INVESTING IN TIMBER PRODUCTION -

Lessons learnt from plantations, natural forests and silvopastoral systems

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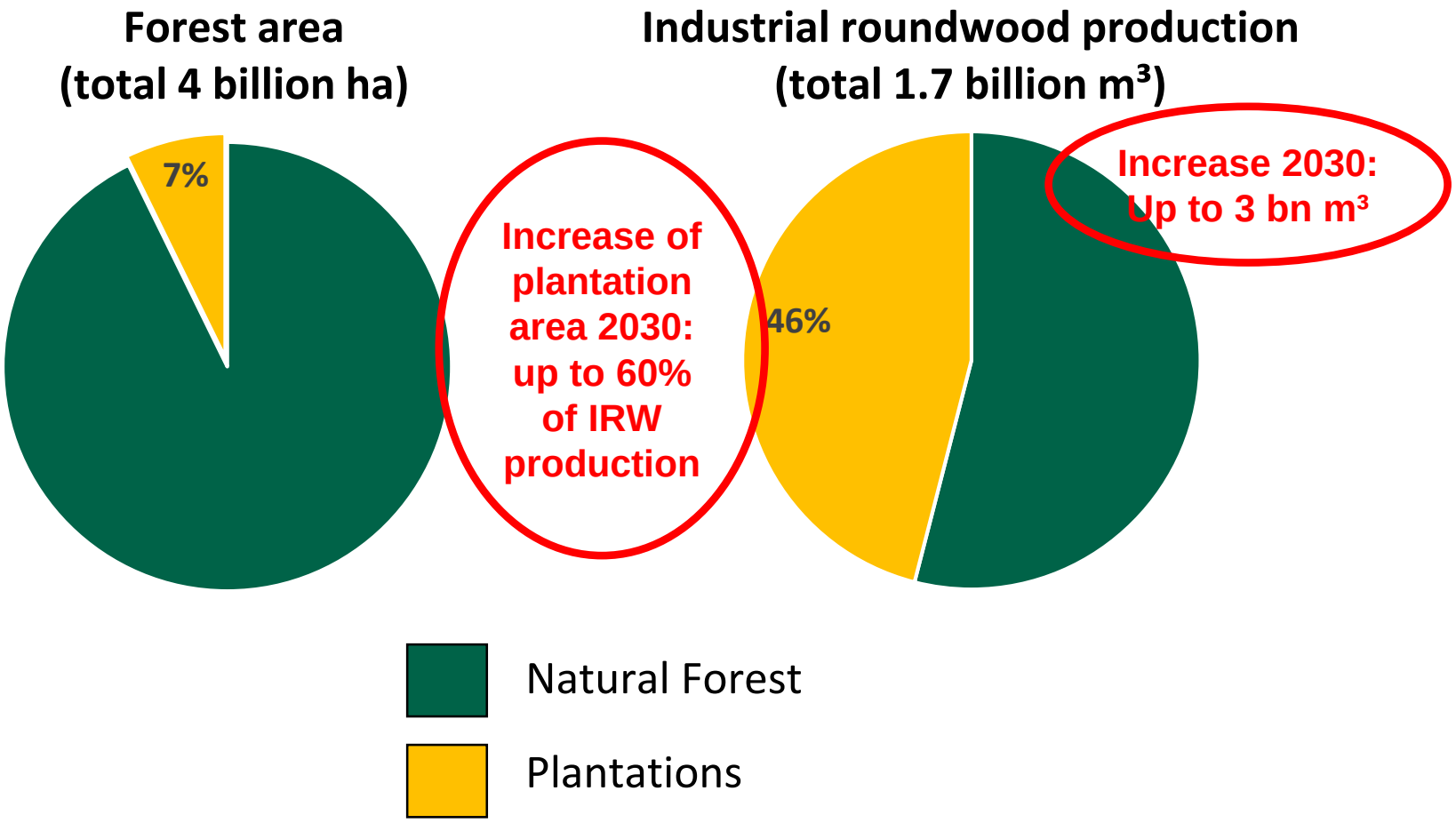
SOURCES OF INDUSTRIAL ROUNDWOOD

