

Analysis of the Lesser-Known Timber Species situation and recommendations

l) Analysis of the Lesser-Known Timber Species situation:

The Lesser-Known Timber Species (LKTS) theme has been approached from a variety of angles since the early 1970s. This has given an overview of the issues and prospects for promoting new tree species on the tropical timber market. Here are the different approaches and the actions to be implemented, knowing that all the publications on the subject can be included in one of the following sections:

1. Actions and publications carried out by recognized organizations

Important organisations in the sector such as the FSC and the WWF have published lately works on the promotion of lesser-known or lesser-used species. These campaigns that have the intention to raise awareness among the public and professionals are the starting point to work and capitalise. Having a privileged visibility, these organisations are strong communication tools for the promotion of lesser-known species.

→ **Action:** The ATIBT has taken similar initiatives to partner organizations.

2. Theoretical reference knowledge

Through continuous work since the 1990s, Centres for Wood Research have described the physical, mechanical and aesthetic characteristics of most of the lesser-known regional species. Although this approach increases knowledge of these species, it has proved to be insufficient to promote their use. This day, other than the lack of information that needs to be identified, the theoretical knowledge about the characteristics of wood is no longer the central problem. However, it is expected to update the data according to the current protocols.

→ **Action:** Identification of missing information, laboratory tests, research on the LKTS characteristics in relation to their application.

3. Scientific works and studies

Many academic publications support the use of new species. These articles have an independent view and prove the benefits of using new species both for ecological renewal and for regional development. In addition, general forest inventory work and information gathering have already been carried out and provide an accurate knowledge of forest stands.

→ **Action:** Create a database of publications and bibliographic knowledge.

➔ **Action:** Study the forest management plans, mapping and renewability analysis.

4. Innovative Sectors and New Products

Some sectors are a driving force for the use of new species and can create new market opportunities for species that are less present in the markets. For example, the maritime construction sector it's a pioneer in finding alternatives to traditional species such as Azobe or Greenheart. The whole of these researches promotes the level of general knowledge. Moreover, the innovation in wood products and the opportunities offered by the evolution of the production processes, gives a chance to new species.

➔ **Action:** Alternative species offer for industrial sectors open to change.

➔ **Action:** Development of an industrial valorization and transformation of LKTS with research of all innovative uses and outlets specific to these new species.

5. Marketing and strategic plans

Market research on tropical timber provides valuable information on the access conditions of new species. Strategic factors have been identified to facilitate the usage of LKTS by industry. Marketing actions based on the observations and analysis of these studies provide reliable feedback and follow-up on the impact on the market. One of the strategies that have been implemented is the establishment of a pilot project with manufacturers, which responds to the lack of viable reference on new species.

➔ **Action:** Establishment of pilot projects with manufacturers, provision of wood and technical support

II) Presentation of publications

1. Actions and publications carried out by recognized organizations

LesserKnownTimberSpecies.com

Under FSC Denmark supervision, an initiative that started in 2015 set up an online platform with an encyclopedia of species classified by usage, location, name or colour. This site is consecrated to lesser-known species. The webpage displays many species with a description of their physical general characteristics. Furthermore, the website presents examples of works and constructions classified by types of use, specie, country and date of realization. For each project, we find the company that supplied the timber. Along side with the website, there is a paper publication with a very attractive format suitable for consumers, that includes the information sheets of the species, and examples of works "FSC ANIMAL PARADE" and a short video presenting the stakes of the promotion of lesser-known species. (<https://www.youtube.com/watch?v=F8Lw9AixWEE>)

http://www.lesserknowntimberspecies.com/	
FSC	2015

<u>A guide to lesser known tropical timber species</u>	
<p>Many forest concessions in the tropics can contain over 100 different tree species, but their characteristics are simply not known and there is lack of knowledge about their uses and purposes. The Guide to Lesser Known Tropical Timber Species, produced by WWF's Global Forest & Trade Network, helps fill this gap by providing more information on these valuable but often overlooked lesser-known timber species. The guide provides details on more than 50 possible alternative species and their end uses, as well as information on GFTN participants supplying those species.</p>	
http://www.worldwildlife.org/publications/guide-to-lesser-known-tropical-timber-species	
WWF	2013

<u>Houtdatabase</u>	
<p>This database contains a considerable number of LKTS and provides the users with an overview of the suppliers of these species and the certificates for sustainable forest management these species are available with. Moreover, the database-users get information on the physical and mechanical properties of the LKTS and the possible uses in residential and commercial construction and waterworks (civil engineering). An essential tool to promote the use of LKTS are the reference projects which are linked to the species. The reference projects contain a description of the project, the LTKS that were used, the supplier and the certificate for sustainable forest management that the timber was supplied with. In this way users of the database (buyers, architects, constructors etc.) can check if there is practical experience in the application of LKTS in the Netherlands and other parts of Europe. Through the contact information the user can contact the supplier for additional information or references on the project.</p> <p>A selection of 30 reference projects is made available in English.</p>	
http://www.houtdatabase.nl/?q=node/243	
Rijkswaterstaat	2009 (with annual update)

<u>Tropical Timber</u>	
<p>This site presents the different LKTS per their availability, use, durability, color, and flexural strength or by substitution species to a traditional species.</p>	
http://www.tropicaltimber.info/fr/	
ITTO	1998 (Last up-date 2017)

2. Theoretical reference knowledge

<u>Plant resources of south-East Asia 5 / Timber trees : lesser-known timbers</u>	
Hong, Lay Thong & Prawirohatmodjo, S & Sosef, M. S. M.	
<p>This volume on lesser-known timbers completes the PROSEA trilogy on timber trees. Lesser-known timbers merit attention because of the growing appreciation of their importance in the sustainable management of tropical forest and of their potential for forest plantations. The increasing use of</p>	

wood-based panels, requiring less outstanding timber qualities and less uniformity, also intensifies their use. These lesser-known species are also essential to supply timber for local use and therefore for rural development. The up-to-date information on these timbers contained in this volume supports all these applications. It includes information on palm wood as well. As wood properties are related to botanical classification, it is important to identify trees and wood correctly. Therefore, there is an extensive list of wood anatomical features plus macroscopic photographs of all timbers. The volume covers 309 genera and about 1550 species, amongst others African mahogany, Agoho, Antiaris, Balsa, Ficus, Lilin, Maple, Mempisang and Tempinis.	
https://books.google.fr/books/about/Timber_trees.html?id=Gu7wAAAAMAAJ&redir_esc=y	
PROSEA	1998

Plant resources of South-East Asia. No. 5(2): Timber trees: Minor commercial timbers	
Pudoc, Wageningen	
The South-East Asian timbers of minor commercial importance are in shorter supply and/or have less outstanding properties than the major commercial timbers. Many are currently used as core veneer and as the raw material for wood-based panels. The market for such products is expanding, so the use of these timbers is expected to increase. For example, this has already happened with rubberwood timbers should be compatible with the concept of sustainable use of tropical forest.	
https://www.tib.eu/en/search/id/zbmql%3AHBZTHT006770260/Plant-resources-of-South-East-Asia-No-5-Timber/	
PROSEA	1993

