Ph.D. study, Lu received her MS from North China Electric Power University, where she studied polymer solar cells with the research focused on solution–processed metal complexes as cathode interfacial layer and optimization of active layer with PVDF as nonvolatile additive.

Dr. Guang-jie Zhao

Professor, Beijing Forestry University, China



Dr. Zhao Guangjie, assistant professor and lecturer of Northeast Forestry College from 1978 to 1985; From 1985 to 1995, he received master's degree and doctor's degree from Kyoto University and Tottori University, Japan. From 1995 to 2018, he served as associate professor, professor and doctoral supervisor of Beijing Forestry University. From 2003 to 2011, he served as vice Dean and Dean of College of Materials Science and Technology of Beijing Forestry University.

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