Forest area and production

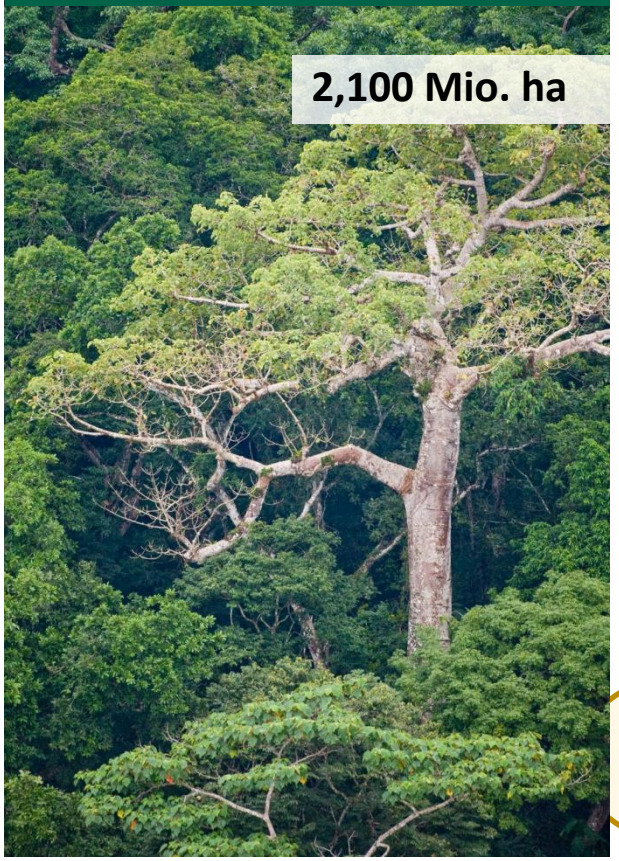


Sources: FAO (2012/2015); Payn et al. (2015); d`Annunzio et el (2015)

NATURAL FORESTS

Today → **Future**

Tropical and sub-tropical forest land



Conversion to agriculture, pasture, settlements, etc.
400 - 500 Mio. ha (???)

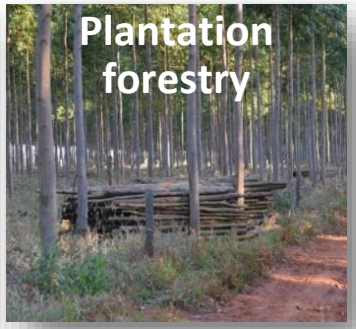
Conservation areas
200 Mio. ha (10% target)

Natural forest (primary, secondary, degraded)
~ 1,500 Mio. ha

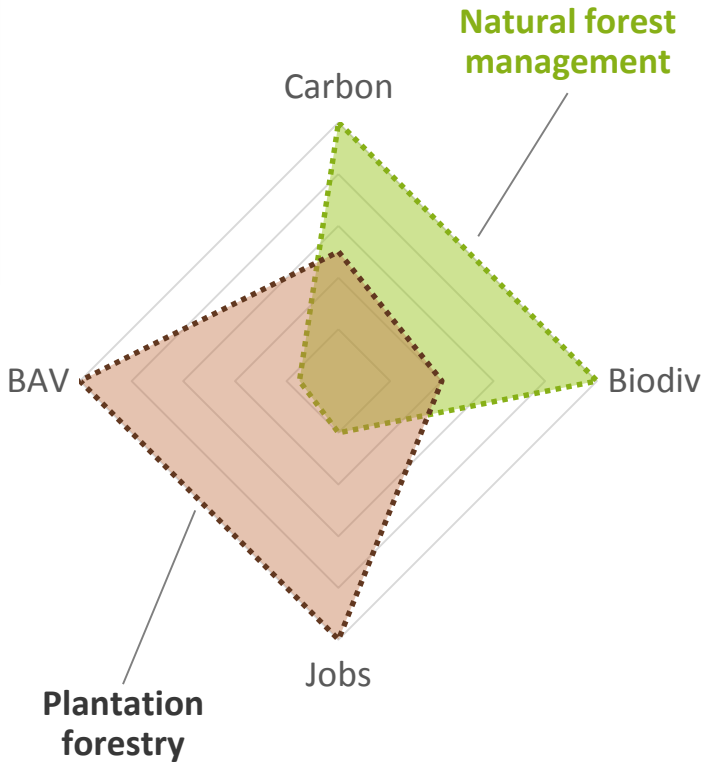
Sources: FAO (2015); own estimates

PLANTATION VS NATURAL FOREST MANAGEMENT (I)

