

CONSIDERING CHANGES FOR WOOD SCIENCE AND TECHNOLOGY

A point of view

By

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CHANGE

What impact on wood utilization?

What to consider in educating
professionals?

Where do we come from?

Where do we need to go?

Uniqueness of Wood Science and Technology

Tradition

Changes

Needs

Future

Forests,
the source
of raw material



Throughout history

forests have provided
important social, cultural
and ecological values

and

a strong basis for economic development

SCIENTIFIC THOUGHT



“ABOUT THE HISTORY OF PLANTS”

by THEOPHRASTES, born 390 BC

first classification of plants; anatomy of trees

In the 14th century, a recognition of
SUSTAINABILITY OF FORESTS

Successful culture and sensitive care of forests
requires a **BODY OF KNOWLEDGE** integrated
from basic sciences:

BOTANY

CHEMISTRY

MATHEMATICS

TECHNOLOGY

POLITICAL SCIENCE

LAW

HARTIG 1830; COTTA 1842

=>FOREST ACADEMIES

COLLEGES - UNIVERSITIES



USA: Universities CORNELL and YALE

then mainly: LAND GRANT UNIVERSITIES

US FOREST PRODUCTS LABORATORY



**WOOD SCIENCE & TECHNOLOGY
= INTERDISCIPLINARY FIELD**

BOTANY

PHYSICS

CHEMISTRY

ENGINEERING

MANUFACTURING and CONSTRUCTION using WOOD

since prehistoric times

TOOLS

BUILDINGS

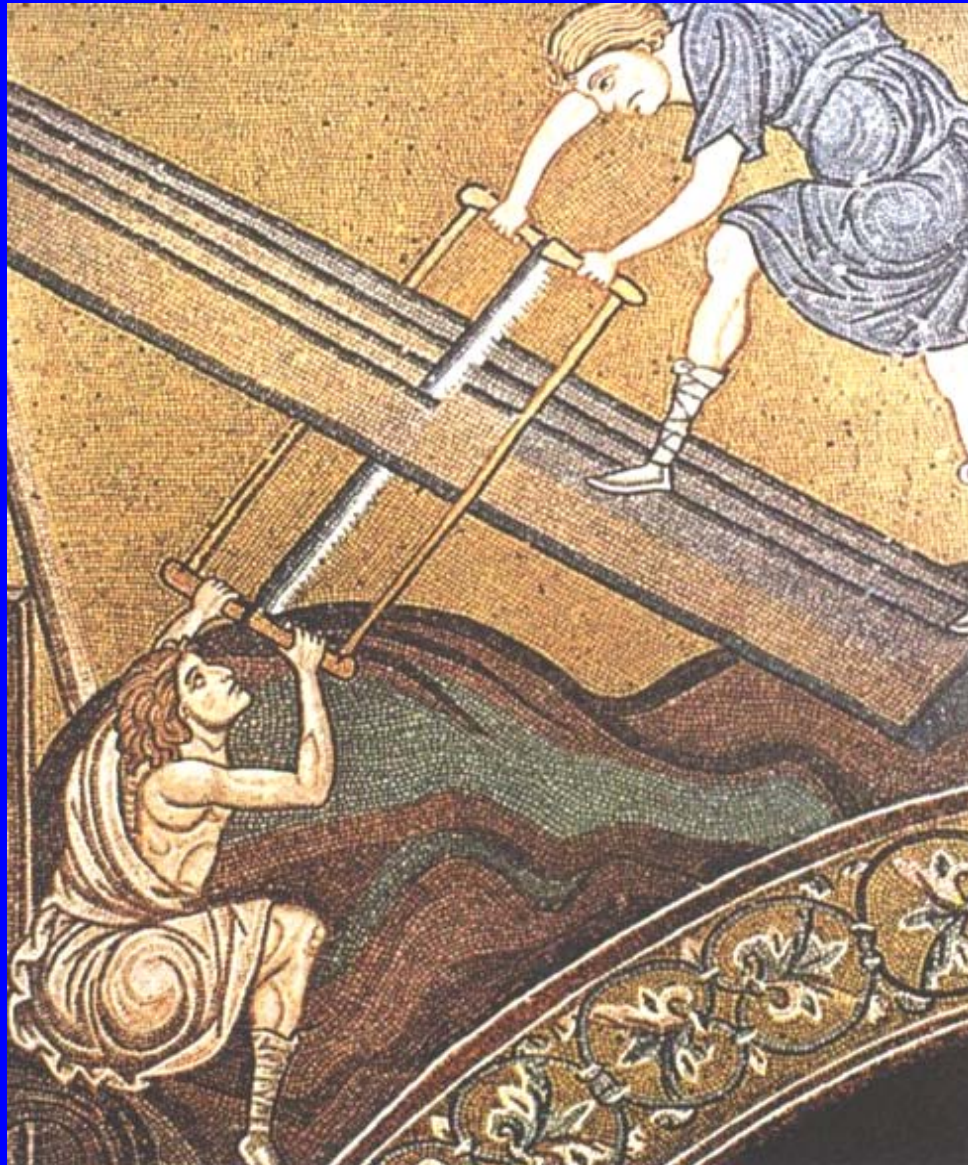
FIRE

Wooden houses

Furniture

Ships

CUTTING AND SHAPING









INDUSTRIAL FURNITURE



Product development

Plywood

Particle- fiber- flake- strand- boards

The key: modern adhesives

Composites

with plastics, metals, and glass

ACADEMIC REQUIREMENTS

determined by academic institutions based
on **QUALITY STANDARDS**

by governments responding to
**TRADITIONS AND EMPLOYMENT
NEEDS**

Standards for professional membership
and accreditation of academic programs
=> SWST

SOCIETY OF WOOD SCIENCE & TECHNOLOGY

Mission:

**To enhance and assure the wide use of
wood**

**by developing knowledge distinctive to
wood science and technology through**

QUALITY RESEARCH

and

**DISSEMINATE THIS KNOWLEDGE
actively and broadly**

SWST

A bridge linking

Academia

Industry

Government

Community

Πάντα ρει – All things change

MAJOR CHANGES

Environmental concerns

Globalization