New Marketable Species in Africa	
Set of English technical sheets published by CTFT and ITTO. Species: Andoung, Bilingua, Celtis, Dabema, Gombé, latandza, Izombé, Lati, Limbali, Tola. Comprehensive information on origin, supply, frequency in forest, processing (information for each process) and information on physical characteristics as in Tropix sheets of CIRAD.	
http://www.houtdatabase.nl/pdf/New%20Marketable%20Species%20in%20Africa%20(CTFT,%201990).pdf	
CIRAD / CTFT	1990

PROSPECT" for Improved Use of Tropical Timbers A Guide to the Use of Lesser Known Timbers	
J.P. Smith, R.A. Plumptre, J.D. Brazier, V.T. Burclaff and C.E. Dorey	
PROSPECT is designed expressly to encourage the use of more tropical timbers; one may, however, ask whether it is not dangerous to use more species if a major priority is to prevent the destruction of the forest; will it not merely speed up the demise of the forest? Paradoxically, this point of view is wrong for a number of very good reasons; these are explained in the following sections of the paper before methods of operating PROSPECT are described in detail.	
http://www.bodley.ox.ac.uk/users/millsr/isbes/ODLF/TFP28.pdf	
Oxford Forestry Institute	1994

Woods from Peru: A Catalog of Peru's Lesser Known Timber Species	
<i>Woods from Peru</i> is a catalog of 40 Peruvian Amazon Lesser Known Timber Species (LKTS), providing details such as wood characteristics, technical advice and what they can be used for. This catalog aims to promote LKTS, thereby reducing pressure on focal species in WWF's priority forests areas.	

http://gftn.panda.org/newsroom/?200967/Woods-from-Peru-A-Catalog-of-Perus-Lesser-Known-Timber-Species	
WWF	2011

Rare tropical timbers	
Sara Oldfield	
This paper is based on a feasibility study, carried out for the IUCN Conservation Monitoring Centre, on the monitoring of rare tropical timber species in international trade.	
https://archive.org/details/raretropicaltimb88oldf	
IUCN	1988

100 Tropical African Timber Trees from Ghana	
Oteng-Amoako	
This handbook addresses the problem of tree and wood misidentification by providing tree, stem, bark, and leaf identification features of 100 timber species selected from the forests of Ghana. The species are also commonly found in many countries of tropical Africa. It provides tree, wood macroscopic and physical identification features as well as essential data on distribution of species by geographical regions of tropical Africa. Additionally, it highlights the distribution of the species in vegetational zones of Ghana, extent of their availability in the forest, their utilization and sustainability status. It further provides notes on ecology and silviculture, ethnobotany (mainly phytomedicine), and industrial uses of the wood. The list includes some 74 lesser-used species (LUS) and lesser-known species (LKS), some of which will from a major promotion.	
http://www.houtdatabase.nl/pdf/100%20Tropical%20African%20Timber%20Trees%20from%20Ghana%20(Oteng-Amoako,%202006).pdf	
Forestry Research Institute of Ghana, Kumasi /ITTO	2006

Other bibliographical references:

Lesser Known Timber Species of SEALPA Countries	
Peter J. Eddowes, G. E. Gresham	
https://books.google.fr/books?id=s9v8MQAACAAJ&hl=fr&source=gbs_navlinks_s	
South East Asia Lumber Producers' Association	1980

Lesser Known Timber Trees of Malaysia	
K. M. Kochummen	
https://books.google.fr/books/about/Lesser_Known_Timber_Trees_of_Malaysia.html?id=wnc2ngAACAAJ&redir_esc=y	
Malayan Nature Society	1973

3. Scientific works and studies

Wood of Ivory Coast lesser or not used. First part	
Thiel Jean, Edi K.A.	

In order to cope with the impoverishment of the Ivorian forest, an initial campaign to promote lesser known and non-marketed species was launched in 1972, in which CIRAD-Forêt participated. In this report, 15 of the 29 species studied are presented in an individual form.	
http://catalogue-bibliotheques.cirad.fr/cgi-bin/koha/opac-detail.pl?biblionumber=41699	
CIRAD / CTFT	1991

Wood technology research in Côte d'Ivoire: towards a rational use of secondary forest species and a technological mastery of plantation forestry in quality and quantity.	
Durand Patrick Y.	
The dense forest of Ivory Coast tends to be impoverish in quantity and quality. In quantity, because of the enormous volume of wood destroyed (bush fires, agricultural clearing, uncontrolled logging). The volume of wood destroyed can be estimated at 5 m3 per m3. As a result of the overexploitation of a limited number of noble species (Acajou, Sipo, Assamela ...), the measures taken by the national authorities to try to stop this degradation of forestry capital are based on three axes: protection of the existing forest estate, reforestation and valorisation of timber products. The forestry research program in Ivory Coast, which aims to adapt as well as possible to these measures, concerns secondary forest and reforestation species.	
http://agritrop.cirad.fr/444275/	
CIRAD / CTFT	1983

Specificities of the gluing of tropical wood: valuation of secondary species and multi-species collage	
Gérard Jean	
The development of gluing techniques contributes to optimizing the use of tropical timber by enhancing part of the production difficult to use as it is: secondary species, poorly shaped logs or small diameter, wood with major defects, decommissioned wood, waste of sawmill.	
http://catalogue-bibliotheques.cirad.fr/cgi-bin/koha/opac-detail.pl?biblionumber=41699	
CIRAD / CTFT	1999

ITTO

Both in Africa and in Asia, ITTO has implemented hundreds of projects for the development of sustainable forest management and local transformation. The will to develop LKTS, for example, is included in the objectives of the ITTO 2008-2011 action plan, but many previous projects also focus on the promotion of lesser-known species before, particularly in Ghana and Guyana. The presentation files of every action are very detailed and present market research on the methods for entering the market of LKTS. Tropical Timber site, ITTO offers the opportunity to select substitutes for the best known species or to conduct targeted research based on species characteristics such as density or durability.

Utilization of lesser used wood species in Guyana	
This one-year project aims to increase the overall contribution of the forest sector to the national economy by improving the awareness and use of lesser used species. The project will focus on gathering technological information on lesser used species; more promotion of current and potential lesser used species and training in processing techniques of these species. It is also expected that the capacity building aspect of the project would not only improve the processing	

techniques used for these species but also improve the quality of the product. The key beneficiaries would be: the forest industry (includes producers and manufacturers); local communities and academic forestry programmes involved in the forestry sector.	
http://www.itto.int/project_search/detail/?proid=PD344%2F05+Rev.2+%28I%29	
ITTO	2008

Technological Profiles of Selected Species Ghana	
The first part presents the project as a whole, the situation of the local market and the available resource, the marketing strategy of the lesser known species and the opportunities represented by these new species.	
The second part brings together about ten species: distribution, definition and morphological characteristics, with a precise mapping of the resource, stocks and machining characteristics.	
http://www.houtdatabase.nl/pdf/Technological%20Profiles%20of%20Selected%20Species%20Ghana%20(ITTO,%202002).pdf	
ITTO	2002

Product development and processing of lesser used timber species	
Nilsson, K	
This paper is a concentrate of the experiences gained from the Product Development Segment in the ITTO-TEDB-FORIG Project "Industrial Utilisation of Selected Ghanaian Lesser Used Timber Species".	
The completed project segment is presented in three reports:	
Phase I: Furniture Production, April-May, 1996.	
Phase II: Product Development, August-September 1996.	
Phase III: Product Development Completion, July-September 1997.	
Species mentioned: Ceiba, Kyenkyen, Celtis, Essia, Denya	
http://fornistest.metla.fi/content/product-development-and-processing-lesser-used-timber-species	
ITTO	1998

