



 5TH INTERNATIONAL CONGRESS
ON PLANTED FORESTS

Session 6: Optimizing trade-offs across ecosystem services: towards new models of management

Co-organizers



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Smallholder Planted Forests and Trees: For Climate, Restored Landscapes, and Livelihoods

Gary Dunning
Yale School of the Environment

ICFP – November 2023



Series Overview

- **Webinar Series** on Smallholder Planted Forests
- **Dates:** Tuesdays, January – April 2023
- **Series Objectives:** explore vital issues related to promote smallholder planted forests and trees to contribute to environmental services, including addressing climate change, and livelihoods
- **Hosted** by the Yale Forest Forum at The Forest School of Yale School of the Environment in collaboration with the UN FAO

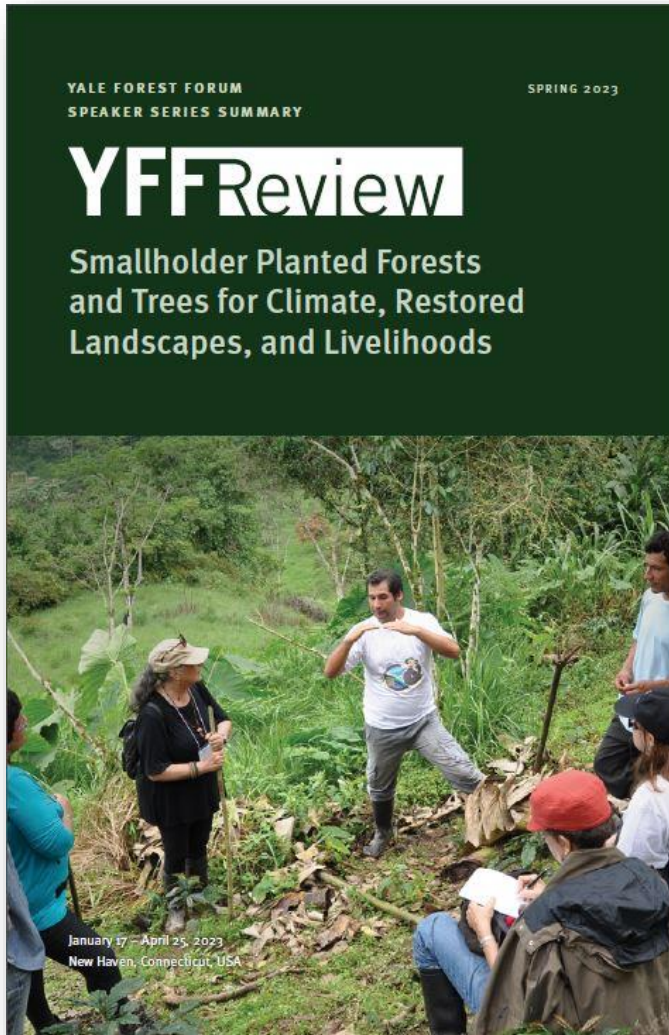
Building on...

- The Initiatives of The Forests Dialogue
 - Intensively Managed Planted Forests
 - Tree Plantations in the Landscape, in collaboration with New Generations Plantation Programme
- YFF Webinars on Forests and Climate
 - Mass timber; Bioenergy; Industrial Plantations, Climate Smart Forestry; Next = Indigenous Forestry
- UN FAO core work
 - Sustainable Value Chain, Investment and Innovation Program + years of work in planted forests



Yale *Forest Forum*





Download the Series Summary



Or go to the YFF Series Website: <https://tinyurl.com/yffsmallholder>

YFFReview Smallholder Planted Forests and Trees for Climate, Restored Landscapes, and Livelihoods | Page 4

Series Introduction and Overview

Presented: January 17, 2023



THAÍS LINHARES-JUVENAL
TEAM LEADER SUSTAINABLE FORESTRY, VALUE CHAIN INNOVATION, AND INVESTMENT STREAM;
SECRETARY OF THE INTERNATIONAL COMMISSION ON POPLARS AND OTHER FAST-GROWING TREES SUSTAINING PEOPLE AND THE ENVIRONMENT (IPC), FORESTRY DIVISION — FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Summary by: Jake Barker

Thaís Linhares-Juvenal, team leader at the Food and Agriculture Organization (FAO) of the United Nations, highlighted the importance of addressing the issue of smallholders and planted forests as a central component in the development of forestry and rural agendas of our time. In considering the importance of forests and trees for climate-restored landscapes and livelihoods, an important socioeconomic component is the cultural aspect, which is essential in smallholders' role. Linhares-Juvenal gave an overview of the series and provided some critical elements for understanding this complex subject.

PLANTED FORESTS FOR SDG GOALS

As a team leader at FAO, Linhares-Juvenal outlined the organization's UN-derived Sustainable Development Goals framework and how forests can help achieve those goals by 2030. One of the UNSDG's universal value principles is to 'leave no one behind' by eradicating poverty and promoting equality by working with small farmers and landowners worldwide. Another recent directive started by the UN is focusing on addressing land and forest degradation. Four specific goals that planted forests and smallholders contribute to are no poverty, zero hunger, climate action, and life on land. Rural poverty is responsible for 80% of extreme poverty in the world,

Download the Series Summary



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Series Facilitators

- ***Thaís Linhares-Juvenal*** - Team Leader, Sustainable Forest Value Chains, Investments and Innovation, Forestry Division, FAO
- ***Mark Ashton*** - Professor of Silviculture and Forest Ecology, Yale School of the Environment
- ***Faustine Zoveda*** - Forestry Officer (Planted Forests and Restoration), Forestry Division, FAO
- ***Gary Dunning*** - Executive Director of The Forest School at Yale; Executive Director of The Forests Dialogue; Yale Forest Forum Lead



Series Presenters with Key Points



Bob Kazungu - *Ministry of Water and Environment, Uganda*

- The creation of cooperatives and associations will support forest registration, reduce isolation in smallholder forestry, and foster communication and networking opportunities building wealth.



Charles Nyanjui - *Farm Forestry Smallholder Producers Association, Kenya*

- Growing membership and building and strengthening partnerships with governments and private sector is integral to the future success of producer organizations



Stefano Bisoffi - *Council for Agricultural Research and Economics (CREA), Italy*

- Due to breeding and cloning innovations, Poplars offer smallholders a fast growing and resilient species option that provides strong restoration and agroforestry opportunities.

Series Presenters and Key Points



Mariem Dkhil - *Crédit Agricole du Maroc*

- By working to reduce transaction costs and provide financial literacy programs, banks can increase small-holders investment capacity and financial inclusion.



Jelmer van de Mortel - *Acorn at Rabobank*

- Agroforestry systems help sequester additional carbon while supporting ecological co-benefits, and in culturally-appropriate ways making highly preferred for climate mitigation strategies.



Richard Donovan – *Smartwood, Rainforest Alliance*

- Forest certification work best when economic players at the demand end are fully vested in the certification model and willing to pay for the costs of certification and certified products.

Series Presenters and Key Points



Dianne Staal Wästerlund - *Swedish University of Agriculture Sciences*

- Forest owners rarely ask extension services for advice, so agents must proactively share information with forest owners. In managing climate risks agents need to be proactive and creative.



Stephanie Chizmar - *USDA Forest Service*

- Climate-Smart Forestry Practices can mitigate risks and stresses to forests. Practices include thinning and harvesting to limit over-crowding of trees, prescribed fire, planting diverse.



Kobsak Wanthongchai – *Kasetsart University, Thailand*

- By utilizing a landscape approach, managers can more effectively mitigate the risks of using – or not using – fire as a management tool and participatory fire prevention programs are key to success.