ENVIRONMENTAL CONCERNS:

Production

- early on, reduction of emissions
- products with long, satisfactory service life
- more recycling
- environmental life cycle inventories and analyses
- higher energy efficiencies
- reduced energy consumption

European “Vision for 2030”

**A competitive, knowledge-based industry
using renewable forest resources
ensuring its societal contribution
in the context of a bio-based,
customer-driven, and
globally competitive European economy**

Biomass

- energy from biomass
 - needs market introduction
- optimized combustion
 - needs new technologies
- bio-energy subsidies
 - create unfair competition
- special eco-energy tax
 - finances such subsidies

Industry suggests the „Cascading principle“

1. First, create new wood products,
2. then recover materials for recycled products,
3. eventually, material that is not economically viable for recycling is to be made available for energy.

Production of Biodiesel, Ethanol, and Wood Pellets in EU and US

	E.U.	% growth, 2005/6	U.S.	% growth, 2005/6
Biodiesel (mill. t)	4.6	45	1.0	300
Ethanol (bill. l)	1.6	71	19.1	25
Wood pellets (mill. t)	4.7	38	1.6*	25

* Much of U.S. wood pellet production is currently exported to EU.

Today, ethanol is made from corn starch, bio-butanol from sugar beets, and biodiesel from rapeseed and soybeans.

In the future, all of these liquid fuels will be made from the cellulosic parts of forest and agricultural plants, and wood will be a preferred raw material.

Significant CO2 savings

by using timber in construction,

trading monetary value of carbon
sequestration

(Emission allowances projected
to range between 15 and 30 €/ tones of
CO2)

Timber Trade Action Plan **by European timber trade associations**

Establish a chain-of-custody systems:

verify the legality of traded timber,

**ensure compliance
with environmental criteria.**

Globalization

Entirely new business patterns
and partially new social and political
patterns

People communicate worldwide,
organizations network,
and
business and governments relate to each
other

Globalization

changes the marketplace so swiftly that many companies are required to show adaptability or face failure.