Industrial Utilisation and Improved Marketing of some Ghanaian Lesser-Used timber Species from Sustainably Managed Forests	
Addae-Mensah, A.	
The general aim of the LUS project was to encourage the forest products industry of Ghana and the sub region to better utilise their forest resources to help aid the development of the Ghanaian society while also attaining ITTO's target 2000, i.e. to achieve complete sustainable forest management by the year 2000. Specifically, the overall objectives were to remove pressure from the over exploited primary species like Mahoganies, Iroko etc. by increasing the use of available and sustainably managed wood whose characteristics are generally known but not utilised extensively, and using this wood more effectively by minimising waste and increasing value.	
http://fornistest.metla.fi/system/files/utilisation_LUS_0.pdf	
ITTO	1998

Utilization of lesser used species as alternative raw materials for forest-based industries	
This 5-year project is promoting the utilization of 20-24 lesser-known species from the Philippines through research and dissemination of information on wood characteristics and technical properties, as well as by manufacturing and testing selected products.	
http://www.itto.int/project_search/detail/?proid=PD047%2F88+Rev.3+%28I%29	

ITTO	1998
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Technology development for the production of lesser known tree species (LKTS) as alternative raw materials for forest-based industries	
The Project attempts to develop appropriate technologies for the production of selected Lesser Known Tree Species (LKTS) which are potential substitutes for traditional tree species. The Specific Objectives are: to document the general phenology of flowering and fruit development of selected LKTS in order to assess the seed potential of each species; to evaluate the environment tolerance of selected LKTS to fire, drought, acid soils and their performance in open grassland conditions; and to develop and standardize seed, nursery, mycorrhizal inoculation and plantation technologies for selected LKTS. The target beneficiaries will be the farmers in the upland communities who will be encouraged to engage in tree farming to supply their cash income and provide raw material for the industries.	
http://www.itto.int/fr/project_search/detail/?proid=PD060%2F97+Rev.2+(F)	
ITTO	1998

Wood Properties and Their Variations Within the Tree Stem of Lesser-Used Species of Tropical Hardwood from Ghana	
Kofi Poku, Qinglin Wu, Richard Vlosky	
Due to increasing demand for traditional market species of timber, which are dwindling in quantities and quality within the Ghanaian forest, there is the need to introduce lesser-used species (LUS) to serve as substitutes. The success of LUS in the marketplace requires technical information that relates to utilization about the species. This paper examines physical and mechanical properties of wood and their variations within the tree stem of <i>Petersianthus macrocarpus</i> , a potential LUS from Ghana. There was an overall increase of wood's physical and mechanical properties from the breast height to the top of the tree. Specific gravity correlates positively with all the wood's properties, making it a good indicator for selection of the wood for use. The wood of <i>Petersianthus macrocarpus</i> is dense (specific gravity of 0.69) with moderately high shrinkage values (radial shrinkage of 4.0% and tangential shrinkage of 6.9%).	
https://wfs.swst.org/index.php/wfs/article/view/511	
Louisiana State University	1999

Termite resistance of selected lesser-known Malaysian hardwoods	
Andrew H.H. Wong, J. Kenneth Grace	
A combination of field and laboratory termite tests were used to evaluate the subterranean termite resistance of lesser-known tropical hardwoods from Malaysia, which have potential future use where termites pose problems to timber structures. The 28-day lab test followed the procedure of AWP A E1-97 subjecting mainly the heartwood of selected woods to either <i>Coptotermes formosanus</i> (in Hawai'i) and/or <i>C. Curvignathus</i> (Malaysia). Up to 22 hardwoods were evaluated. Test block mass losses and termite ratings were compared to show a range of termite resistance between wood species and in cases, within a single tree species occurred due to different degrees of attacks between these termites especially with rubberwood and kempas. Overall the most termite-resistant woods are notably: Burmese teak, Casuarina, Kekatong, Perah and Rengas (including surprisingly its sapwood) while notable perishable woods are: Carribean pine, Scots pine, <i>Acacia mangium</i> and <i>Albizia</i> sp. Malaysian teak sustained moderate resistance, as were the woods Tualang, Sentang, Hoop pine, Kedondong, Kelat, mempening, Pauh Kijang and Keledang. Such findings contribute to the selection of wood species for	

structural applications aboveground indoor (or outdoor) with options for wood protection among the lesser-resistant woods.	
http://www.prtrg.org/pdfs/S3%20%20Wong.pdf	
Proceedings of the 10 th Pacific-Rim Termite Research Group Conference	2014

Fibre Saturation Point of Lesser-Known Timbers from Sabah	
MOHD. HAMAMI SAHRI, MOHD. ZIN JUSOH, ZAIDON ASHAARI and LUDI APIN	
The fibre saturation point (FSP) values of some 'OT' timbers from Sabah, Malaysia were evaluated. 'OT' is a term used to refer to a number of unidentified or unknown timbers and also some identified lesser known timbers of Sabah. The fibre saturation point values of these 30 species of OT timbers range from 17-33%. Determination of fibre saturation point in relation to OT wood properties is very useful in timber drying, conversion and timber utilization.	
http://www.prtrg.org/pdfs/S3%20%20Wong.pdf	
http://www.pertanika.upm.edu.my/Pertanika%20PAPERS/JTAS%20Vol.%2021%20(1)%20Apr.%201998/09%20JTAS%20Vol.21%20(1)%201998%20(Page%2067%20-%2071).pdf	
University Putra Malaysia Press	1998

Selected wood properties of two lesser known and lesser utilized indigenous agroforestry species from Kilosa district, Tanzania	
Isaac Termimba	
This study was conducted to determine basic density, fibre length and some strength properties of <i>Lonchocarpus capassa</i> and <i>Combretum zeyheri</i> suitable for growing under agroforestry systems in Kilosa district. A total of three 13-year-old trees from each species were sampled in Rudewa Gongoni village for the study.	
http://suaire.suanet.ac.tz:8080/xmlui/bitstream/handle/123456789/770/ISAAC%20KAYUMBA.pdf?sequence=1&isAllowed=y	
Sokoine University of Agriculture	2015

Strength properties of selected Uganda timbers	
A.Ziwa, Y. N. Ziraba and J. A. Mwakali	
To improve the utilisation of timber in building construction and enhance the market value of Ugandan timber species, especially the lesser known, strength properties of 17 species were studied. Small clear specimen tests were conducted in bending, compression and shear parallel to grain using the standard procedures of the American Society for Testing and Materials, ISO 8905:1988, AS/NZS 2878:2000 and BS 373:1957. Results showed significant differences in strength properties of the investigated timbers. A positive relationship was found between bending strength and stiffness. It was recommended that the timbers be grouped on the basis of the variability in their strength properties.	
https://www.researchgate.net/publication/228397296_Strength_properties_of_selected_Uganda_timbers	
International Wood Products Journal	2015

Physical-Mechanical Properties and natural durability of Lesser Used Species from Mozambique	
Charifo Ali	
The aim of this study is to assess properties of lesser used/known timbers from Mozambique. The studied species were ncurri (<i>Icuria dunensis</i> Wieringa), ntholo (<i>Pseudolachnostylis maprounaefolia</i> Pax), metil (<i>Sterculia appendiculata</i> K. Schum), namuno (<i>Acacia nigrescens</i>	

