



CONVERSION FACTORS

Tropical logs,
sawnwood, veneer,
and plywood

Frances Maplesden

CONTENT

- Use and importance of conversion factors (CFs) in trade statistics
- Solidwood product weight/volume conversions
 - Issues
 - Background on physical properties and moisture relationships of wood and bark
 - Summary of ITTO derived weight/volume conversion factors for logs and sawnwood
- Next steps



Use of conversion factors by ITTO and FAO

Conversion factors are used to standardise international reporting units:

- Data reported by countries in non-standard units
- Inconsistent data
- Converting data from other sources to FAO/ITTO/UNECE standards
- Calculation of national and international wood balances
- Policy/scenario development for wood requirements at national and international levels

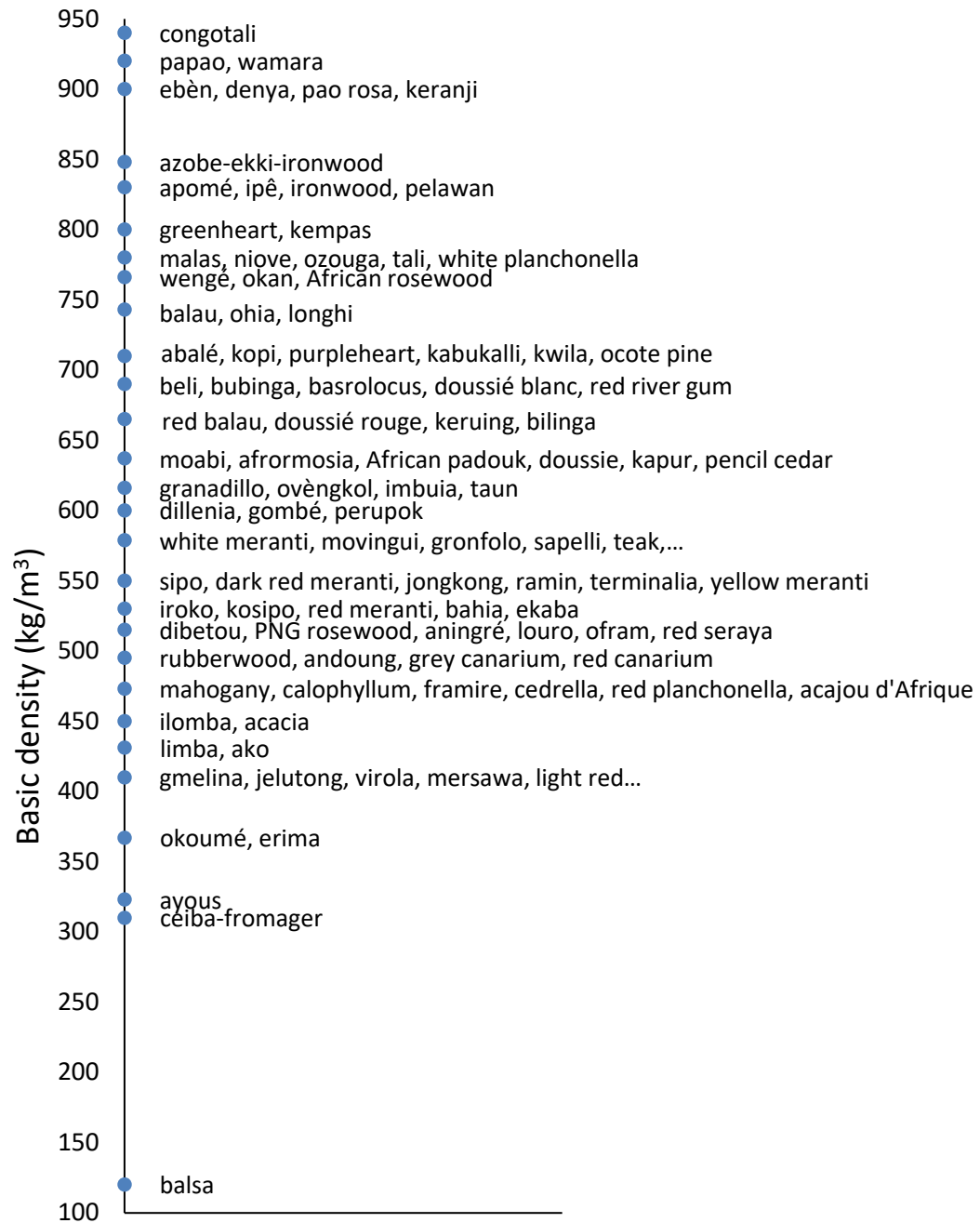
Accuracy of conversion factors important to improve transparency in wood products trade



Weight/Volume conversions

- Volumes are used to estimate national and international wood requirements and balances and can indicate illegally logged roundwood in the supply chain.
- Inconsistent reporting of trade volumes in trade statistics, weight to volume conversions required.
- ITTO has traditionally used generic weight/volume conversions for tropical logs, sawnwood, veneer and plywood.
 - Not specific to species or country of origin
 - Large variations known between different species and environmental conditions.
- Mix of tropical species traded and major trading countries has changed considerably over the last 30 years.