Computers and the Internet

Individuals obtain, manipulate, and create information in digital form

W W W enabled people to create, organize, and link documents over the Internet

Browsers made it possible to surf the Web

Companies can
create, transmit, and analyse data
for
manufacturing, inventories, marketing,
sales, and billing

Anyone can become a buyer or seller

Information technology

Manufacturing process can be taken apart
and individual tasks can be sent around
to whoever can do it

best

or cheapest

or both

Real-time monitoring and decision making

**for quality control,
preventive maintenance,
and servicing jobs in a plant,**

**or secure online connection
via the Internet**

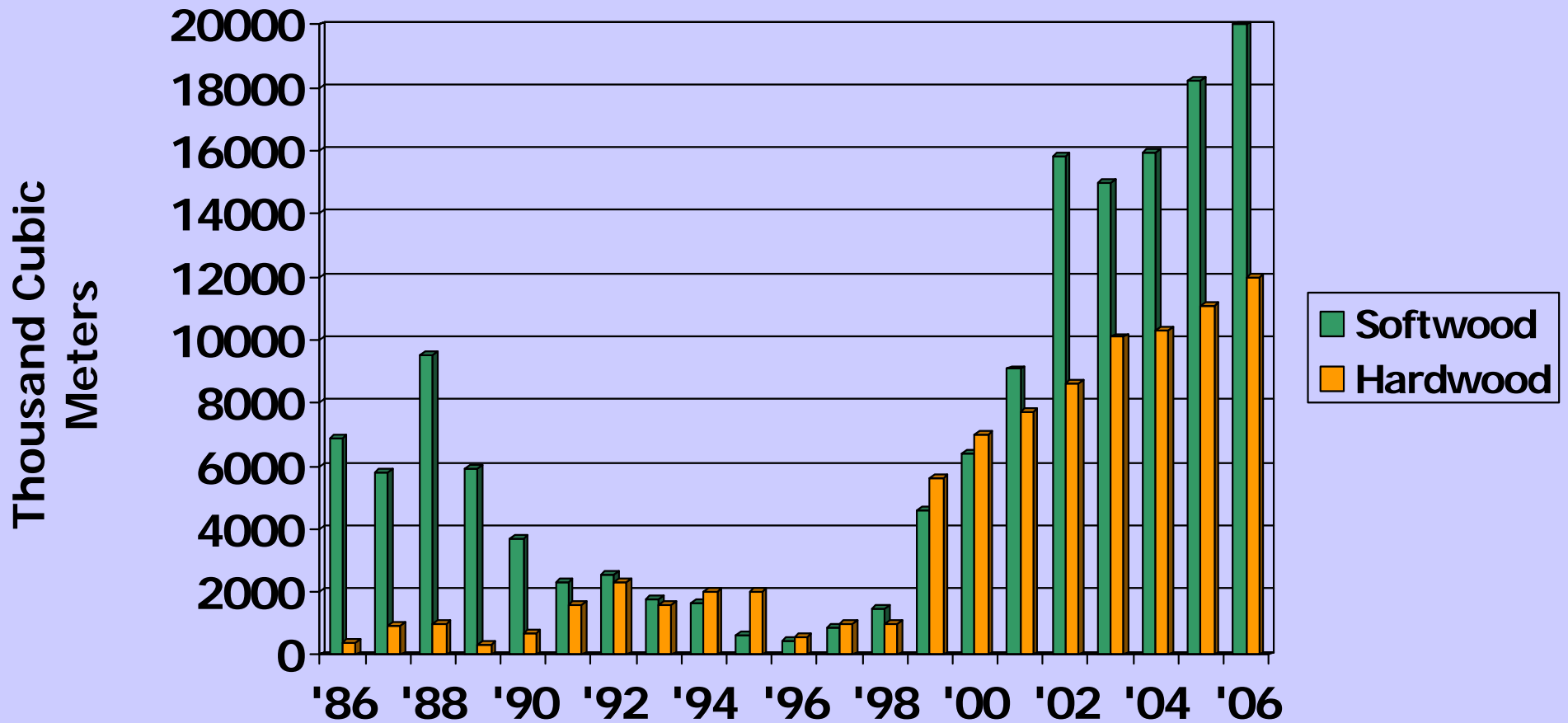
Globalization

also became possible through political actions:

