



Alternative timbers for use in construction

Project Summary SC070083/S

A research project commissioned by the Environment Agency on lesser known species of hardwood timber has generated technical data which will allow engineers to use a wider range of timbers for marine and freshwater marine construction, thereby supporting more sustainable forestry on a global scale.

The Environment Agency builds and maintains coastal and freshwater structures throughout England and Wales, many of which incorporate timber. Timber is a renewable resource and an environmentally acceptable choice of construction material if obtained from a recycled source or well managed forests.

Timber has been used for marine and freshwater construction applications for centuries because it exhibits a range of properties that make it particularly suitable for use in these environments, such as:

- high strength to weight ratio
- high density
- good workability
- good durability to attack by decay-causing fungi
- resistance to attack by marine borers (gribble and shipworm)
- ability to withstand shock and impact loads
- resistance to abrasion.

A narrow range of “tried and tested” tropical hardwood timbers are normally used for these applications, with Greenheart and Ekki being the preferred choice in many cases. However, this over-reliance on a few species is not compatible within sustainable forest management in the longer term, as certain species are being over-exploited causing supply issues and price rises.

The main obstacle preventing the wider use of lesser known species is a lack of reliable technical data on their performance. The marine and freshwater construction industry is typically conservative and there is a general reluctance to specify timber species without a proven track record. This is understandable as often the material cost of timber in a construction scheme is dwarfed by the overall construction cost. However, it means that this impasse can only be overcome if reliable data on the performance of lesser known species of

timber are obtained. Therefore we commissioned this research project to try to encourage the specification and use of a number of lesser known hardwood timber species, as alternatives to Greenheart and Ekki.

The results of the research will be of interest to anyone who uses timber in marine and freshwater applications, particularly structural and civil engineers, design consultants, building contractors and asset managers.

The results have been brought together in a user guide, containing a step-by-step methodology for identifying the most suitable timber species for different structures and applications, along with tables of technical data on the key properties of a range of lesser known species.

The most comprehensive set of data (e.g. on strength, natural durability, resistance to abrasion and resistance to attack by marine borers) is available for the following five lesser known species:

- Angelim Vermelho
- Cupiuba
- Eveuss
- Okan
- Tali

However the user guide also contains information on thirteen other lesser known species of hardwood timber which can be used in applications where strength is not critical. The performance of the lesser known species is compared with that of Greenheart and Ekki which were chosen as benchmark species.

The user guide is intended to complement rather than replace established design references and national or international standards and codes of practice.

The best timber species for a particular application or structure will be determined by the particular risks facing a given structure at a given location. These risks include attack by marine borers, damage due to abrasion, and attack by decay-causing fungi, or structural failure. This ‘risk-based’ approach provides opportunities for considering lesser known species of timber alongside traditional favourites such as Greenheart and Ekki.

Although the functional performance of a timber and its ability to withstand the most dominant site-specific hazards or risks should drive the choice of timber species, other factors may also influence the decision making process, such as availability of the timber within project timeframes, cost, required section sizes and workability. Ultimately, the decision about which species to use will depend on a mixture of technical, environmental and commercial considerations.

© Environment Agency.

In accordance with the Environment Agency's timber purchasing policy, all the lesser known species of timber featured in the guidance document can be sourced with evidence of legality, sustainability and chain of custody (FSC certification in all cases).

The results of this research project will help staff to make more informed decisions about the choice of timber they use in marine and freshwater structures, improving their service life. They will ensure that the Environment Agency contributes to the wiser, more sustainable use of natural resources.

This summary relates to information from Project SCO70083, reported in detail in the following:

Report: Assessment of the durability and engineering properties of lesser known hardwood timber species for use in marine and freshwater construction:

<http://www.trada.co.uk/techinfo/research/>

Internal Status: Released to all regions

External Status: Publicly available

Project manager: Melanie Meaden, Sustainable Procurement Advisor (Finance), Environment Agency Wales / Emma Milner, Scientist, Evidence, Environment Agency.

Research Collaborators: British Waterways, The Crown Estate, CETMEF, VolkerStevin Ltd, Ecochoice Ltd, Aitkin & Howard Ltd.

Research Contractors:

Dr John Williams, TRADA Technology, Stocking Lane, Hughenden Valley, High Wycombe, Bucks, HP14 4ND

Jonathan Simm, HR Wallingford Ltd, Howbery Park, Wallingford, Oxon, OX10 8BA

This project was commissioned by the Environment Agency's Evidence Directorate, as part of the joint Environment Agency/Defra Flood and Coastal Erosion Risk Management Research and Development Programme.

Email: fcerm.evidence@environment-agency.gov.uk.

Further copies of this summary are available from our publications catalogue: <http://publications.environment-agency.gov.uk> or our National Customer Contact Centre: T: 08708 506506
E: enquiries@environment-agency.gov.uk.