Series Presenters and Key Points



Meredith Martin – *North Carolina State University*

- Many restoration-oriented NGOs work with smallholders to plant trees. They often promote planting agroforestry species but this must be coupled with investments in supply chains or market development.



Carolina Toapanta – *BOMACO, Ecuador*

- Municipalities show the most significant potential to implement local change. Facilitating commodity prices, improved traceability, land tenure, tax benefits, and formalized farm plans all help.

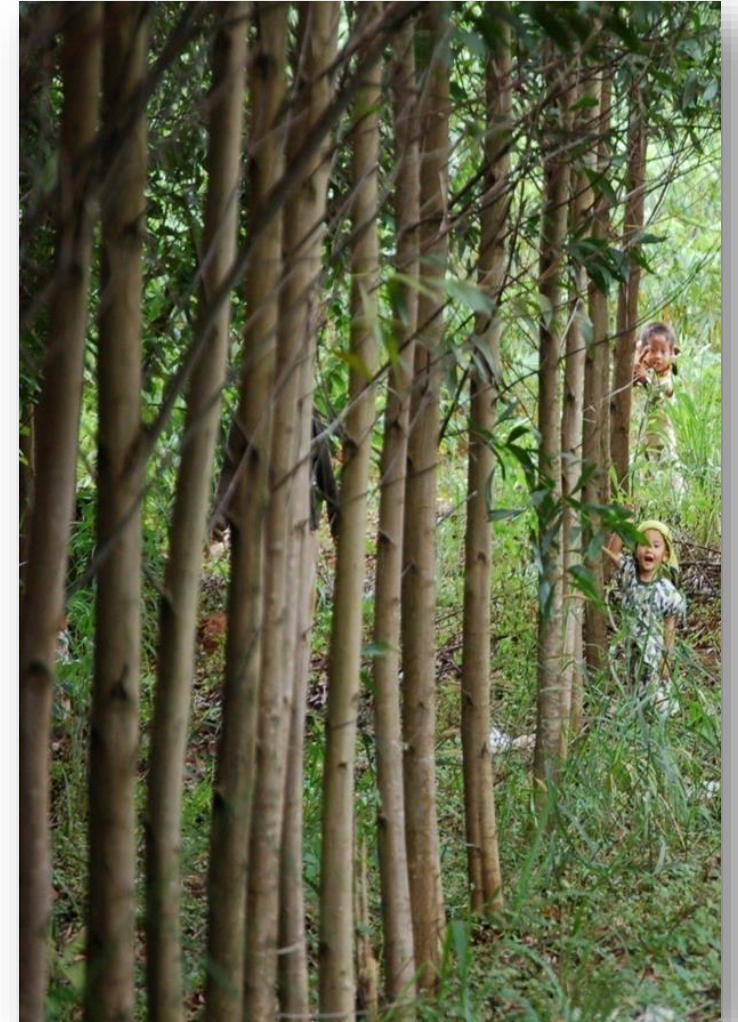


Zoraida Calle – *CIPAV, Columbia*

- Implementing intensively managed silvopastoral systems has proven successful to in converting treeless pastures into diverse, resilient, productive landscapes that are economically and socially beneficial.

Conclusions

- Smallholders are key to successful global reforestation, restoration, climate mitigation and meeting demand for forest products
- They are very independent and need support tailored to their needs and challenges
 - No matter your objectives, livelihoods are theirs
 - Gov. policy, regulation, incentives needs to be considered
 - Access to financing
 - Technical support and innovation
 - Partnership and collaboration
 - Carbon credit schemes
 - Viable certification



Thank you

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Yale Forest Forum – yff.yale.edu; yff@yale.edu



5TH INTERNATIONAL CONGRESS ON PLANTED FORESTS

BUILDING RESILIENCE OF ECOSYSTEMS AND PEOPLE'S LIVELIHOOD THROUGH AFFORESTATION: CASE OF LAKE CHILWA BASIN IN MALAWI

Michael Likoswe

Forestry Research Institute of Malawi

ICRAF - Kenya



1.0 Introduction

- Lake Chilwa Basin Climate Change Adaptation Programme (LCBCCAP) was a seven-year (2010-2017) research and development programme in Malawi funded by Norwegian government.
- Designed to protect livelihoods of 1.5m people and enhance resilience of the natural resource base upon which it depends.
- It has highest population density in Malawi and Southern Africa with 321 people per km².
- This creates a soaring demand for forest products and other ecosystem services resulting into high levels of deforestation and forest degradation.
- The programme used Ecosystem Approach (EA) to implement the activities in 10 hotspots as focal sites to optimize impact.
- Hotspots were selected in a participatory manner with full involvement of both district and community members
- The EA was chosen because the basin was designated a Ramsar site in 1997



Introduction continues

- Key issues include energy crisis, water catchment degradation, transparency and accountability, limited NTFP, wild fires
- In order to address deforestation problem, LCBCCAP adopted the Drivers-Pressures–State–Impact–Responses (DPSIR) framework
- it describes a problem as a chain of casual links where responses are easily identified and implemented at each of these steps of the casual links.
- Two themes were selected based on the DPSIR framework:
 - i. ecosystem restoration and protection
 - ii. provision of forest products for improved community livelihoods.
- Selection of these interventions was made after a wider community consultations; notably awareness campaigns, meetings, trainings, and community choices.
- Specific interventions were selected based on identified community priorities in relevant hotspots

2.0 Themes and their intervention

Theme	Intervention
Ecosystem restoration and protection	Tree planting <ul style="list-style-type: none">● Fruit tree (both indigenous and exotic)● Truncheons● Agroforestry● Fire management● Bamboo planting Natural regeneration–VFA, Farmlands-FMNR, homesteads
Forest products for improved livelihoods	Timber production (fine hardwood species testing) Energy alternative Energy efficiency technologies NTFP e.g. honey

2.1 Ecosystem restoration and protection

2.1.1 Tree planting

- Land ownership in the basin is mostly under customary law and afforestation activities are approved by leaders
- In this case afforestation was community driven
- Communities had greater understanding of most vulnerable and degraded local sites where afforestation was needed
- Community involvement acted as incentive for continuation of activities
- It was done through VNRMC with the programme technical support
- VNRMC is an elected committee to represent interests of the village or GVH
- Program provided key inputs like seed, hoes, tubes
- Extension workers provided technical advice and training.
- Communities under supervision of VNRMC and extension staff planted trees
- Species list was generated after species prioritization survey involving men, women and youth while considering species site matching.
- Both exotic and indigenous species were promoted to meet short-medium-long term benefits
- To improve communities' nutrition, fruit trees were planted
- Also trained in grafting for continuation
- Truncheons were also planted for spp like *P. angolensis*. *C. africana*

2.2 Forest products for improved livelihoods

2.2.1 Timber production

- Programme provided equipment for fire fighting, communication, fire towers maintenance and fire breaks Zomba timber plantation
- Engaged key stakeholders in tree planting such as faith, schools, civil society, politicians
- Test plantation established from indigenous species *K anthotheca*, *B. nyasica*

2.2.2 Energy efficient technologies

- *Improved cook stoves*- chitetezo mbaula were distributed and saves 50% energy more than 3 stone stove. Households were trained in stoves making
- Efficient *smoking kilns and solar fish driers*
 - Programme supported women groups in 3 fish landing sites. Reduces firewood by 30%

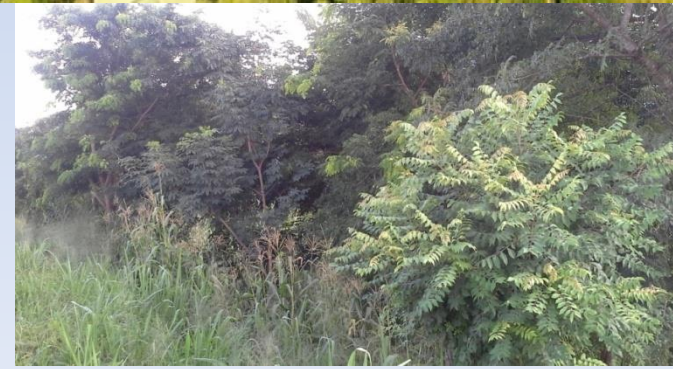
2.2.3 Non Timber Forest Products (NTFP)

- It significantly contributes to forest dependent communities
 - Honey, fruits and bamboo growing were promoted with relevant training in selected VNRMCs.