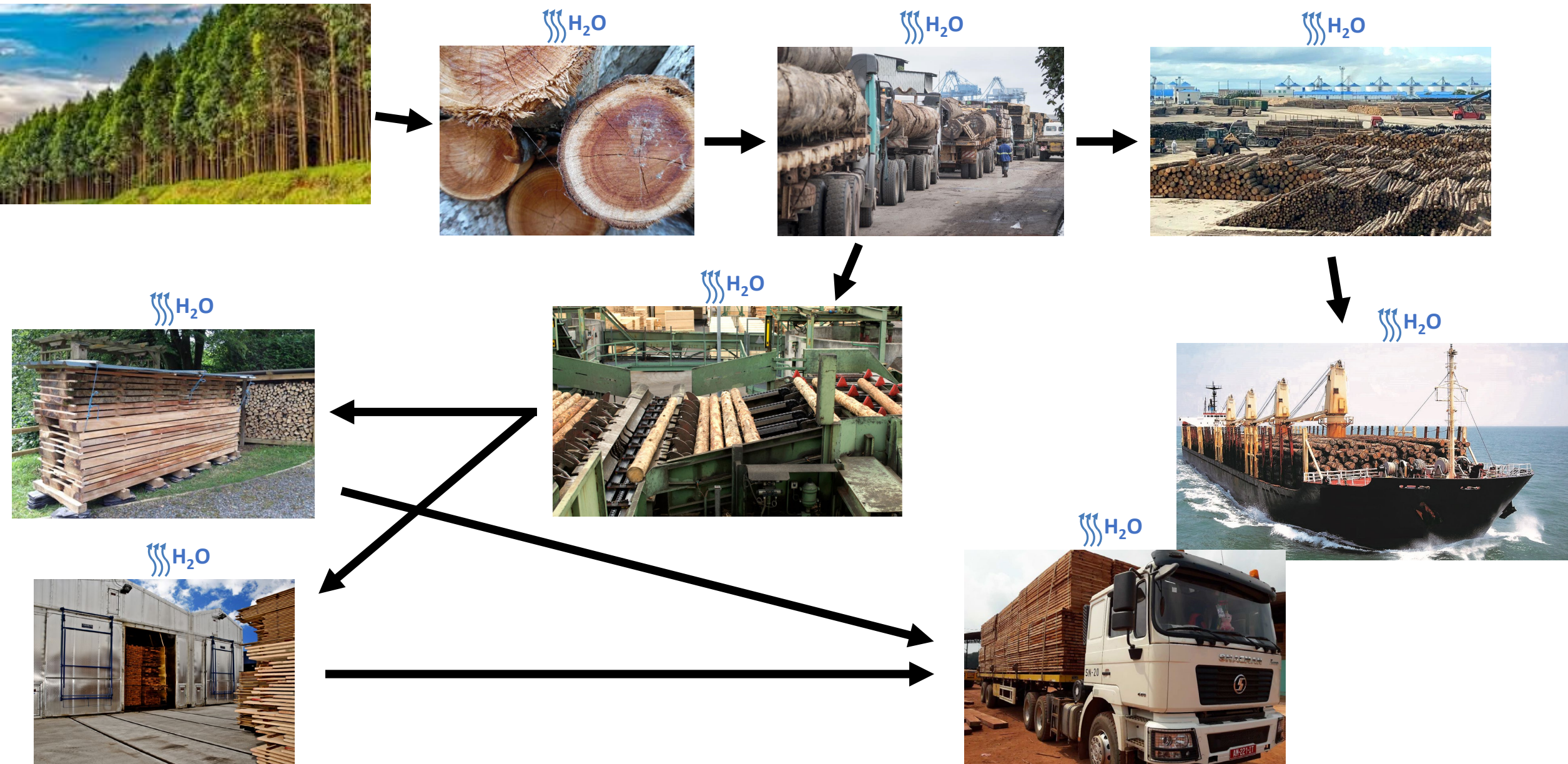


Variation in wood basic densities for some tropical wood species

Congotali	940 kg/m ³
Sapelli	574 kg/m ³
Balsa	120 kg/m ³

$$\text{Basic density} = \frac{\text{oven dry weight}}{\text{green volume}}$$

Roundwood and sawnwood moisture loss in the supply chain



Weight/volume conversion estimates for tropical wood species

- Limited data for directly measured weight/volume CFs for tropical logs and sawnwood by species.
- ITTO has derived weight to volume relationships for tropical logs and sawnwood by species and country/region based on:
 - Known wood basic densities by species
 - Known theory and assumptions about moisture content (MC), volumetric shrinkage, bark density
- Tropical log CFs by species are based on:
 - Ratio of green volume (wood only) to green weight (wood and bark)
 - Estimates for green logs, moisture losses of 5% and 10%
- Tropical sawnwood CFs by species are based on:
 - Ratio of volume (wood only) to weight (wood only) at 12% MC (typical MC of wood in service use).
- Weighted average CFs by ITTO tropical country/region are based on the traded volume of the main reported species



