# Trees as nexus for Sustainable Development Goals (SDG's): *agroforestry* for integrated options

Since the 1972 Stockholm and 1992 Rio meetings, the need for reorienting global development has been debated and agreed in 2012 in Rio+20. Current growth with GDP (gross domestic product) as primary metric does not take into account the destruction of natural capital and the social equity aspects. The 'five capitals' view brings human, social and natural capitals into focus, beyond finance and infrastructure. The eight Millennium Development Goals (pre-2015) worked for health, gender and education aspects, but failed to deliver on sustainability; the goals were not integrated with climate issues, and the goal of containing anthropogenic climate change was missed, making costly adaptation unavoidable. The 17 post-2015 Sustainable Development Goals combine the unfinished MDG agenda with a re-enforcement of climate and biodiversity conventions and lessons learned on policy effectiveness. We reviewed the evidence on tropical land use in the light of these SDG's, focusing on tradeoffs among the SDG's as currently framed, and the opportunity that a more holistic land use perspective, as in agroforestry, can bring.
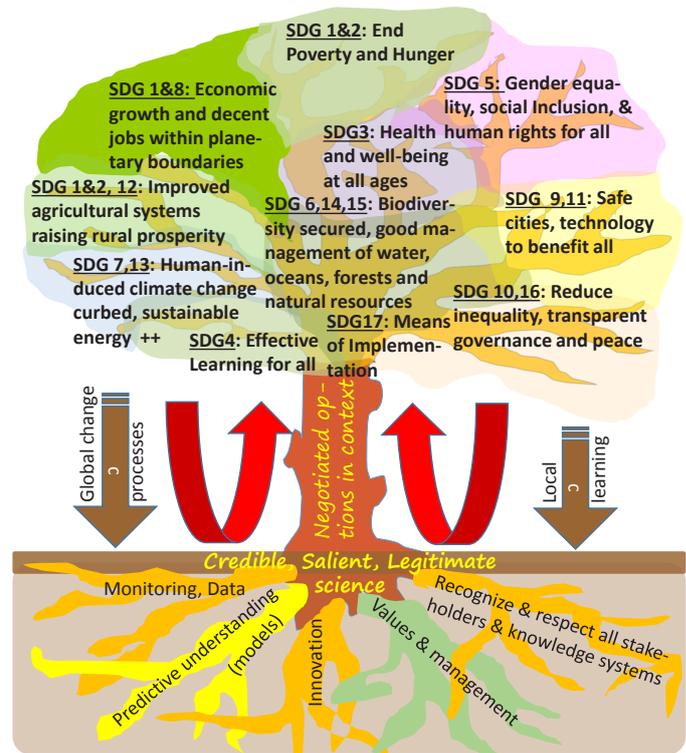
Key findings

1. With current human population size resource use already exceeds the planetary boundaries, while the Sustainable Development Goals imply improved wellbeing for large numbers of people in developing countries; land productivity in agriculture and forestry will have to increase to meet these expectations

2. The sum of area needed for the various SDG's at current production levels, exceeds what is available on the globe (technically: the Planetary Appropriation Ratio > 1), if calculations are based on monocultures

3. The historical and current way of segregating forest land from agrarian communities leads to conflicts and contestations that reduce land productivity and increase inequity

4. Development challenges are in part the result of the sectoral (silo'ed) approach that dominates government systems, with the various SDG's attributable to separate conventions and Ministries

Implications: four ways agroforestry can help

- Agroforestry as a land use system in-between forest and open-field agriculture, can – with appropriate combinations of trees, crops and livestock – provide a range of goods, benefits and services simultaneously, providing nutritious food, renewable energy, and clean water, while conserving biodiversity.

- By allowing efficient, multifunctional land use (technically speaking, with a Land Equivalent Ratio > 1) it supports "sustainable intensification"

- Agroforestry as institutional response to contested resource access, allowing gender and social equity enhancement and source of empowerment

- Agroforestry as integrative mindset and culture can help create synergy between the various SDG's in multifunctional landscapes, break out of institutional silo's

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The adoption of a set of 17 Sustainable Development Goals (SDG's) on ** Sept 2015 in the United Nations general assembly in New York, will guide international interactions in the coming decade. The goals bring together development concepts based on economic, social, political, technological and ecological perspectives. The 169 targets and agreed monitoring systems will underpin much of the bilateral and multilateral negotiations, and shape the public-private partnerships. Agroforestry and trees are not mentioned and the word 'forest' only a few times; yet, land use with and without trees will have a major influence on the degree to which the goals can be achieved. Based on exploration of these relations, we formulated four key findings for the SDG set as a whole.

