

***Aquilaria malaccensis* (agarwood-producing species): Has the listing in Appendix II come too late?**

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# Aquilaria products and derivatives in trade





## List of projects where data has been used

- Reproductive and genetic studies towards the conservation and management of *Aquilaria malaccensis* in Peninsular Malaysia, 2013–2015;
- CTFS-ForestGEO network of forest research plots, 1980– ;
- National Forest Inventory 1993– ;
- *Kajian pemuliharaan dan pembangunan mikrosatelit DNA ke atas Aquilaria malaccensis (karas) di Semenanjung Malaysia, 2011–2012; and*
- *In vitro* technology for mass propagation and phytochemical analysis of *Aquilaria malaccensis* and *A. hirta* (endangered gaharu producing species), Project No. MINT0000089, 2007–2008.



## Preliminary results

- mortality rates have been consistently higher than recruitment rates;
- a declining abundance of trees in various diameter categories;
- high floral abortion rates;
- wild populations suffer from a declining of rate of population change; and
- several of its life history traits are thought to be natural evolutionary constraints.



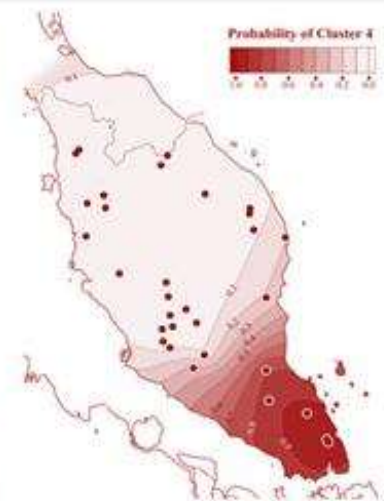
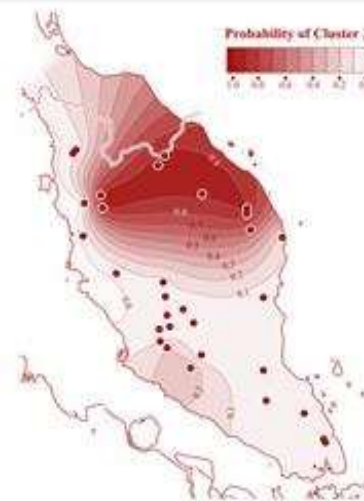
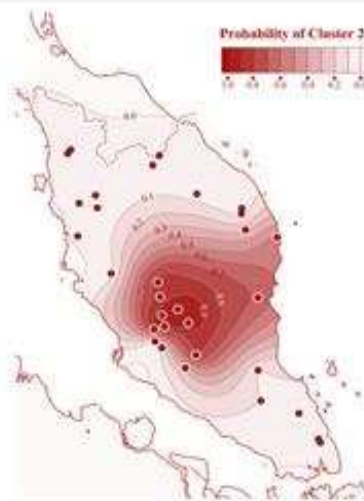
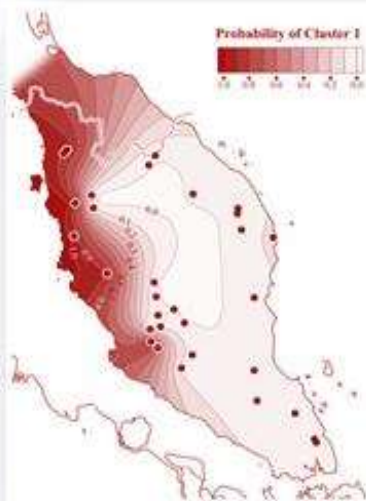
# Species biology and life cycle characteristics

- clear nomenclature concept, taxonomic description widely available;
- supra-annual reproductive behaviour;
- infrequent flowering episodes, high floral abortion rate during masting;
- High levels of genetic diversity within populations but low low levels among populations; and
- lower rates of recruitment compared to mortality.