3.0 Key outputs

- i. Registered 51 VNRMCs
- ii. Planted 73 running km along rivers
- iii. Planted 30,000 fruit trees
- iv. Planted over 5,400 truncheons
- v. Over 3.8m trees of various species planted
- vi. Survival 88 %. High survival was due to:
 - a. Ownership by communities
 - b. Small portions planted
 - c. Good governance structures
 - d. Use of high quality seed
 - e. Well hardened off seedlings
- vii. Established 124 woodlots
- viii. Established 48 Village forest areas (VFAs)
- ix. 6,760 ha planted



3.0 Key outputs cont..

- xi. Managed to increase plantation forest area from 2700 to 4100ha from 2010 to 2015
- xii. Forest fire reduced by 50%
- xiii. Distributed over 15,300 stoves
- xiv. Trained over 72 households from 21 villages
- xv. Produce more stoves for sale in basin and beyond
- xvi. 25,000 bamboos planted in VFA and degraded sites
- xvii. *K anthotheca* plantation established
- xviii. Agroforestry technologies promoted



4.0 Challenges and impacts

4.1 Challenges

- Incentives
- Insufficient bamboo seed
- Unsustainable harvesting and utilization of wood – charcoal, firewood, timber
- Forest fires
- Riverine tree planting vs agricultural irrigation
- Pests infestation e.g. *Lerp psyllid*
- Truncheon availability
- Small land for tree planting
- Heavy rains/flush floods/erratic rainfall/drought affect planted trees

4.2 Impacts

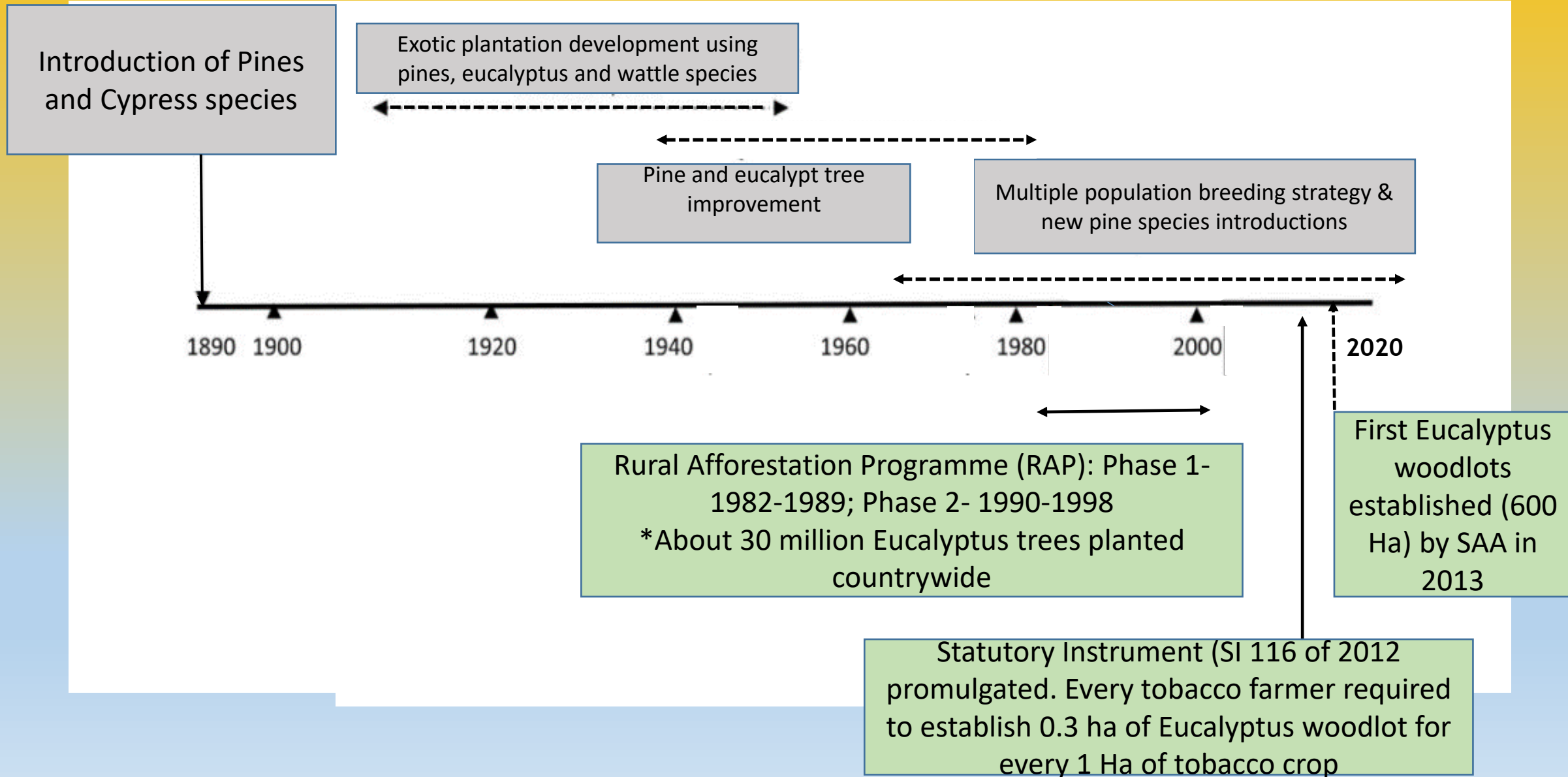
- Community cohesion towards common goal of ecosystem restoration
- Ecosystem benefits
- Transparency and accountability
- Increase in forest cover
- Conservation of existing forest stocks
 - Fish smoking kilns save 10.2m³/day = 0.102ha
- Improved food security
- Increase in tree seed demand by NGOs, gvt projects such as One Acre Fund, MWASIP, SVTP, estates and individual (over 30m trees)

Thank you for your attention

**Estate plantations and
small scale woodlots:
Two models of planted
forests with different
implications for
sustainability and
livelihoods in Zimbabwe**