Oliv.) and muanga (<i>Pericopsis angolensis</i> Meeuwen). A comprehensive literature review found the Mozambique timber sector to be dominated by very few hardwood species while the rest of 118 lesser used wood species are almost unexplored. The above mentioned lesser used timbers were selected and subjected to descriptive and comparative analyses aiming at describing the physical-mechanical properties and natural durability with regard to prospective end uses.	
http://pub.epsilon.slu.se/8079/1/Ali_ac_110419 .pdf	
Faculty of forest Science of Uppsala	2011

Tool wear for lesser known tropical wood species	
Luís Cristóvão , Inácio Lhate , Anders Grönlund , Mats Ekevad & Rui Siteo	
This study investigated the relationship between tool wear and some chemical and physical properties for four different Mozambican lesser known tropical species, <i>Pseudolachnostylis maprounaefolia</i> (ntholo), <i>Sterculia appendiculata</i> (metil), <i>Acacia nigrescens</i> (namuno) and <i>Pericopsis angolensis</i> (muanga). Tool wear is an important aspect for sawmilling and for the woodworking industry. For Mozambique, the utilization of available lesser known wood species will help to increase domestic industry and the economic usage viability of sustainable forest management. A set of experiments was performed on a shaper with a mechanical feed mechanism.	
http://www.tandfonline.com/doi/full/10.1080/17480272.2011.566355?src=recsys	
Lulea University of Technology	2011

Emerging markets for tropical lesser-known species and their impact on sustainable forest management in southeast Mexico	
Rene Forster, Benno Pokorny, José Luis Zapata	
Findings suggest that markets effectively have been an important driver for forest management, although its impact is mediated by regional and operation-specific factors. Marketing increases have allowed several communities to progressively improve silvicultural measures, whereas decreases have been an important factor for communities to leave forest management altogether, leaving forests in a state of “degrading fallow”. Increasing marketing opportunities have not led communities to reengage in forestry, hinting at important market entry barriers. LKS promotion needs to consider these aspects to become successful.	
https://aisfdotit.files.wordpress.com/2016/02/1073-1080-forster.pdf https://aisfdotit.files.wordpress.com/2016/02/1073-1080-forster.pdf	
Proceedings of the Second International Congress of Silviculture	2015

Lesser used species of Bolivia and their relevance to sustainable forest management	
Marc Barany, A.L. Hammett, Phil Araman	
Bolivia has extensive forest resources and potential to become one of the world’s largest producers of tropical wood. However, this potential is currently constrained due to the depletion of Bolivia’s top commercial timber species (mahogany, Spanish cedar, and South American oak). To insure that Bolivia’s forestry sector contributes to the growth of the national economy and stimulates investments in sustainable forest management, timber harvests need to include currently underutilized species. Augmenting demand for lesser used species (LUS) is necessary to sustain the value of forest resources. Limiting the potential for LUS is a scarcity and inaccessibility of information regarding their wood properties. This paper discusses the relevance of LUS research and wood property information to countries focusing forest sector development on secondary and value-added forest products. We also list potentially valuable, yet under-exploited timber species in Bolivia and species that need further wood property research.	

https://pdfs.semanticscholar.org/f519/1ac6456c5df72545a8ddee851f0c4fbe378f.pdf	
US Forest Service	2003

Forest communities and the marketing of lesser-known species from Mesoamerica	
René Forster, Harald Albrecht, Mirna Belisle, Arturo Caballero, Hugo Galletti, Orlando Lacayo, Spencer Ortiz	
A promising option to increase income from community forestry management is to increase use of lesser-used hardwood species. While traditional commercial species, such as mahogany (<i>Swietenia macrophylla</i>), have been overexploited through the years and actually decreased in commercial importance in many forestry operations, numerous other species are currently underutilized. These species represent significant income potential for forest operations. Many operations have already been successful in using these species, thereby increasing incomes and, in some cases, improving forest management.	
http://pdf.usaid.gov/pdf_docs/Pnacy401.pdf	
US Forest Service	2003

Relationships between some anatomical, physical and durability properties of the wood of some lesser utilised Ghanaian hardwoods	
Quartey	
This thesis is the result of a comprehensive study of some anatomical structures as well as some of the properties of wood utilization of selected species and the interrelationship amongst them. The natural durability of ten lesser-known West African species, namely <i>Albizia ferruginea</i> (Guill. & Perr.) Benth. (Awiemfosamina), <i>Amphimas pterocarpoides</i> Harms (Yaya), <i>Antiaris toxicaria</i> Lesch. (Kyenkyen), <i>Blighia sapida</i> Koenig (Akye), <i>Canarium schweinfurthii</i> Engl. (Bediwonua), <i>Celtis zenkeri</i> Engl. (Esa), <i>Cola gigantea</i> A. Chew. (Watapuo), <i>Petersianthus macrocarpus</i> (P. Beauv.) Liben (Esa), <i>Sterculia oblonga</i> Mast. (Ohaa), <i>Sterculia rhinopetala</i> K. Schum. (Wawabima), and as reference Teak (<i>Tectona grandis</i>), were evaluated by the field test according to EN 252 (1989) for a period of 6 months. Structural size samples were tested for their mechanical properties according to EN 408 (2003). Their water sorption properties were determined at relative humidity conditions of 30, 45, 60, 75, and 90 % at a temperature of 25°C and compared with <i>Albies alba</i> , <i>Picea albies</i> , <i>Fagus sylvatica</i> (European species). Three of the ten species, <i>Albizia ferruginea</i> , <i>Blighia sapida</i> , and <i>Sterculia rhinopetala</i> were selected for anatomical investigations based on their performance in the durability and mechanical strength tests.	
http://dspace.knust.edu.gh/bitstream/123456789/4723/1/Quartey.pdf	
Kwame Nkrumah University of Science and Technology	2003

The less known timber species: What is their future?. <i>Unasyiva</i> – No.145	
Freezaillah B.C. Yeom	
Hundreds of potentially useful trees are left behind - often to be burnt out - when cutting or clearing land for agriculture or dam construction. Little is known about their possible end uses, or even their physical characteristics, which gives rise to long controversies about what to do with them. Should we undertake research, projects and investments to find uses for them, as stated by Freezaillah B.C. Yeom in this article, or to eliminate them without delay and replace them with plantations, as James S. Bethel In the following article?	
http://www.fao.org/docrep/Q9270F/q9270f02.htm	
FAO	1984

Capacity of sawmills and carpentry workshops for processing Lesser Used Species (LUS) in Ghana	
Appiah-Kubi, E., Adom-Asamoah, M., Frimpong-Mensah, K. and Tekpetey, S. L.	
In Ghana, the exploitation of timber is limited to a few of the over 300 known species. Majority of the species are not being utilized because their properties (including physical, mechanical and machining properties) are not known. Due to this, sawmills hardly process these lesser used species. To avoid the overexploitation of commercially known species the use of lesser known ones is inevitable. The objective of the study was to assess the capacity of the sawmills and carpentry workshops in terms of their machinery to process lesser used timber species for efficient utilization.	
http://fornistest.metla.fi/content/capacity-sawmills-and-carpentry-workshops-processing-lesser-used-species-lus-ghana	
Forestry Research Institute of Ghana	2011