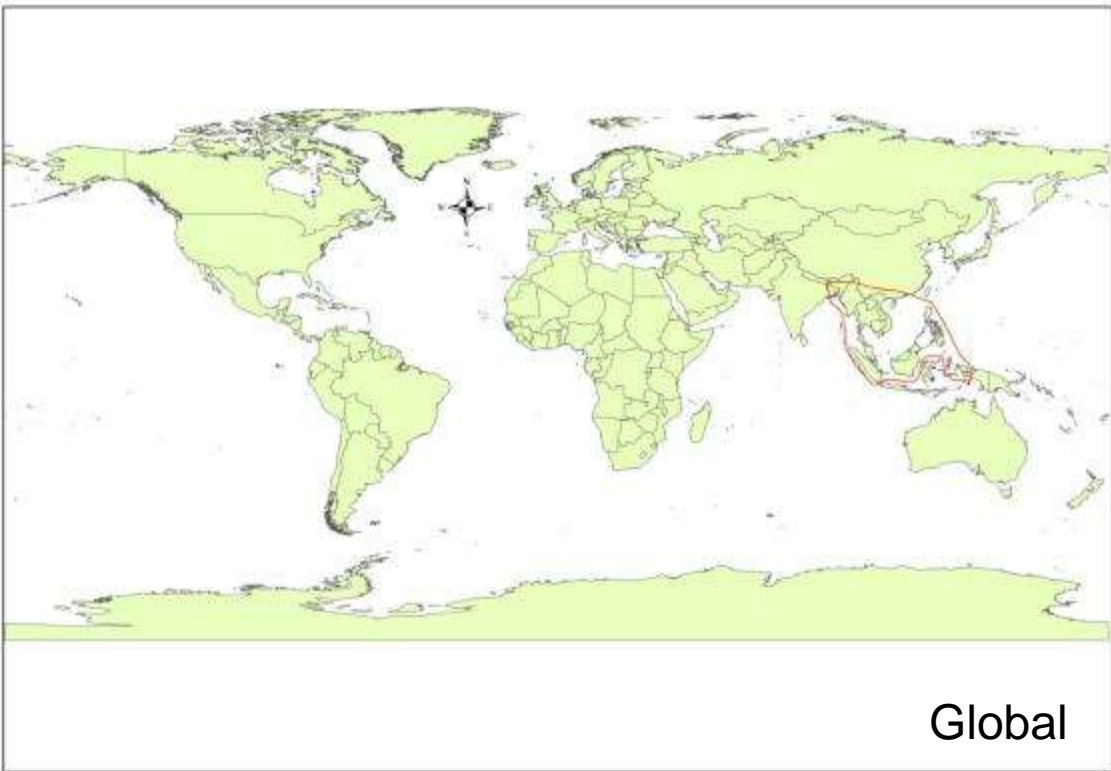




## Conservation genetics of *A. malaccensis* in P. Malaysia

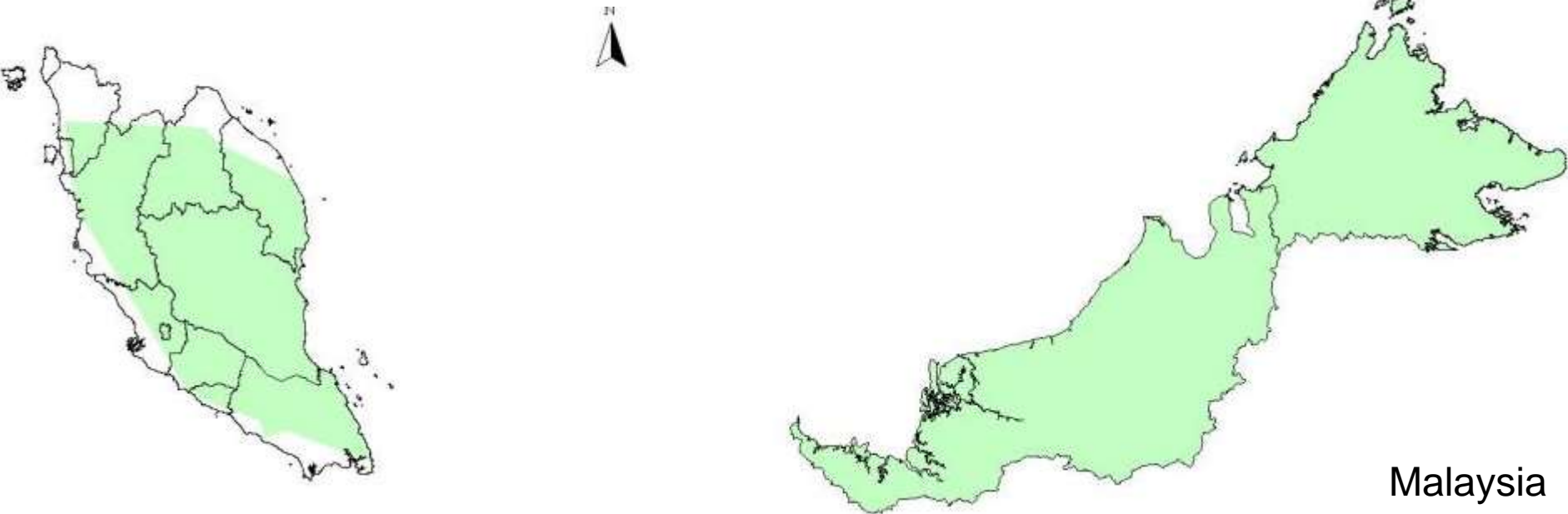






Global

# Species range



Malaysia

Cont.

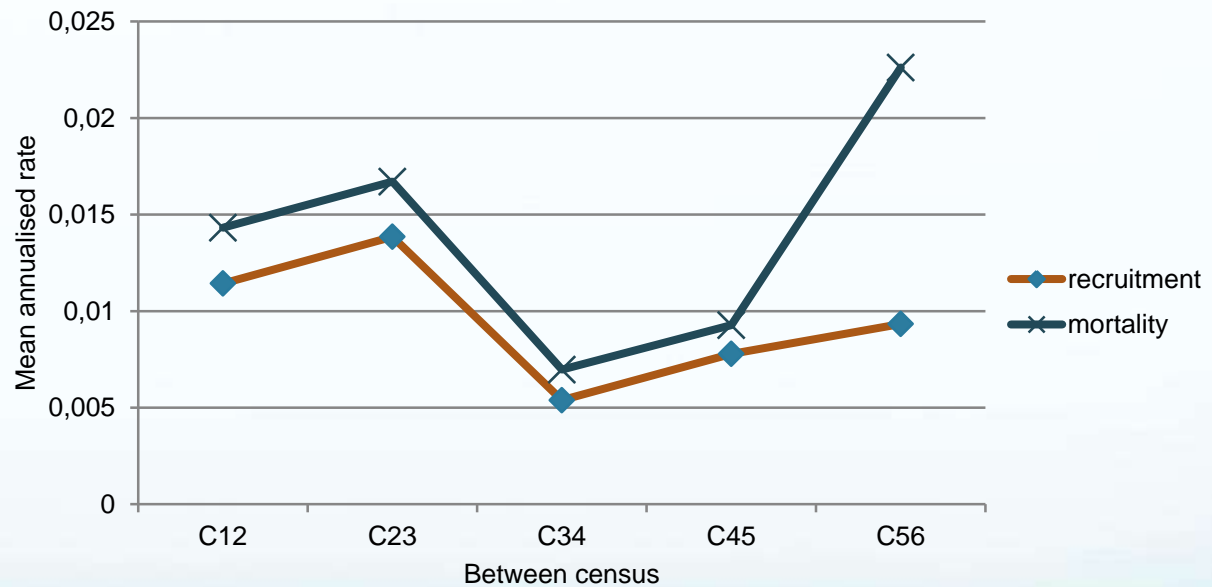
- It has no habitat preference and is found in a variety of soils from sea level to 1700 m altitude in the primary and logged-over natural forests;
- In a forest, individuals are scattered and nowhere abundant.