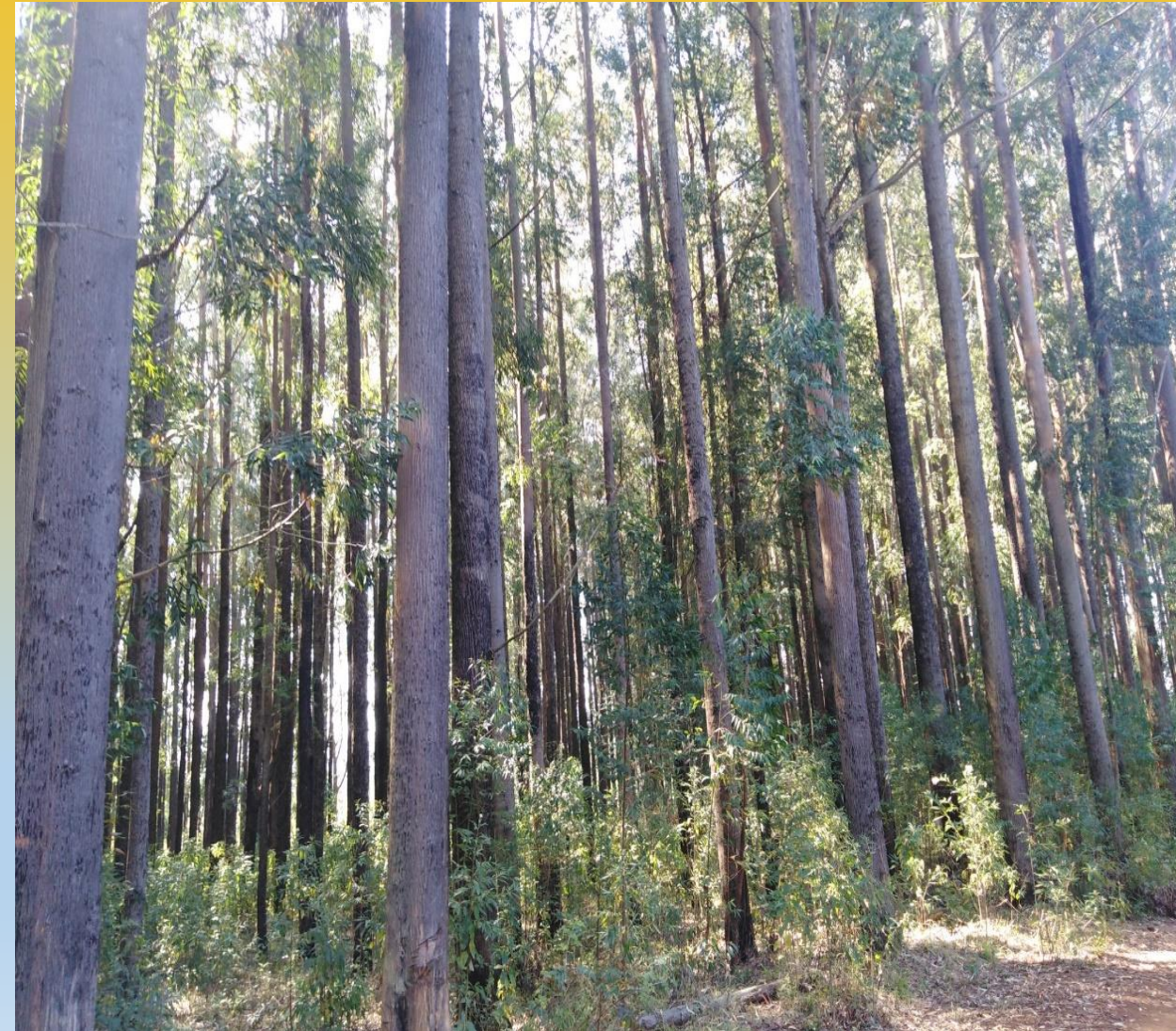


Evolution and development of the commercial plantation forest sector (above bold line) and small scale Eucalyptus woodlots (below bold line) in Zimbabwe



Commercial Plantation (Estate) Forests: 1900- 2023

1. Exotic plantation species – introduced in the 1890s
2. Early species trials resulted in large scale afforestation using *Eucalyptus grandis* , *Pinus patula* and *Pinus radiata* as from 1900 to late 1950s
3. The major exotic softwood species are *Pinus* species, and hardwoods are *Eucalyptus* species and wattle
4. The total area under plantation is about 90 000 ha
5. The sector is represented by Timber Producers Federation (TPF) as its trade association – representing about 5 commercial plantation companies (Allied Timbers; Wattle Company; Border Timbers Pvt Ltd; Mutare Board and Paper Mills ; Manica Boards and Doors) affiliated to it



Some of the early introductions in the commercial plantation sector

TABLE 1 *Early species introductions in Zimbabwe*

Species	Year introduced	Origin	Location planted
<i>Cupressus lusitanica</i>	1986	Colombia, Kenya	John Meikle Forest R Station
<i>Eucalyptus grandis</i>	1892	Australia	Mtao
<i>E. paniculata</i>	1892	Australia	Mtao
<i>E. resinifera</i>	1892	Australia	Mtao
<i>E. saligna</i>	1892	Australia	Mtao
<i>P. caribaea</i> var. <i>hondurensis</i>	1954	British Honduras	Mtao
<i>P. clausa</i>	1963	S.E United States	Mtao
<i>P. densa</i>	1961	Florida	Erin, Tarka, Chisengu
<i>P. echinata</i>	1961	Louisiana, Texas	Lionhills
<i>P. elliotii</i> var. <i>elliotii</i>	1938	Gulf States via South Africa	Imbeza
<i>P. glabra</i>	1963	Georgia,	Lionhills, Rupere
<i>P. kesiya</i>	1935	Baguio, Philippines	Stapleford, Mtao, Grasslands
<i>P. mitis</i>	1963	Arkansas, Tennessee	Rupere
<i>P. monteumae</i>	1966	South Africa	Stapleford
<i>P. oocarpa</i>	1962	Mexico	Stapleford,
<i>P. palustris</i>	1963	S.E United States	Mtao
<i>P. patula</i>	1920	Mexico	Rupere
<i>P. patula</i>	1930	South Africa	Rupere
<i>P. psuedostrobus</i>	1948	Michigan via South Africa	Stapleford
<i>P. pungens</i>	1963	Avery County, USA	Lionhills
<i>P. ...</i>	1988	New Zealand	John Meikle Forest R Station

Source: Tembani et al. 2014

Commercial plantations: species distribution and ownership arrangements

- About 30 497ha, equivalent to 34% of the total plantation area, is under **state ownership**
- The remainder 66% (59 319ha) is owned by various **private entities**.
- Conifers (mostly pines) account for the highest portion, about **48000** ha equivalent to 53% of the total planted area.
- Eucalyptus species account for 40% of planted area and Wattle plantations account for the remainder of 7% .



Small Scale woodlots: 1982- 2023

- **Rural Afforestation Programme (RAP)** Phase 1 (1982-1989), funded by the **World bank**, established the first Eucalyptus woodlots in the rural communities to provide fuelwood for domestic use.
- The programme was extended to second phase (1990 -1998) to further support establishment of eucalyptus woodlots and exotic fruit tree orchards, including the **Tree Growing and Tree Care Programme** in schools and communities to support livelihoods of rural people.

Province	Seedlings produced (million)	Trees planted (million)
Masvingo	7.97	5.04
Mash East	8.56	3.35
Mash Central	15.17	7.72
Mash West	5.88	3.07
Manicaland	5.25	2.96
Midlands	3.65	1.49
Mat North	0.49	0.42
Mat South	0.34	0.13
Total	47.31	24.18

Seedlings and Trees planted under RAP2
Source: Forestry Commission 2002

Small scale woodlots: Tobacco Wood Energy Programme (TWEP) - 2012 -2023

- **Statutory Instrument (SI) 116** of 2012 made it mandatory for every tobacco farmer to set aside land for planting woodlots of fast growing trees (Eucalyptus)
- To support woodlot establishment by farmers, **Afforestation Levy** was initiated through deduction of 1.5% of tobacco sales
- Through the **Tobacco Wood Energy Programme (TWEP)** , and private sector initiatives , over 20,000 ha of small scale woodlots have so far been established



A banner for the TIMB Afforestation Project. The banner is teal and white. It features the TIMB logo at the top, which consists of a stylized tree icon above the word "TIMB". Below the logo is the tagline "For Livelihoods. For Sustainability." followed by "AFFORESTATION PROJECT" in large, bold, white letters. Below that, it says "In Partnership With Smallholder Farmers". At the bottom, there are social media handles: "#Afforestation #Sustainability" and "timb.co.zw" with icons for Facebook, Twitter, and Instagram.