The Distribution, Density, and Estimates of Carbon and Inorganic Nutrients in some Lesser-Used Species	
Blay, D	
Timber is the third foreign exchange earner for Ghana and timber exports had for some time now been based on the so-called prime timber species (Table I) with little attention being paid to other species called secondary species or Lesser-Used species (LUS). This is with the result that prime species have been exploited, most of them are currently threatened, and their harvesting either reduced or banned. To sustain the timber industry therefore attention has been focused on the promotion of the Lesser-Used species.	
http://fornistest.metla.fi/content/distribution-density-and-estimates-carbon-and-inorganic-nutrients-some-lesser-used-species	
ITTO/FORIG/TEDB	2011

Anatomical Properties of Three Lesser Utilised Ghanaian Hardwood Species	
Gladys A. Quartey	
Wood is composed of mostly hollow, elongated, spindle-shaped cells that are arranged parallel to each other along the trunk of a tree. The characteristics of these fibrous cells and their arrangement affect strength properties, appearance, resistance to penetration by water and chemical solutions, resistance to decay and many other properties. The characterisation of wood helps in identifying them. In this work, we studied the anatomical properties of three lesser utilised Ghanaian hardwood species namely <i>Albizia ferruginea</i> (Guill. & Perr.) Benth, <i>Blighia sapida</i> K. D.Koenig and <i>Sterculia rhinopetala</i> K. Schum using the light microscope and scanning electron microscope (SEM).	
http://file.scirp.org/pdf/MSA_2015122115414164.pdf	
Takoradi Polytechnic	2015

Anatomical characteristics, properties and use of traditionally used and lesser-known wood species from Mozambique: a literature review	
Ali, A.C., Uetimane, E., Lhate, I.A.	
Mozambique is a country with vast forestry resources that include native wood species with high commercial value. Thus, the trade of timber as raw material, as well as wooden finished products are commercial options of considerable valuable for the country. This work presents information about anatomical characteristics, physical and mechanical properties and use of some native wood species from Mozambique, namely, <i>Azelia quanzensis</i> , <i>Androstachys johnsonii</i> , <i>Erytrophleoum suaveolens</i> , <i>Khaya nyasica</i> , <i>Pterocarpus angolensis</i> , <i>Milletia stuhlmannii</i> and the emerging lesser-known species <i>Pericopsis angolensis</i> , <i>Sterculia appendiculata</i> and <i>Sterculia quinqueloba</i> .	

http://link.springer.com/article/10.1007/s00226-008-0186-5	
Wood Sci Technol	2008

Utilization of Broussonetia and Borassus palm as timber resources in Ghana	
J. Ofori, J. K. Appiah, F. W. Owusu, A. I. Mohammed, B. Brentuo & M. Mensah	
Sustainable forest management has been made a priority in Ghana, and the government is now actively pursuing the use of Lesser-Used-Species (LUS) and plantation species to reduce the pressure on the more popular timber species. Broussonetia papyrifera occur in abundance in the Afram Headwaters and Pra Anum Forest Reserves. Palmate species (including Borassus palm) are also in abundance in the forests of Ghana, and are underutilized. For the effective utilization and promotion of the 'invasive' Broussonetia papyrifera and palmate species as raw materials in the wood industry, knowledge of their basic and technological properties and characteristics are required to provide information concerning their suitability for specific end-uses.	
http://fornistest.metla.fi/content/utilization-broussonetia-and-borassus-palm-timber-resources-ghana	
FORIG	2008

Research of lesser known timber species, Ghana	
The Bern University of Applied Sciences Architecture, Wood and Civil Engineering and the Kwame Nkrumah University of Science and Technology, Ghana, have teamed up for a research project sponsored by the Swiss National Science Foundation and the Swiss Agency for Development and Cooperation. The aim is to develop and promote light bridges (traffic up to 16t) built with lesser-used timber species in Ghana. The project may help to solve local transportation problems on the one hand and reduce the danger of the overexploitation of the few widely known and used noble timber species on the other hand.	
(Video of presentation: https://www.youtube.com/watch?v=l76TlJd44pw)	
https://www.ahb.bfh.ch/fileadmin/content/International/Dokumente/CDC_P_Ghana_120821_e.pdf	
Berner Fachhochschule	2009

Identification and utilisation of lesser-known commercial timbers in Peninsular Malaysia 1: Ara, Bangkal, Bebusok and Bekoi	
Most of the time, however, the consumers of Lesser-known commercial (LKCT) do not know exactly the identity of the timber species they used since they were supplied and sold in mixed parcel. The use of LKCT is guided by the weight and the availability of the timber. The heavier LKCT will find their way to the construction industry for such purposes as roof trusses, door and window frames, outdoor structures and many other uses. The lighter-weight timbers, on the other hand, will be used for temporary structures, furniture, boxes and crates and other low values products. Sometimes, however, timbers with low strength are found to be mixed with higher strength timbers and use for structural purposes. Thus, the situation in the use of LKCT can be quite confusing resulting in premature failure of some structural members, particularly roof trusses.	
https://www.researchgate.net/profile/Keeseng_Gan/publication/237698460_Identification_and_utilisation_of_lesser-known_commercial_timbers_in_Peninsular_Malaysia_1_Ara_Bangkal_Bebusok_and_Bekoi/links/0c96053cc6a15bfb03000000.pdf	
Forest Research Institute Malaysia FRIM	2004

4. Innovative sectors and new products

Thermomechanical Treatment and the Effects on the Properties of <i>Simarouba amara</i> (Aubl.)	
Ana Salgado Freitas, Joaquim Carlos Gonzalez, Cláudio Henrique Del Menezzi	
<p>The pressure concentrated in a small group of tropical species necessitates greater investment in research and breeding techniques in lesser known species in an attempt directs them to multiple uses. This work aims to evaluate the influence of thermomechanical treatment on colorimetric properties and modulus of elasticity of timber marupá, in order to use it on the floor segment. The results showed a significant change with temperature effect on the color and the property of elasticity of wood. In general, an improvement in dynamic elastic modulus as the speed varied with each treatment shown, having lower values for the treatments with high pressure. The dark wood (lower L * values and higher values of a *) with application of temperature. The colors of wood marupá after treatments, combined with property of elasticity enhances this species as an option for the flooring industry.</p>	
http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2179-80872016000400565	
International Wood Products Journal	2016

Multipurpose Australian trees and shrubs: lesser-known species for fuelwood and agroforestry	
Turnbull, J.W.	
<p>Chapters on The Australian environment (A.G. Brown and J.W. Turnbull), Australian vegetation (J.W. Turnbull), Selection of species and provenances for tree introduction (D.J. Boland) and Seed, nursery practice and establishment (J.C. Doran) are followed by notes on 100 Australian tree and shrub species (mainly acacias) with potential for fuelwood and agroforestry, prepared by J.W. Turnbull, P.N. Martensz and N. Hall. For each species, information is presented on botanical features, natural distribution, ecological conditions, utilization, silvicultural features, pests and diseases, limitations and related species.</p>	
http://trove.nla.gov.au/work/12310234?q&versionId=45771042	
Australian Centre for International Agricultural Research	1986