various trade-rounds and establishment of the World Trade Organization

Shipping and transportation in general became reasonably priced

China Log Imports by Species Type, 1986-2006



Source: Wood Resources International, Ltd. 2002; RISI 2005; Jaakko Poyry 2007

China's wood imports continued to rise in 2006, with a 9.5% increase over 2005.

Over two thirds are imported from Russia, with one-fourth from the tropics.

China's 2006 trade balance in forest products

**total import value was US\$ 19.39 billion
and
exports amounted to US\$ 27.68 billion**

Quality assurance

for products and their manufacturing

European guidelines for building products,
the basis for CE-marking,
used for certification of EU product quality

European Norm (EN) prevails,
but efforts to harmonize requirements with
standards of the International Standard
Organization (ISO).

Significant differences to standards of the
ASTM

CHANGES IN POST-SECONDARY EDUCATION

- from industrial => knowledge societies
- global harmonization
- in EU: Sorbonne / Bologna process

SORBONNE / BOLOGNA PROCESS - REFORM

Adoption of a common framework of
readable and comparable degrees.

In May 2005, confirmed the degree system,
quality assurance,
recognition of degrees and study periods

now:

**BACHELOR (3 YRS.), MASTER (+ 1 to 2
YRS.)**

PhD (+ YRS.)

SW&T - BASIC REQUIREMENTS

BIOLOGY

incl. anatomical structure; identification; pathology; microtechniques; etc.

PHYSICS and CHEMISTRY

incl. wood-fluid relations; physical properties; chemical constitution

ENGINEERING

incl. design of structures and principles of processing

ADDITIONAL REQUIREMENTS

at least 2 from:

BASIC SCIENCES

incl. Research methods and techniques

TECHNOLOGICAL APPLICATIONS

i.e. drying; preservation; machining;
finishing; manufacturing of boards, paper

**FORESTRY, ECONOMICS, BUSINESS,
AND INDUSTRIAL ENGINEERING**

Knowledge / skills needed

- Scientific core
- Computer literacy
- Mastery of languages
- Ability for teamwork / cooperation
- Networking / life long learning

INTERDISCIPLINARY TRAINING

essential for forest products professionals
and material scientists focused on wood
products:

Have capability to

**integrate knowledge from traditional
academic disciplines including
business, economics, and engineering.**

A defined core is to be augmented by
options and enlarged by graduate studies.

Students need

image of professional opportunities

Universities cannot be inviting,

if the industry is not attractive

UNDERGRADUATE CURRICULUM

3 phases recommended

1. A broad knowledge base and broad understanding of the profession,
2. specialized topics with options,
3. integration of the provided knowledge plus options

Features

- Project type excercises / laboratory
- Use computer / internet technology
- Practical training with industry
- Internationalisation, esp. marketing
- Integration of research & education
- Entrepreneurship

INTERDISCIPLINARY TRAINING

Give specialists in other fields the opportunity to learn from the unique body of knowledge

„wood science & technology“

Information and technology transfer

Continuing education

MODERN SOCIETIES

demand innovation & specialized education

Obligation to deal with sustainable forest resources along the forest-wood chain to benefit humanity!

Interactions of decisions in forestry and in forest products industries must be based on knowledge from science and technology!

WOOD

An important sustainable and renewable material resource for:

Industry, world trade, and employment based on wood, its derivatives and engineered products:

They guarantee the forest as an environment-friendly production location

Wood Science And Technology **A Great History,** **A Promise For The Future**