TIMB
For Livelihoods. For Sustainability.
**AFFORESTATION
PROJECT**
In Partnership With
Smallholder Farmers
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Sustainability and livelihoods: Commercial plantations vs Small scale woodlots

Attribute	Commercial plantations	Small scale woodlots
Area (Ha)	90 000 (TPF, 2022)	6645 (Tobacco Leaf Exporters Association, 2023)
Operational model	Large scale plantations owned by private companies and the State	Long term partnership contracts with farmers (Landowners)
Funding	Private investment (both domestic and foreign)	Government (Fiscus) funding through tobacco levy (1.5 % of tobacco sales); private investment
Employment (Direct and Indirect)	4000 (TPF, 2022)	≈35000 farmers (Forestry Commission, 2022)
GDP contribution	≈3%	N/A
Primary product(s)	Sawlogs, poles, pulpwood	Fuelwood for agriculture and domestic consumption
Annual planting targets (Ha)	10 000 (TPF, 2022)	3000 (SAA, 2023)
Annual production volumes	≈1 million cubes	10 496 cubes (Tobacco Leaf Exporters Association, 2023)

Challenges

- Low investment in the commercial plantation sector from 2000 onwards, continues to negatively affect growth of the sector.
- Invasion of plantations by illegal settlers, illegal mining activities.
- Forest fires
- Long rotations (≈ 15 years) for small scale woodlots (for tobacco fuelwood) as a result of low volume gains in most dry parts of the country
- Late disbursement of Afforestation funds by treasury to support tree planting and establishment of woodlots

Conclusion and recommendations

- Planted forests have a significant potential to improve the livelihoods of rural communities and contribute to the sustainable national development
- However, they face several threats such as illegal invasion, fire, pests and diseases, and policy and institutional constraints.
- There is need to explore other forest financing models e.g **Multilateral (GCF; GEF)** and **philanthropy (e.g Terra fund)** for small scale woodlots to enhance sustainability ; and **loan schemes** for the commercial sector
- There is need for collective effort to address a number of challenges such as **forest fires**, **forest invasion**, **illegal logging** and **security of tenure** which impact on viability and sustainability of commercial plantations and small scale woodlots

Thank you

Presented by:

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International Congress on Planted
Forests (ICPF)

7-10 November, 2023

Nairobi , Kenya

- Forest Research Centre
- Forestry Commission
- @ZimForest 
- www.forestry.co.zw

Revisiting ecosystem services from planted forests

Himlal Baral, Arlene Lopez, Vincent Gitz

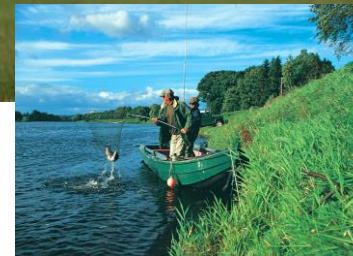
ICPF 7-10 Nov 2023

Nairobi, Kenya

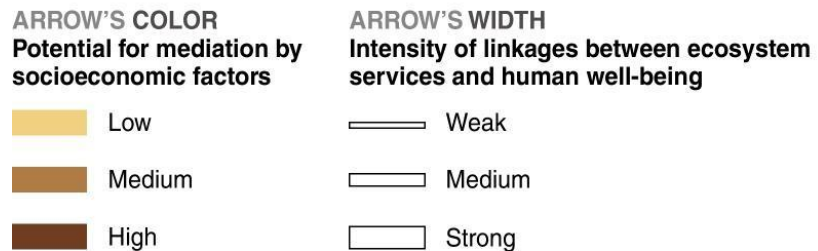
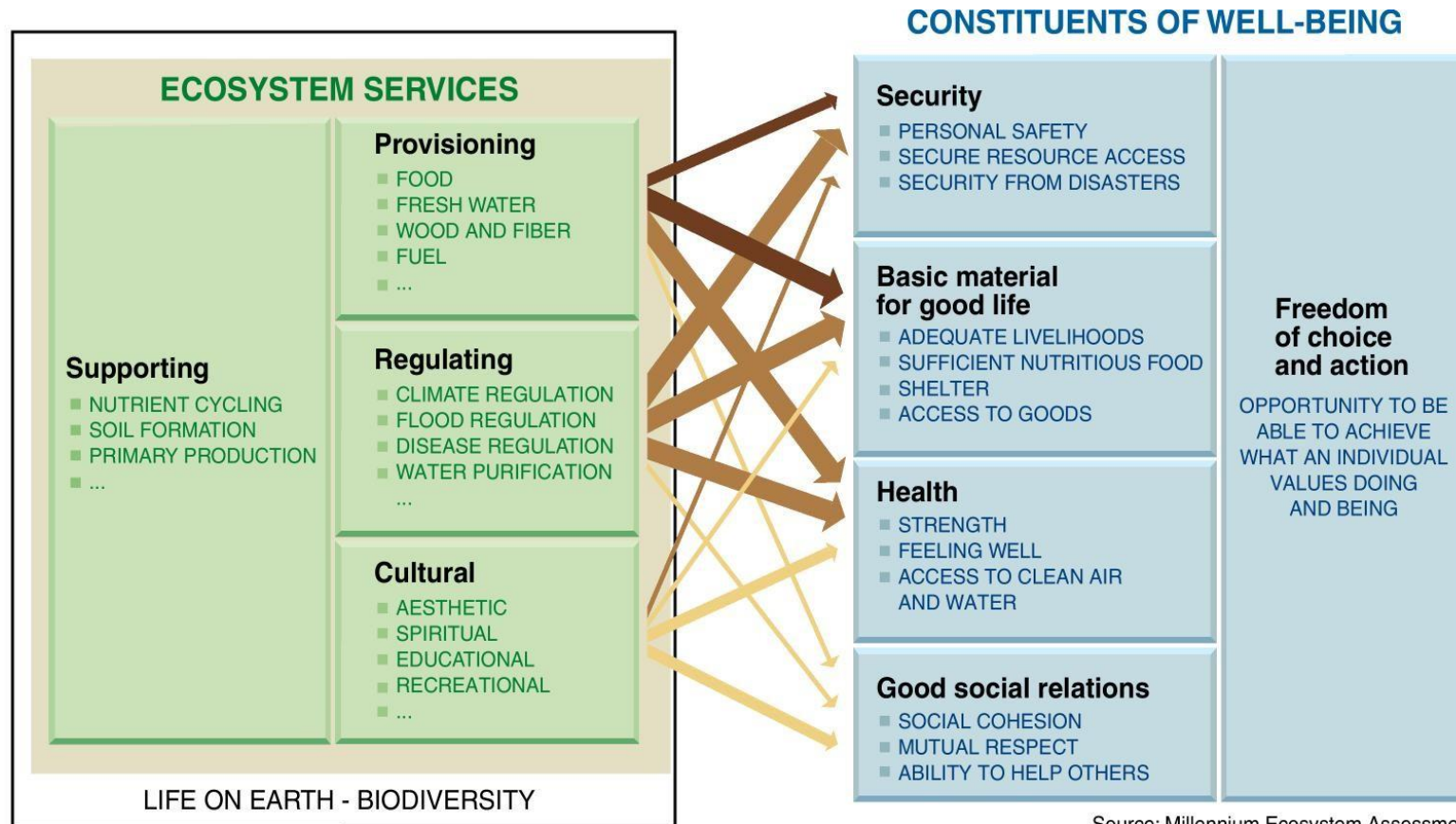