Key finding 1: Current planetary boundaries already exceeded, constraining development ambitions
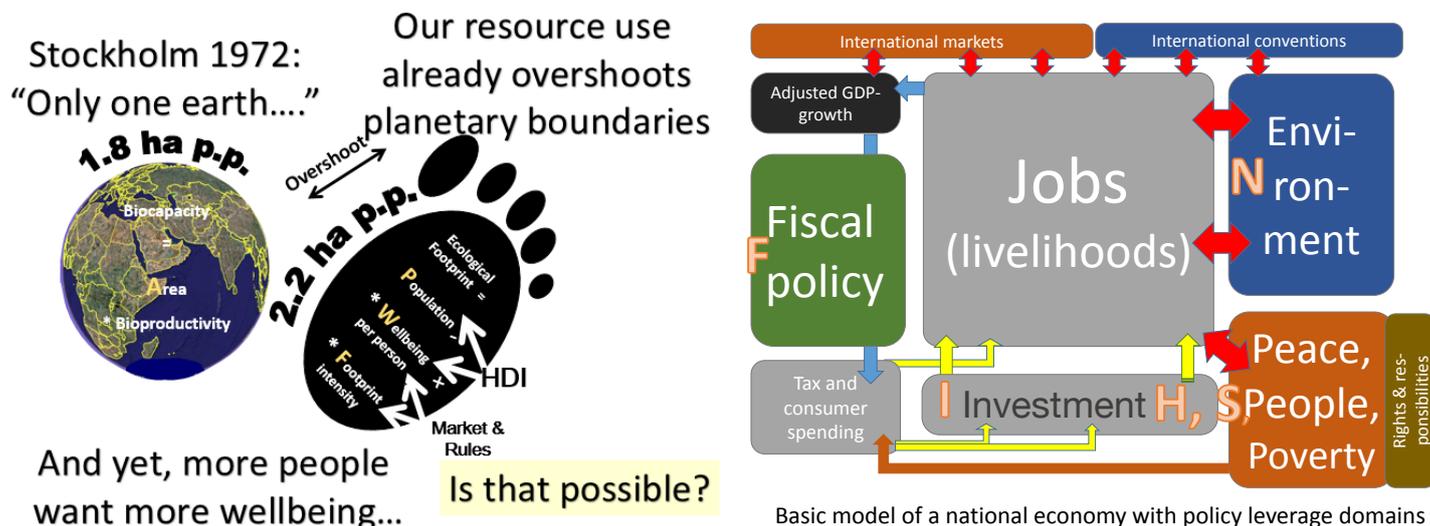

Figure 1. (left) Comparison of what the earth can support and the current average per capita resource use, suggesting that decrease of footprint intensity per unit human wellbeing is essential for reducing 'overshoot'; (right) Schematic perspective on a national economy and its relation to five asset types (N, H, S, F and I, or natural, human, social, financial and infrastructure capitals)

Paraphrase and expand on: Agroforestry as a land use system in-between forest and open-field agriculture, can – with appropriate combinations of trees, crops and livestock -- provide a range of goods, benefits and services simultaneously, providing nutritious food, renewable energy, and clean water, while conserving biodiversity.