Technological Innovation and Energy Production from Timber Waste	
Christian Sales	
<p>Timber processing operations, from logging to end products, produce waste materials of every sort, size and shape. It is estimated that when no waste recovery takes place, overall yields from logging to end products amount to no more than 15%. In the processing chain alone, from the sawmill to the end product and with- out including felled timber left in forests, yields are rarely above 25%.</p> <p>These figures, viewed in the light of sustainable development and equitable natural resource management, clearly illustrate the importance of recovering and recycling timber industry waste, trimmings and residues. Any technological or commercial solution that gains a few percentages in yield without affecting the industry's competitiveness can help to keep resource use under control while ensuring the continuity of raw material supplies.</p>	
http://agritrop.cirad.fr/514483/1/document_514483.pdf	
CIRAD	2003

Assessment of the durability and engineering properties of lesser-known hardwood timber species	
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for use in marine and freshwater construction	
Williams et al	
<p>This report describes the scope of work undertaken in each of the three stages, including information on the research methods used, together with the results and findings that were reported. In all cases, the performance of the long-list candidate timbers were compared with the performance of Greenheart and Ekki (benchmark species) and also a number of reference species (Yellow Balau, Douglas Fir, Purpleheart, Karri, Oak and Bilinga). The reference timbers were included on the basis that they have been used in marine and freshwater construction applications in the UK, and their performance in these environments is relatively well known and understood. The results of the laboratory screening trials undertaken in Stage 2 are detailed in the following table.</p>	
https://www.trada.co.uk/publications/download/?id=CC44DC2F-C9D4-4680-A909-DEE81E5F7F32	
TRADA	2010

Effect of heat treatment on color, weight loss, specific gravity and equilibrium moisture content of two low market valued tropical woods	
Diego Valério Braido Dos Santos, Luiz Fernando de Moura, José Otávio Brito, Luiz de Queiroz	
<p>In this study, heat treatment was analyzed as a way to add value to low market valued tropical woods. The effect of heat treatment performed at 160 and 220°C was assessed on color, weight loss, specific gravity, and equilibrium moisture content (EMC) of cedroarana (<i>Cedrelinga catenaeformis</i>) and cedro-marinheiro (<i>Guarea trichilioides</i>) woods. Heat treatments caused weight loss, darkening, and decreased EMC, as the maximum temperature increased. However, no changes in specific gravity were observed as a function of heating. Cedro-marinheiro has presented the highest changes in color and weight as a function of heating, while cedroarana has shown the highest reduction in EMC. Heat treatments improved some wood properties, being a good approach to improve low market valued tropical woods. Results also suggest that resilience to reduction of hygroscopicity after heating might be related to wood specific gravity.</p>	
http://www.centrumdp.sk/wr/02/04.pdf	
Wood research	2012

Thermomechanical treatment of tropical wood – Final Report	
Larissa Medeiros Arruda and Cláudio Henrique Soares Del Menezzi	
<p>Thermomechanical modification is a densification technique that combines heat treatment with mechanical compression. The aim of this study was to evaluate the physical and mechanical properties of four tropical wood thermomechanically treated for the production of hardwood floors. The following species were selected: cedrinho (<i>Erismia uncinatum</i> Warm.), angelim (<i>Hymenolobium</i> sp.), tachipreto (<i>Tachigali myrmecophila</i> Ducke) and mandioqueira (<i>Qualea paraensis</i> Ducke). Samples measuring 100 mm (width) x 300 mm (length) were thermomechanically treated and afterwards physical, mechanical and colorimetric properties were assessed. The treatment was efficient to reduce the EMC and surface wettability of species. Angelim and mandioqueira had significant increase in apparent density and the highest compression ratio. Color of species became darker, mainly due to reduction of lightness. Values of mechanical properties increased compared with values of reference.</p>	
http://pimads.org/documentos/Thermomechanical%20treatment%20of%20tropical%20wood-Final%20Report._2342013154841.pdf	
ITTO / Dept. Forest Engineering, Faculty of Technology, University of Brasília	2013

5. Marketing plan and strategy

Marketing opportunities for potential Surinamese wood species	
Sietze van Dijk	
<p>This study recommends the following:</p> <ol style="list-style-type: none"> 1. Reliable data needs to be available on the volume per species that can be marketed when the focus is only on a limited number of LKS. Secondly, the quality needs to be secured by continuing the ongoing process of the introduction of product standards. Where applicable, these standards should also meet international standardization. 2. Additional laboratory-testing is needed to make technical information inherent to the nature of 'lesser known species' more available. 3. The introduction of new species needs to be supported by active promotional measures. Active promotion needs adequate and constant attention and can - initially - best be done at a sector level. 4. Wood markets are traditional; the introduction of LKS will take time to materialize. 	
http://www.tropenbos.org/publications/marketing+opportunities+for+potential+surinamese+wood+species	
Tropenbos	2013

PROBOS

[http://www.houtdatabase.nl/pdf/Lesser-known%20timber%20species%20are%20part%20of%20it%20too%20\(Bosberichten2011-07\).pdf](http://www.houtdatabase.nl/pdf/Lesser-known%20timber%20species%20are%20part%20of%20it%20too%20(Bosberichten2011-07).pdf)

Factors influencing the choice of timber for furniture and joinery production in Ghana	
Ernest Boampong / Bernard Effah / Kwaku Antwi / Jack Nti Asamoah / Alfred Boadi Asante	
<p>The local timber industry in Ghana has for some time now experienced major challenges that have subjected the sector to severe pressure regarding raw material unavailability and a struggle for efficient use of the limited available timber. This study investigated the availability of timber species and their sizes in two local timber markets and the factors that influence their selection for furniture and joinery production. A cross sectional survey study which used questionnaire, observation and photography was employed. Random Systematic sampling methods was used to select a realised sample of 306 respondents from an infinite population comprising of timber processors, timber sellers and consumers from the study sites. From the study, out of thirty-two species that were outlined, twenty-two of them were found to be available on the markets. Durability, appearance, quality and processability were the most influential factors for the specification and selection of the species for furniture and joinery production. Affordability, area of usage and informed decision were the least influential factors.</p>	
http://www.idpublications.org/wp-content/uploads/2015/05/FACTORS-INFLUENCING-THE-CHOICE-OF-TIMBER-FOR-FURNITURE-AND-JOINERY-PRODUCTION-IN-GHANA-Full-Paper.pdf	
Lulea University of Technology	2015

The Level of Utilization of Secondary Timber Species among Furniture Producers	
ANTWI-BOASIAKO C, BOADU KB	
Inadequate supply of wood raw material is one of the major obstacles for the global furniture industry's growth. Several secondary timbers/Lesser-Utilized-Species (LUS) that could substitute the scarce traditional timbers for furniture production exist in tropical forests. However, the industry continuously faces persistent timber shortages. The extent to which manufacturers utilize LUS as alternatives is unclear, which this study sought to ascertain.	
http://dx.doi.org/10.15177/seefor.16-08	
SEEFOR	2016

Evaluating the potential for lesser used timber species	
Dr Andy Pitman	
Dr Andy Pitman discusses how information held in BM TRADA's timber library can help clients to better understand the ease with which wood products can be manufactured from alternative timber species and how they are likely to perform in use as products.	
https://www.trada.co.uk/publications/download/?id=CC44DC2F-C9D4-4680-A909-DEE81E5F7F32	
TRADA	2010