Ecosystem Services – definition and examples

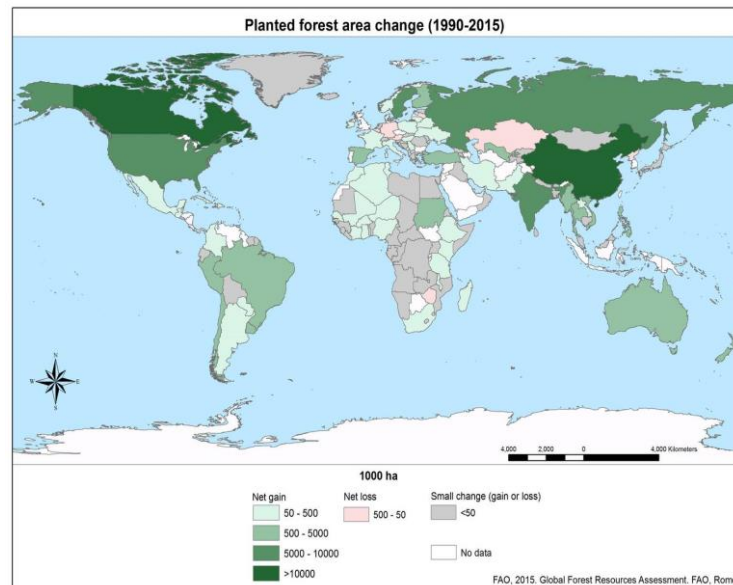
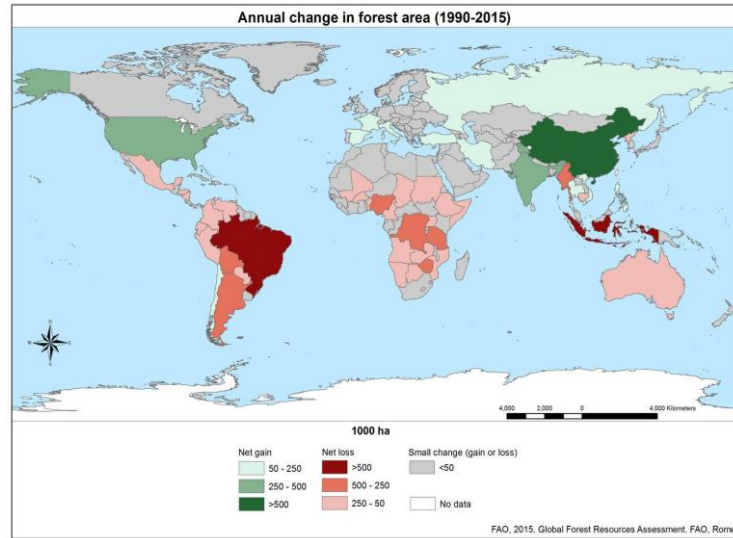
"Ecosystem Services are the benefits people obtain from ecosystems" – include provisioning, regulating, cultural and supporting services (MEA,2005).



The linkages between ES and human well-being



Changing role of planted forests



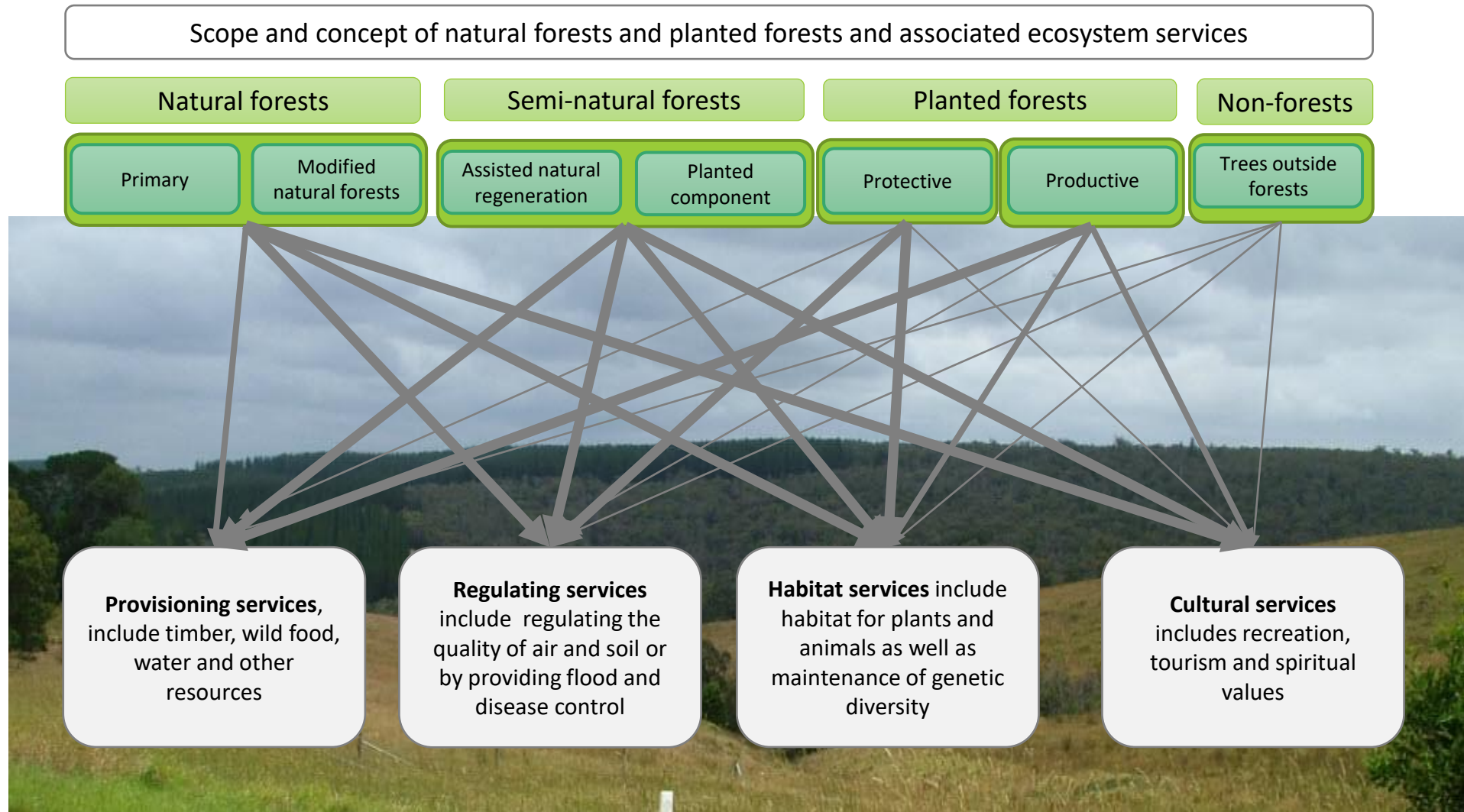
- Global Forest Resource Assessment 2015 (1990 – 2015),
 - Total area of native forests (NF) are decreasing (tropics and sub-tropics)
 - Area of planted forest (PF) are increasing rapidly
- Trend likely to continue due to – increasing demand for EGS from forests in line with population growth, increasing standard of living...
- Role of PF is increasing to support restoration – Bonn Challenge, NYDF, objectives of Article 5 of the Paris Climate Agreement ...
- Important to understand full function and services of PF

Typology of planted forests

- **(i) purpose**, such as industrial use, environmental, agroforestry, farm forestry;
- **(ii) species choice**, such as monoculture or mixed species, and native or exotic species;
- **(iii) rotation length** – short, medium, long
- **(iv) end use** – e.g. timber, non-timber products, pulp, bioenergy;
- **(v) intensity of management** – intensive or extensively managed;
- **(vi) scale of operation** – large and contiguous or small and fragmented;