ITTO estimates of weight/volume conversion factors for tropical sawnwood and logs (m³/1,000kg)

	SAWNWOOD	LOGS		
	(12% MC)	(green)	(5% MC loss)	(10% MC loss)
Cameroon	1.696	0.836	0.856	0.877
Gabon	1.412	NA	NA	NA
Ghana	1.596	0.848	0.873	0.891
Rep. of Congo	1.488	0.902	0.930	0.960
AFRICA	1.677	0.860	0.885	0.908
Malaysia	1.556	0.914	0.943	0.975
Papua New Guinea	4.239	0.865	0.895	0.913
ASIA-PACIFIC	1.614	0.882	0.911	0.934
Brazil	1.203	NA	NA	NA
Guatemala	1.342	NA	NA	NA
Guyana	1.144	0.790	0.807	0.821
Suriname	1.153	0.848	0.875	0.891
LATIN AMERICA/CARIBBEAN	1.203	0.841	0.868	0.883
ALL COUNTRIES	1.609	0.871	0.898	0.920

Study Results

- Sawnwood CF estimates vary significantly between countries reflecting differences in species traded and their wood properties:
 - e.g. high density species in Guyana, low density species in PNG.
 - differences in shrinkage values between species from green to dried state (12% MC)
- Log CF estimates show less variation although differences reflect differences in species traded. Less shrinkage than sawnwood
- Results indicate inaccuracies in using a generic weight/volume CFs for tropical logs and sawnwood



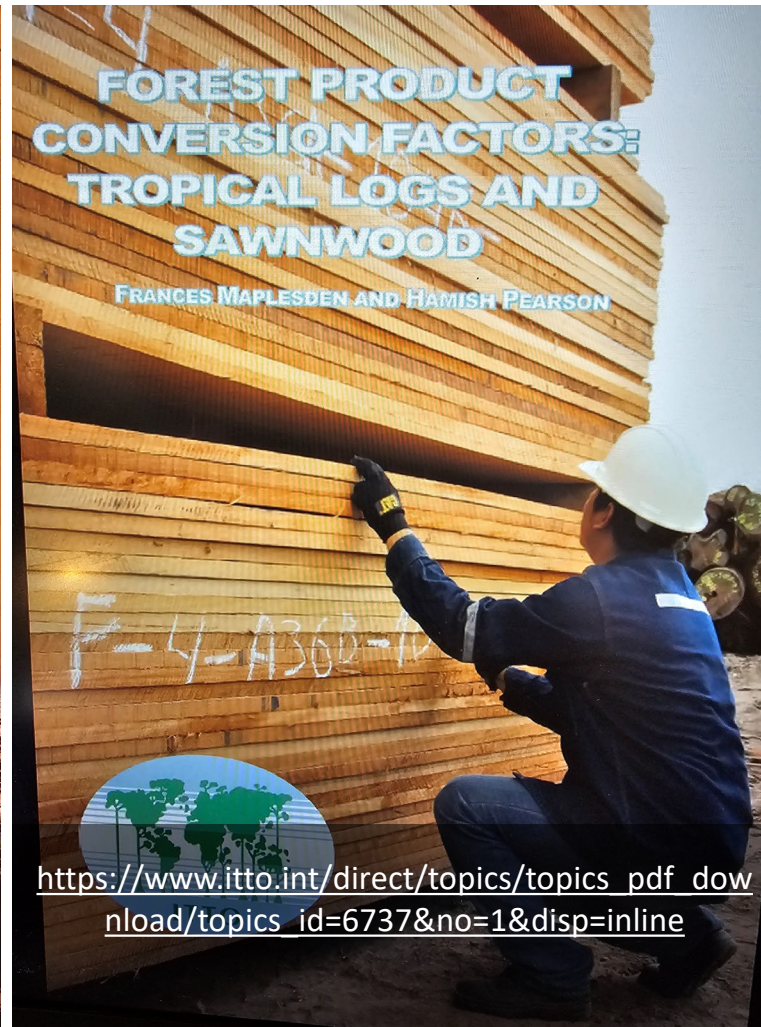
Next steps

Develop accurate weight/volume CFs for the Central America region:

- Limited trade data by species for the Central America region
- Request statistical correspondents complete “ITTO-2 Trade in Tropical Species” section of JFSQ

ITTO update of weight/volume CFs for veneer and plywood

- Theoretical calculations complicated by use of other materials (glue, fillers) and effects of manufacturing (compression) on wood density.
- Request in-country CFs from measured data.



ITTO/FAO/UNECE
Publications