A Market Study on Lesser-known Timbers Species: A Minor Field Study	
Daniel Forsberg	
https://books.google.fr/books/about/A_Market_Study_on_Lesser_known_Timbers_S.html?id=bVtcMQAACAAJ&redir_esc=y	
Sveriges lantbruksuniv.	1994

III) Actions and achievements to be implemented

A. RESOURCE

Action 1: State of the art, capitalization of experiments on LKTS	
Much has been done over the years, but with a reduced impact on the consumer habits overall. Numerous experiments have been carried out by manufacturers in their factories with the species present in their concessions, but the results are not conveyed and do not allow to normalise the use of LKTS. In addition, academic and marketing work has already been done on this subject, but there is lack of visibility.	
Issue	Objective
Capitalize the knowledge already known by the industry, the results of the studies already carried out and the steps for promotion to raise the general level	Create a database of empirical evidence and bibliographic knowledge. Make these data

of knowledge about LKTS.	known using simple marketing tools.								
<p>Actions to implement</p> <p>1) Professional and carried-out work consultation</p> <p>After identifying the organisations in forest management and the firsts manufactures, that may have information on LKTS, we would like to launch a consultation to identify the tests that have been already carried out within their companies. The questionnaire will contain:</p> <ul style="list-style-type: none"> - Species tested - Desired end use - Tested conditions: quality of wood, amount of wood used - Manufacturing protocol used - Reaction of species during manufactured - Feedback on the species after its implementation - General remarks related to this species <p>Not all experiments are relevant, but they will provide with knowledge for manufacturing with new species. As a first step, we will be able to warn professionals about unexpected problems or take a census of the works that have been already done in certain companies.</p> <p>2) Creation of a database accessible to the general public and professionals</p> <p>Through the ATIBT website, a tool to communicate the internal actions and initiatives of the entire tropical timber industry, we will set up a platform to consult documents concerning the LKTS that are already available and we will update this database with future publications</p> <p>3) Focus efforts and research towards identified gaps</p>									
<p>Budget</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 80%;">1) Consultation of professionals and effected works</td> <td style="text-align: right;">6 500,00 €</td> </tr> <tr> <td>2) Creation of a database accessible to the public and professionals</td> <td style="text-align: right;">5 000,00 €</td> </tr> <tr> <td><i>ATIBT 's coordination</i></td> <td style="text-align: right;"><i>4 000,00 €</i></td> </tr> <tr> <td>3) Focus efforts and research to address shortcomings</td> <td style="text-align: right;">5 000,00 €</td> </tr> </table>		1) Consultation of professionals and effected works	6 500,00 €	2) Creation of a database accessible to the public and professionals	5 000,00 €	<i>ATIBT 's coordination</i>	<i>4 000,00 €</i>	3) Focus efforts and research to address shortcomings	5 000,00 €
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<i>ATIBT 's coordination</i>	<i>4 000,00 €</i>								
3) Focus efforts and research to address shortcomings	5 000,00 €								

Action 2: Study of management plans, maps and renewability analysis	
<p>In all the countries of the Congo Basin, management plans are essential to obtain the right to exploit a concession. When the plans are established, an inventory is made and a map of the resource is available. LKTS are most of the time also included in the plans but the data is not published in detail.</p>	
Issue	Objective
<p>Without knowing precisely, the distribution, the available volumes and their renewability, it not possible to foresee doing a promotion of any specie.</p>	<p>To be able to establish a list of species that are sufficiently numerous and renewable</p>

So, we have to start with an upstream analysis.	and easy to distribute.
Actions to implement	
<p>1) Collecting information from regional partner management plans</p> <p>Regional legislation has different disposition of LKTS. Indeed, some inventories must include LKTS. It is therefore necessary to take into account the stock of LKTS from the management plans from the Congo Basin producing countries, and in the case of a weak consideration, we wish to accompany the countries to take into account the LKTS to enable their management plans.</p> <p>The second phase of this action involves contacting concessions with a management plan in the widest possible area in order to be able to allow a homogeneous distribution of new species.</p>	
<p>2) Analysis and conclusion sharing</p> <p>All information must be analysed to get to know the regional information on availability and the renewal capacities of the species. This study will make the establishment of a list of species that meet the necessary conditions possible. The diffusion of this list will be a tool to promote the consideration of LKTS upstream in forest management.</p>	
Budget	
1) Collecting information from regional partner management plans	30 000,00 €
<i>ATIBT's coordination</i>	2 000,00 €
2) Analysis and conclusion sharing	20 000,00 €
<i>ATIBT's coordination</i>	2 000,00 €

B. TECHNIQUE

Action 3: Laboratory tests, research on the characteristics of LKTS in relation to their end-uses	
The LKTS are discriminated because of the lack of information about them. Some areas require specific testing before they can evaluate the value of a new species. Projects using new species are not really encouraged.	
Issue	Objective
Enrich technical and physical knowledge on LKTS to allow better value.	Publish new results on LKTS properties.
Actions to implement	
<p>1) Integration of information acquired during tests conducted by PPECF</p> <p>In response to the lack of data on the lesser-known species or reliability of the available values of the comprehensive, tests have been implemented as part of an action carried out by the ATIBT financed by PPECF. These tests concerned all the mechanical and durability characteristics for 12 species considered to be lesser known as the main traditional species.</p>	

2) Identify missing information of species

We identified four fields where new species could be considered as alternatives to overexploited species:

- Outdoor carpentry
- Marine / River Constructions
- Decking / Pavers
- Traverse

For each of these sectors we have identified the main criteria of choice of a species and the specific tests to be carried out to determine if a specie is suitable for this use. For example, for the use in the construction of a traverse, the resistance is one of the characteristics specific to this use and which determines the choice to rule out a timber.

To carry out the tests, we have identified the laboratories that would test woods. We will offer to the selected laboratories the quantity of wood required for a limited number of species depending on the sectors and availabilities.

3) Publication of results

Baseline document, in the form of a technical manual, will be published to communicate the results to the professionals.

Budget

1) Integration of information acquired during tests conducted by PPECF	2 000,00 €
2) Identify missing information of the species and set tests	100 000,00 €
<i>ATIBT's coordination</i>	<i>10 000,00 €</i>
3) Publication of results	10 000,00 €
<i>ATIBT's coordination</i>	<i>2 000,00 €</i>

Action 4: Choice of species for specific industrial sectors

Many LKTS suppose problems due to their identification and promotion. A multitude of species can potentially be used in different cases. However the multiplication of the species creates confusion and slows down the promotion of the LKTS as a whole. Moreover, the sectors likely to consume these species have special requirements, and therefore need communication focused on their problems.

Issue

Share targeted and limited number of species to encourage the use of new species by professionals.

Objective

Identification of technical needs by sectors and accept a small number of new adapted species.

Actions to implement

1) Technical Needs Assessment by Sector

For a better understanding of the needs and particularities of the sectors, we will produce a sheet combining the technical peculiarities and normative requirements for the use of producers and

traders. To make our message clearer to professionals, we will match a list of new species that are available, sufficient renewable, and have good feedback on experience and above, that meet the specific requirements of the chosen sectors.

2) Communication targeted to the technical needs of each sector

Once the list of species to promote has been decided, we wish to address directly to the final consumers on the technical challenges of each sector by presenting the chosen species as answers for the future of each sectors.