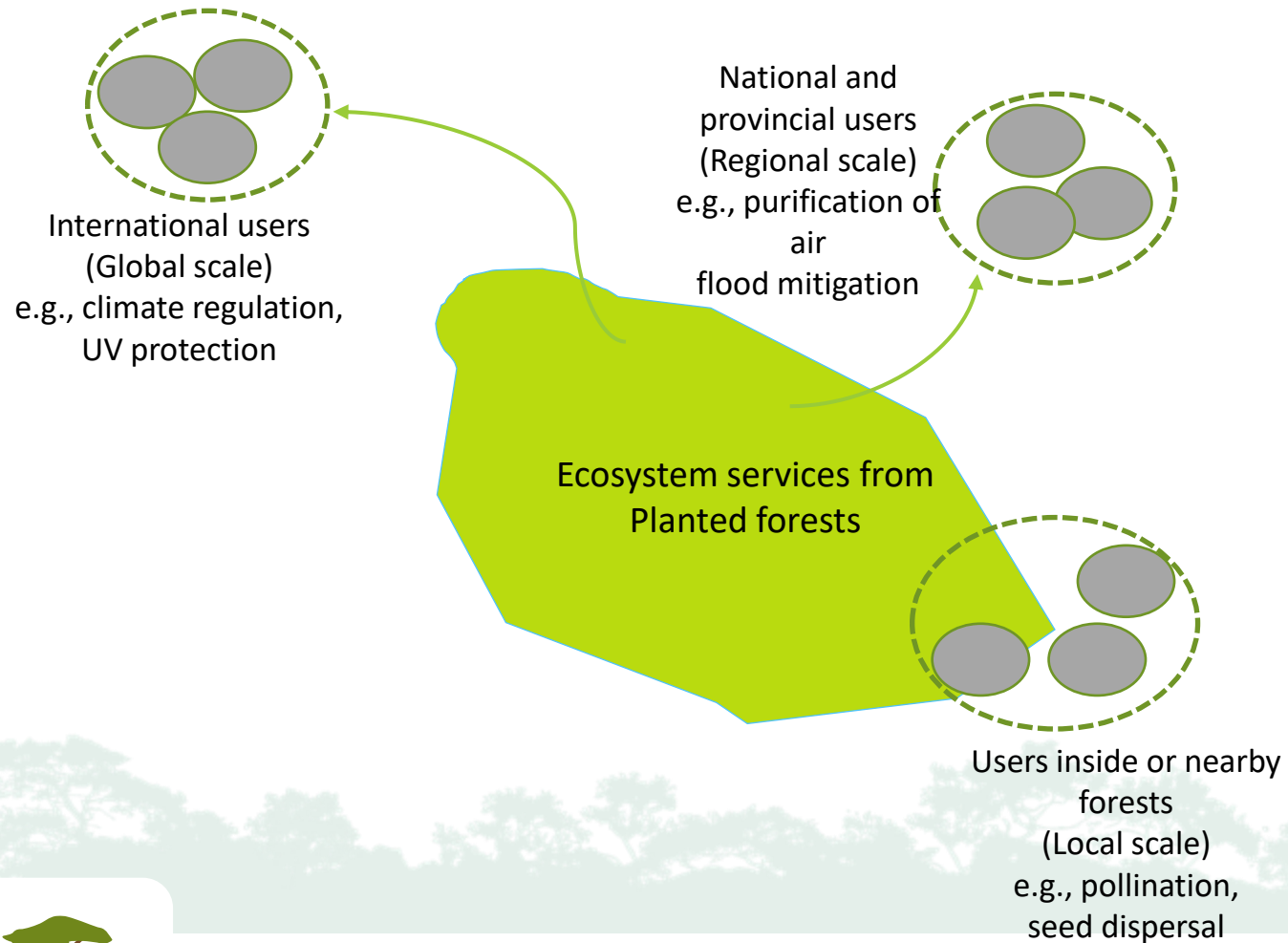


Ecosystem services from various types of forests



Baral et al., 2016 *Eco Serv*

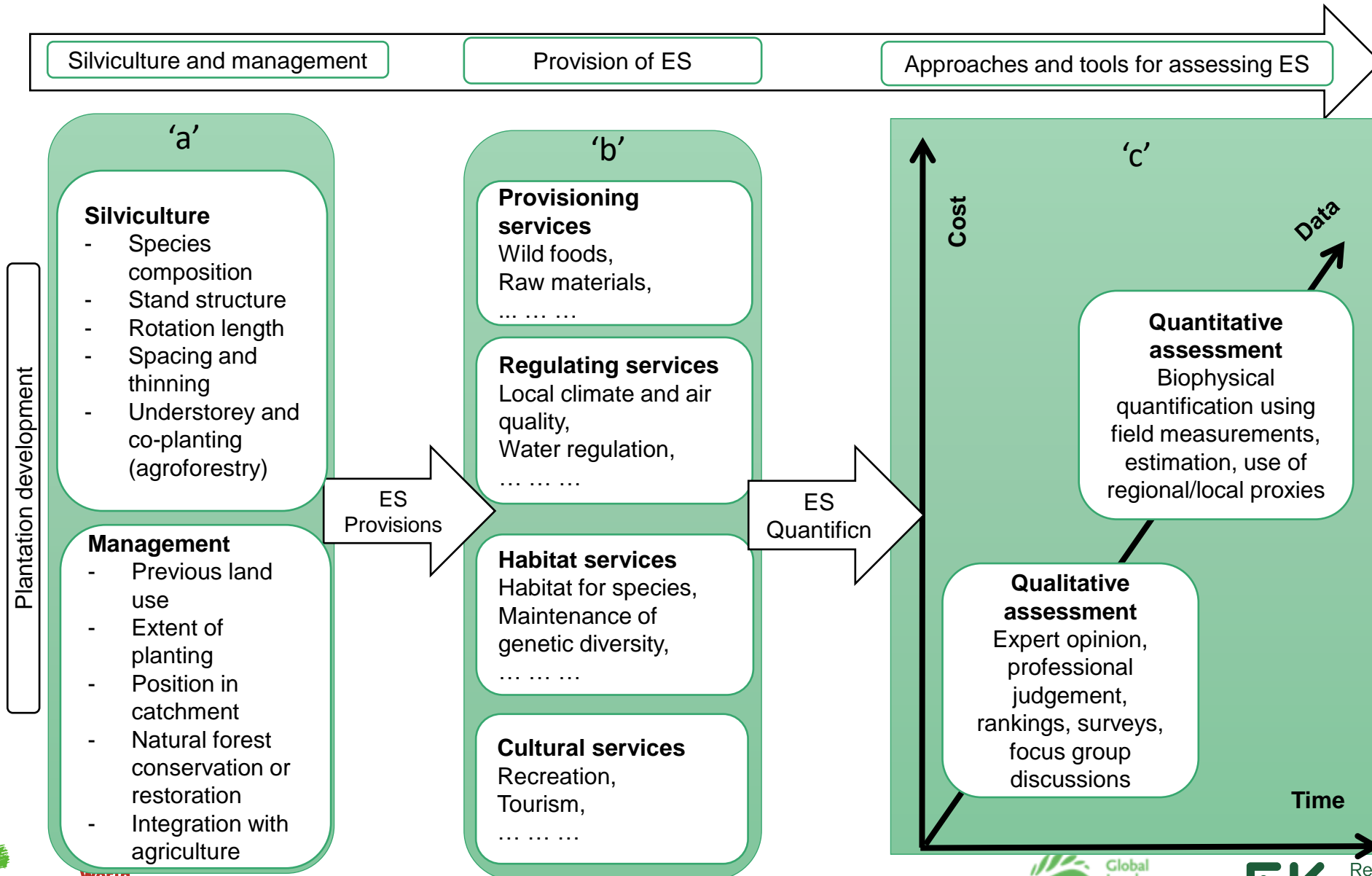
User of ES from planted forests








Baral et al., 2016 Eco Serv (in press)