Key finding 2: many of the SDG's imply additional requirements for land allocation to productive and protective functions
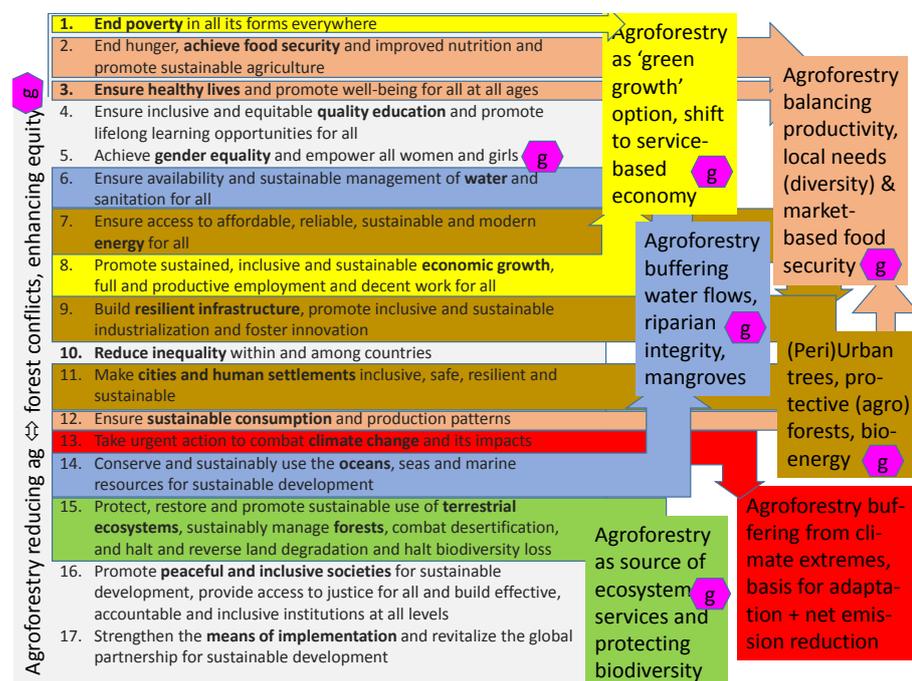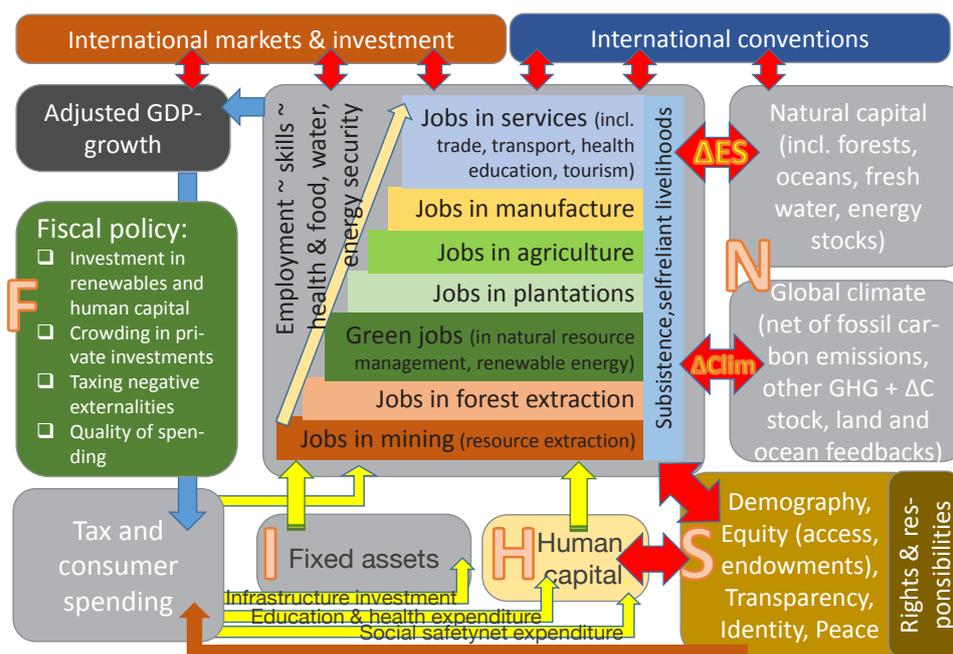

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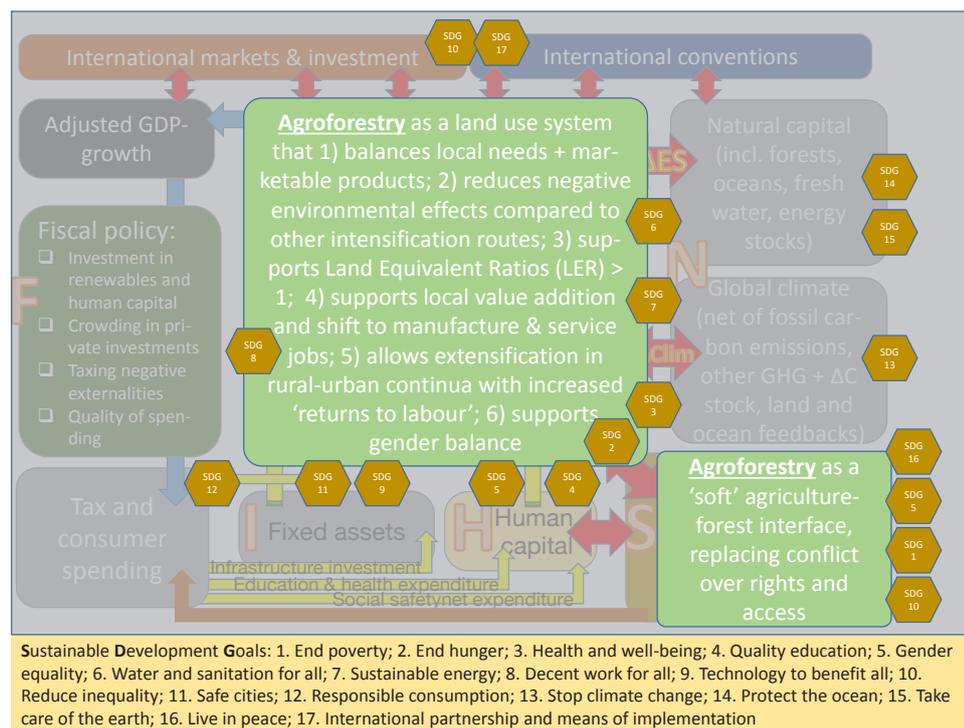
The 17 SDG's as agreed by the United Nations General Assembly interact with agroforestry in at least seven groupings, that are the vbasis of this set of 'briefs'