Budget	
1) Technical Needs Assessment by Sector	10 000,00 €
2) Communication targeted to the technical needs of each sector	20 000,00 €

Action 5: Development of industrial value and transformation of LKTS with research of all innovative uses and opportunities of outlet for new species.

The main obstacle to the development of the commercialization of lesser-known species is the lack of knowledge on the profitability of their transformation with very few known marketable by-products to be associated with a flagship product. For everyday uses where the best-known species are used, LKTS have difficulty finding a place in already developed markets but innovative opportunities are opportunities for new species.

Issue	Objective
Making the transformation of LKTS profitable to establish their use at the industrial level, from products that already have a place on the market. Find uses for which LKTS are competitive with major species, new uses that could value LKTS and make them accessible to niche markets.	Making the transformation of LKTS profitable to establish their use at the industrial level, from products that already have a place on the market. Create a document listing all the innovative uses of LKTS.

Actions to implement

1) Explore new markets and by-products

We have identified possible by-products around a product already on the market or with good potential even though the lack of profitability makes it uncompetitive. Technological innovations and market developments are opportunities for new species. For example, the development of pellet production opens up prospects for wood with a high calorific value and a better utilization of by-products. We therefore want to identify existing LKTS opportunities, identify markets with very specific needs, and emerging markets that could give an opportunity to new species.

2) Analysis to increase value

For a number of target species we will find a palette of associate products to ensure maximum value.

The areas on which we will concentrate are: exterior carpentry, marine constructions, sleepers and decking.

For example, the Niové can both be upgraded as a sleeper and in the form of slab of short dimensions.

3) Publication on the possibilities of LKTS

To give visibility to these markets and partners with the LKTS theme, we wish to publish an inventory of industrial opportunities, available online and intended for a wide audience.

Budget

1) Prospecting of new markets and by-products	5 000,00 €
2) Analysis to increase value	20 000,00 €
3) Publication on the possibilities of LKTS	20 000,00 €
<i>ATIBT's coordination</i>	<i>5 000,00 €</i>

C. MARKET

Action 6: Implementation of pilot projects with manufacturers, provision of timber and technical support

Professionals have no examples of industrial use of LKTS, and thus have no certainty about their actual qualities. Some markets, such as decking, are conditioned by the demand of consumers, who know only a few species or expect only a specific colour, so there need concrete examples to convince.

Issue	Objective
Giving visibility to the LKTS at all levels of the timber industry and encouraging professionals of the sector to carry out projects that can create a ripple effect.	To give visibility to the LKTS at all levels of the timber industry and to mobilize professionals of the sector to carry out projects that can create a ripple effect.

Actions to implement

1) Technical Support for Design

The first phase of this action involves the creation of partnerships with manufacturers well established in the sector, by identified key sectors (exterior woodworking, marine constructions, sleepers and decking). As part of the activities and projects of the companies, we will accompany them in the design of a project where LKTS can have their place.

2) Provision of wood

For the continuation of the support, the ATIBT will provide with technical support and facilitate the supply of wood thanks to its contact with the member producers.

3) Experience feedback and communication

Above all, it is necessary to communicate about the projects with ATIBT tools as well as external tools (press articles) and to target communication with other professionals in the sectors concerned.

Budget

1) Technical Support for Design	50 000,00 €
2) Provision of wood	50 000,00 €
<i>ATIBT's coordination</i>	<i>2 000,00 €</i>
3) Experience feedback and communication	15 000,00 €

Action 7: Publication of a simple document for the general public with a general presentation of species.

The LKTS lack visibility and are lesser used because they are not well known by all the manufacturers in the sector. In general, the public at large is unaware of the challenges of using lesser-known species and has little knowledge of the realities of sustainable management.

Issue	Objective
Increase the visibility of LKTS and make all information about them in an accessible format.	Increase the visibility of LKTS and make all information about them in an accessible format.

Actions to implement

1) Review of all species of interest

The first job will be to gather all the published and available information on the species chosen to have a part of the ecology of species, anatomy of wood and tree, and the set of physical characteristics with updated results during the tests and as an example, the pilot projects will be set up in the LKTS 2020 framework.

2) Publication for the general public

Formatting the sum of information should be thought for the general public. The main thing is to find distribution networks: schools specialised in woodwork in Europe and Africa, points of sale of wood like Point P, Leroy Merlin.

Budget

1) Review of all species of interest	5 000,00 €
2) Publication for the general public	15 000,00 €
<i>ATIBT's Coordination</i>	<i>2 000,00 €</i>

D. ORGANISATION

Action 8: Professionals on the theme of LKTS meeting	
Timber growers deal with the issue of LKTS in-house without consulting each other on feedback of the other companies and exchanging information on the actions to be taken.	
Issue Increase the level of knowledge about LKTS and bring together professionals for the need to promote LKTS.	Objective Increase the level of knowledge about LKTS and bring together professionals for the need to promote LKTS.
Actions to implement 1) Organisation of professionals meetings during the ATIBT commissions Use the ATIBT Forestry Commission mechanism to make it a central theme of an exchange and a recurrent issue to follow up actions. 2) Implementation and communication of actions decided in session Regularly communicate progress, new projects, and publications on lesser-known species with members of the Forestry Commission.	
Budget	
1) Organisation of professional meetings during the ATIBT commissions	10 000,00 €
2) Implementation and communication of actions decided in session	10 000,00 €

Action 9: ATIBT's collaboration with similar initiatives by other organizations	
Several organizations have already carried out promotional activities in the past, which have not always been followed by a change in the place of LKTS in the markets.	
Issue Redefinition of the species considered as LKTS / Technical support to update their database.	Objective Redefinition of the species considered as LKTS / Technical support to update their database.
Actions to implement 1) Coordination of actions Identify the actors who have already taken action in the past on LTKS or who currently have projects on the subject. The implementation of joint actions with organizations with ongoing projects, such as FSC, it needs to take into consideration: <ul style="list-style-type: none"> - Finding the complementarity of our know-how - Build our action taking into consideration our strengths: technical expertise, our knowledge of the sector and our marketing program on African timber. - Use the strengths of our partners: their network with certified companies, their visibility 	

in the eyes of the general public.

2) Technical support to promote the species

As part of the dictating and technical expertise activities, the ATIBT has a role to play as a reference in tropical timber and therefore advise professionals in their choice of new species.

Budget

1) Coordination of actions	10 000,00 €
2) Technical support to promote species	5 000,00 €

Action 10: Establishment of a common platform in the form of a website at European level

At European level, there is a lack of unity in the sources of information on new species. Operating sites are very rich resources to use as a basis for work.

Issue

Make the technical and commercial information on the LKTS as accessible as possible.

Objective

Create an independent reference site on LKTS with suppliers, listing as many examples of usage as possible

Actions to implement

1) Coordination of actions with the organisations that have taken part in this topic.
The answers to the problem of the LKTS have already been in the past, translated by websites allowing presenting the species and related projects. It is therefore necessary to bring together all the data to determine how to gather all the information, under which site, which providers ... The ATIBT as an independent entity and with its international reach, can play the role of coordinator so that the interests of each one are respected with a single and clear message to consumers.

2) Technical support for the creation of a website
The realization of a website requires a technical support for the contents and the databases. It is necessary to coordinate the development work of the site and the production of the contents.

Budget

1) Coordination of actions with the organisations that have taken part in this topic.	10 000,00 €
2) Technical support for the creation of a website	5 000,00 €