# Mortality rates are higher than recruitment rates

Mean annualised recruitment and mortality rates of karas in S6

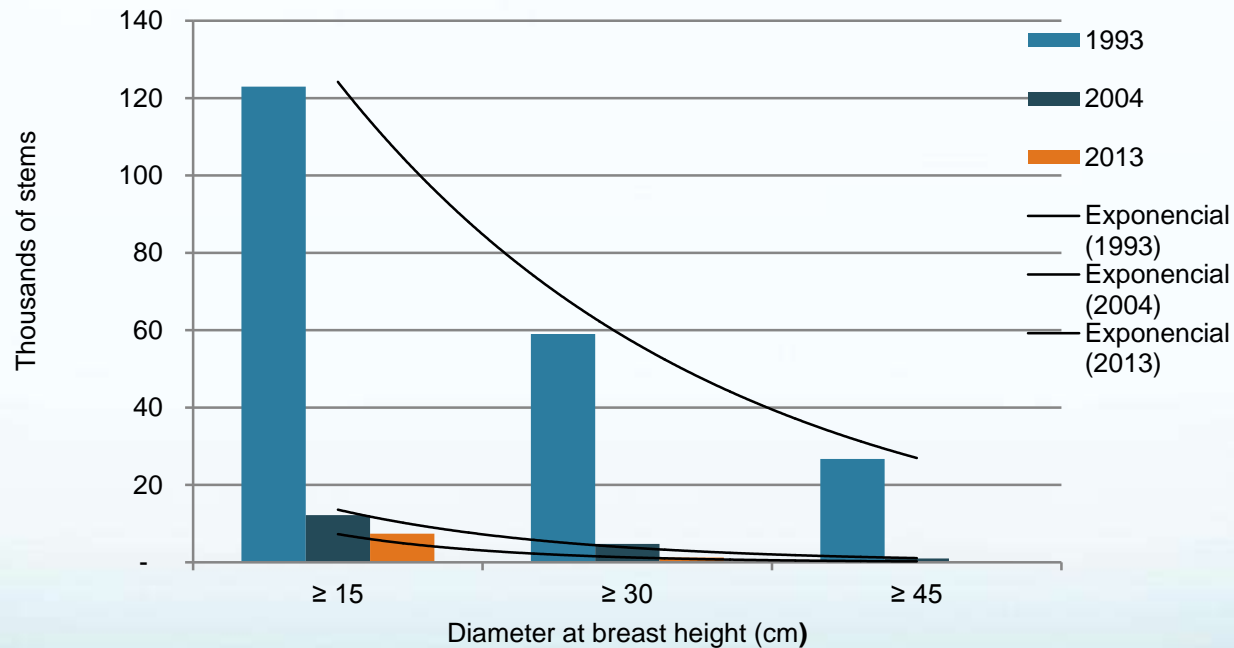


Note: from 1987 onwards



# Declining frequency abundance in various diameter categories

Stocking of *Aquilaria malaccensis* and *A. hirta* in 1993, 2004 and 2013 in Permanent Reserved Forests in Peninsular Malaysia based on AOO



## Threats

- Unsustainable harvesting;
- Land conversion (very minor).



## Conservation status

Species	Malaysia Red List	IUCN (2014) Red List
<i>Aquilaria beccariana</i>	DD	VU A1d
<i>Aquilaria hirta</i>	VU A4cd	NA
<i>Aquilaria malaccensis</i>	VU A4cd	VU A1d
<i>Aquilaria microcarpa</i>	DD	NA
<i>Aquilaria rostrata</i>	DD	CR B1ab(v)

NA = Not available

Source: Malaysia Biological Diversity Clearing House Mechanism <http://www.chm.frim.gov.my/>



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## Current management measures

- Larger trees are target leaving the smaller-diameter ones untouched (this threshold may be lowered when the resource dwindles);
- Minor licence is required to harvest from Permanent Reserved Forests (PRFs) and Stateland but rarely enforced where local and indigenous communities are concerned;
- Issuance of a removal pass which records the amount of timber/chip/blocks leaving a concession. This pass is required when applying for other permits, e.g., CITES export permit;
- In national parks, state parks and protection forests in the PRFs, no harvesting is permitted; and
- Frequent patrolling by stakeholders.



## Adaptive measures

- Enhanced cooperation and collaboration between primary stakeholders (state authorities) and enforcement agencies (police and army forces, customs, maritime and immigration authorities);
- National Forestry Act (1984, amended 1993; Act 313) is being revised; and
- Severe penalties imposed by the International Trade in Endangered Species Act 2008 (Act 686);
- Harvest is regulated through an export quota system.



## Proposed management measures

- review present compliance level; and
- Improve further the adaptive management strategies.

These strategies however must be developed in a holistic manner.





# Acknowledgement

- ITTO-CITES Program: Support to ITTO-CITES Implementation for Tree Species;
- Centre for Tropical Forest Science and Forest Global Earth Observatory, Smithsonian Tropical Research Institute;
- Government of Malaysia; and
- CITES.



Thank you