Key finding 3: Conflict over land allocation and rights hinders SDG attainment

Paraphrase and expand on: Agroforestry as institutional response to contested resource access, allowing gender and social equity enhancement and source of empowerment

Elaboration of the basic development model, with key relationships relevant for the SDG's

Sustainable Development Goals: 1. End poverty; 2. End hunger; 3. Health and well-being; 4. Quality education; 5. Gender equality; 6. Water and sanitation for all; 7. Sustainable energy; 8. Decent work for all; 9. Technology to benefit all; 10. Reduce inequality; 11. Safe cities; 12. Responsible consumption; 13. Stop climate change; 14. Protect the ocean; 15. Take care of the earth; 16. Live in peace; 17. International partnership and means of implementation

The two primary entry points for agroforestry in the SDG debate: as land use/employment option and as interface between agriculture and forests in terms of rights, responsibilities and conflicts.

Key finding 4: Sectoral perspectives on silo'ed SDG's are an unnecessary additional challenge

Agroforestry as a word was formed thousands of years after the practice evolved. But trees on farm invisible in policy documents and fell through the cracks between agriculture and forestry as silo's in governance, research and education (van Noordwijk, 2014). Earlier analysis of agroforestry in the Millennoium Development Goal context still holds (Garrity, 2004). As integrative mindset and culture agroforestry can help create synergy between the various SDG's in multifunctional landscapes, break out of national silo's and combine 'mitigation' and 'adaptation' as separate spheres of attention of climate change (Duguma et al 2014).

Across the 17 SDG's we see the following key roles for trees and tree-based land uses in the continuum of agriculture to natural forest:

SDG's	Poverty, economic growth 1+8	Food, health, diets 2+3+12	Water, oceans 6+14	Energy, infrastructure, cities 7+9+11	Climate change, UNFCCC 13	Biodiversity and land health, CBD and UNCCD 15	4+5+10+ 16+17
1 + 8	Efficient transition to service-based economy in rural-urban continuum	Stronger value chains for food; income-based food security	Water foot-print of traded commodities	Rural-urban continuum; renewable energy as growth engine; natural hazards contained	Low-emission development, ptotecting high-carbon stocks land cover	Biodiversity- friendly and non-degrading commodity production	Empowerment of underprivileged; fairness; transparency
2+3+12		Sustainable agriculture providing for healthy, affordable diets and adjusting demand	Blue water for irrigation; productive use of green water; wet-lands, mangroves	(Peri) urban agriculture; waste reuse and reduction; integrated bio-energy	Climate-smart agriculture	Biodiversity- friendly agriculture; utilize both land sparing and land sharing opportunities	
6 + 14			Protect clean water sources, avoid pollution	Avoiding flood damage; grey water reuse; coastal zone health	Continental rain-fall recycling; mangrove integrity	Water towers, springs, riparian zones, wetlands, mangroves	
7 + 9 + 11				Efficient use of renewable energy; no un-used waste	Climate smart cities with cool trees	Spatial planning of infrastructure & conservation	
13					Maximize high C stock land cover, CC buffering	Conserving, restoring high C-stock + high biodiv. habitat	
15						Min.20% fully protected; minimize loss elsewhere	
4 + 5 + 10 + 16 + 17	Distributional, gender-equity and non-area based goals interacting with all the above: 4+5+10+16+17 a) equitable land use planning, rules for access, guarding from environmental spillovers b) education, access to dynamic, relevant knowledge; governance transparency; scrutiny of SDG progress						

Way forward

A series of briefs that explore smaller groups of SDG's is in preparation. As many other organizations are similarly reorienting to the SDG as overall umbrella for development efforts in the coming decade, we hope the tree canopy will indeed be supported by a strong stem of negotiations in dynamic landscapes (Minang et al 2015), and be rooted in multiple knowledge systems with science as key contributor.

Key website link:

http://unsdsn.org/resources/goals-and-targets/

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Correct citation

The ASB Partnership for the Tropical Forest Margins is working to raise productivity and incomes of rural households in the humid tropics without increasing deforestation or undermining essential environmental services.

ASB is a consortium of over 90 international and national partners with an eco-regional focus on the forest–agriculture margins in the humid tropics, with benchmark sites in the western Amazon Basin of Brazil and Peru, the Congo Basin forest in Cameroon and DRC Congo, southern Philippines, northern Thailand, and the island of Sumatra in Indonesia.

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