Plantations win the economic competition while SFM scores ecologically



Average carbon stock	400 tCO_2/ha	200 tCO_2/ha
Biodiversity	Highly diverse	Limited diversity
Jobs	5 FTE/1,000 ha	23 FTE/1,000 ha
Biological asset value	660 USD/ha	4,500 USD/ha



Sources: UNIQUE (2016): Sustainable natural forest management in the tropics. Best practices and investment opportunities for large-scale forestry; World Bank (2017): Harnessing the Potential of Productive Forests and Timber Supply Chains for Climate Change Mitigation and Green Growth (elaborated by UNIQUE and Climate Focus) ; Results from UNIQUE due diligence on planation investments in Africa and Latin America

PLANTATION VS NATURAL FOREST MANAGEMENT (II)

Supply target perspective equialize the socio-economic valuation for SFM

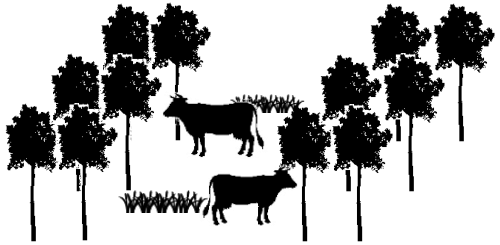
Impacts of producing 100,000 m³ industrial roundwood (sawlogs):

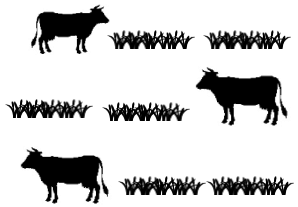
	Plantation	SFM tropics
MAI (m³/ha/a)	~30 (15 – 50)	~5 (2 – 10)
Area required (ha)	3,333	20,000
Employment (FTE)	77	100
Carbon sequestration (tCO2)	666,600	8 million
Biological asset value (USD)	14.9 million	13.2 million

Sources: UNIQUE (2016): Sustainable natural forest management in the tropics. Best practices and investment opportunities for large-scale forestry; World Bank (2017): Harnessing the Potential of Productive Forests and Timber Supply Chains for Climate Change Mitigation and Green Growth (elaborated by UNIQUE and Climate Focus) ; Results from UNIQUE due diligence on planation investments in Africa and Latin America

PLANTATIONS VS SILVOPASTORAL SYSTEMS VS PASTURE

Silvopastural systems combine attractive return profile and socio-ecological benefits





	Plantation forestry	Silvopastoral systems	Traditional cattle breeding
Stocking (head/ha)	--	0.6-0.9	1.0-1.5
Density (trees/ha)	1,000 to 200	714 to 200	--
MAI (m^3/ha/yr)	35-40	30-35	--
Weight gain (kg/ha/yr)	--	100-150	150-250
Return on invest	13-16%	12-15%	6-10%
Cash flow positive after	7 years	4 years	2-3 years
Job generation per 1,000 ha	25-30	25-30	2-4
Carbon balance (ha/yr)	-8 tCO_2-eq	-5 tCO_2-eq	+2 tCO_2-eq

Sources: IDB (2016): Upscaling silvopastoral systems in South America (elaborated by UNIQUE); UNIQUE company data

UNIQUE IN PARAGUAY

Sustainable timber production systems

	Natural forest	Silvopastoral system	Plantation
			
Area under management	5.600 ha	3.200 ha	2.600 ha
MAI	6 m^3/ha/a	33 m^3/ha/a	38 m^3/ha/a
Production cost	42 USD/m^3	17 USD/m^3	16 USD/m^3
Revenues on timber	58 USD/m^3	42 USD/m^3	42 USD/m^3
Profit	95 USD/ha/a	850 USD/ha/a	950 USD/ha/a

Source: UNIQUE company data 2015

Conclusions

- Sustainable supply with timber is long-term global challenge, which has to be addressed taking into account local conditions and assets (land/resources availability, with a view on natural forest resources and degraded areas, markets, policy framework).
- Economically viable timber production is possible in plantations (large scale and small scale) **and** other production systems, i.e. natural forest, silvopastoral systems (and agroforestry).
- Plantations are the most attractive production system economically and in terms of efficient land use, but require substantial investments compared to natural forests.
- Natural forest management, though challenging, offer a competitive package of economic, social and ecological returns.
- Silvopastoral systems are competitive for their resource efficiency, upsides for food production and economic performance.

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