Ecosystem services	Provision of ES from planted forests in relation to			
	Native forests	Native grasslands	Managed pasture	Agriculture
Provisioning Services				
Food Production	Lower	Lower	Similar	Lower
Timber production	Higher	Higher	Higher	Higher
Medicines	Lower	Lower	Higher	Higher
Freshwater	Lower	Higher	Lower	Higher
Regulating services				
Fresh air regulation	Lower	Higher	Higher	Higher
Carbon sequestration and storage	Higher	Higher	Higher	Higher
Groundwater recharge	Lower	Lower	Lower	Higher
Natural hazard regulation	Lower	Higher	Higher	Higher
Water purification	Lower	Lower	Higher	Higher
Disease regulation	Lower	?	Higher	Higher
Pollination	Lower	Lower	Lower	Higher
Erosion prevention and soil protection	Similar	Lower	Similar	Higher
Habitat or supporting services				
Habitat for species	Lower	Lower	Higher	Higher
Maintenance of genetic diversity	Lower	Lower	?	Higher
Cultural services				
Spiritual and religious values	Lower	Lower	?	?
Aesthetic values	Lower	Lower	?	?
Recreation and ecotourism	Lower	?	Higher	Higher

Framework for assessing ES from planted forests







Approaches and tools

Process	Tools for inputs and outputs	Input level, type and scale	
General problem definition	← past to present → 	Key informants	Local input
Local problem definition and contextualization	← past to present → 	Focus group discussions + Participatory mapping + ESS calendars	
Data collection, Local perceptions of current status and change	← past to present → 	Household surveys	
Data collection, Recorded change, data comparison, verification	← past to present → 	Statistics, satellite data (crops, landuse, water, population, etc.)	Scientific input
Data generalization, projection	← past and present to future → 	Impact analysis, Climate projections and impact projections	



Article

Spatial Assessment of Ecosystem Services from Planted Forests in Central Vietnam

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Article

Participatory Assessment of Ecosystem Services from Community-Managed Planted Forests in Bhutan

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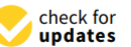
³ Center for International Forestry Research (CIFOR), Jalan CIFOR, Situ Gede, Bogor 16115, Indonesia; h.baral@cgiar.org

⁴ The School for Field Studies (SFS), Post Box 1308 Paro, Bhutan; sphuntsho@fieldstudies.org

⁵ School of Ecosystem and Forest Sciences, University of Melbourne, Parkville, VIC 3010, Australia

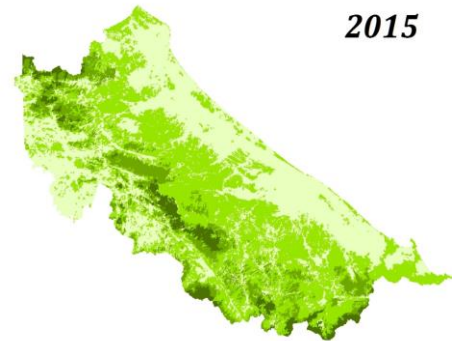
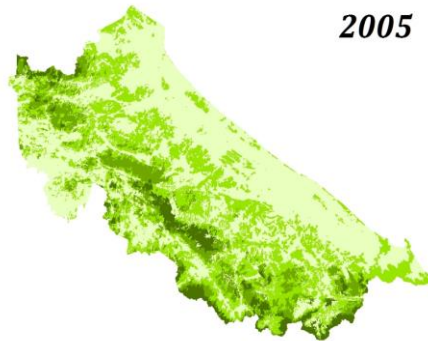
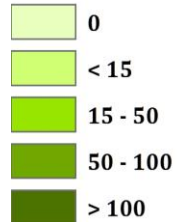
* Correspondence: y.artati@cgiar.org

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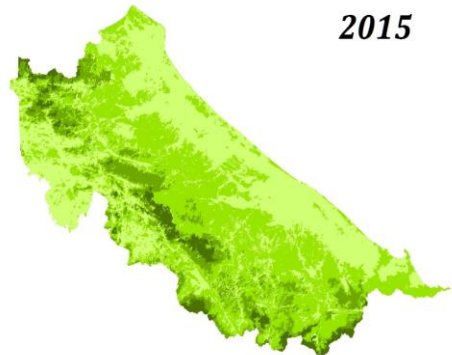
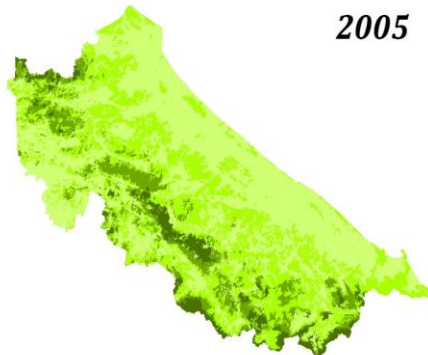


Results – central, Vietnam

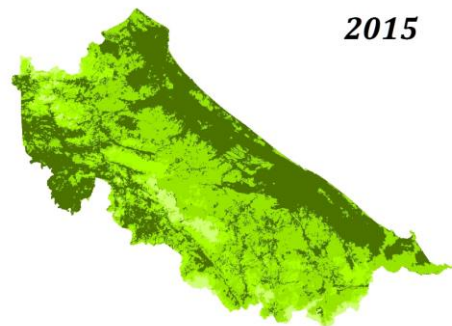
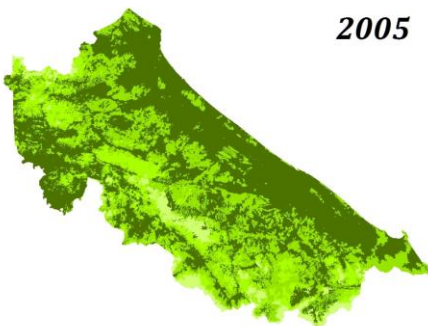
Carbon



Biodiversity



Water Yield



- Results showed that the increasing plantations on bare ground or grassland, increased the carbon sequestration in the study areas
- Conversion of bare ground or grassland to plantations also increase habitat quality that may support several birds and insect species,
- Higher leaf area index resulted higher water consumption and lesser water yield – therefore conversion of bare ground or grassland for plantation reduces the water yield.
- However, it improves the water regulation services and associated water quality.

Technical Paper

Ecosystem Services From Bamboo Forests: Key Findings, Lessons Learnt And Call For Actions From Global Synthesis

Kiran Paudyal, Li Yanxia, Trinh Thang Long, Shankar Adhikari, Soni Lama,
Kishor Prasad Bhatta

2022



Figure 3: Major ecosystem services from bamboo forests

Results – community plantations, Bhutan

Table 3. Ecosystem services from community plantations identified by CFMGs in Punakha and Trashigang dzongkhags.

Ecosystem Services	Community Forest					
	Kuenphen	Mangizingkha	Phentog	Thuenkey	Yargey	Khaling
Provisioning services						
Flag pole	✓	✓				
Leaf litter	✓				✓	✓
Fodder			✓			
Incense			✓		✓✓	✓
NWFP edibles			✓	✓		
Regulating services						
Water/soil regulation	✓	✓		✓	✓	✓
Water resources						✓
Cultural and amenity						
Aesthetic, sport	✓				✓✓	✓
Education		✓				✓
Supporting services						
Wildlife habitat	✓	✓		✓	✓	
Increased plant diversity	✓	✓	✓		✓	

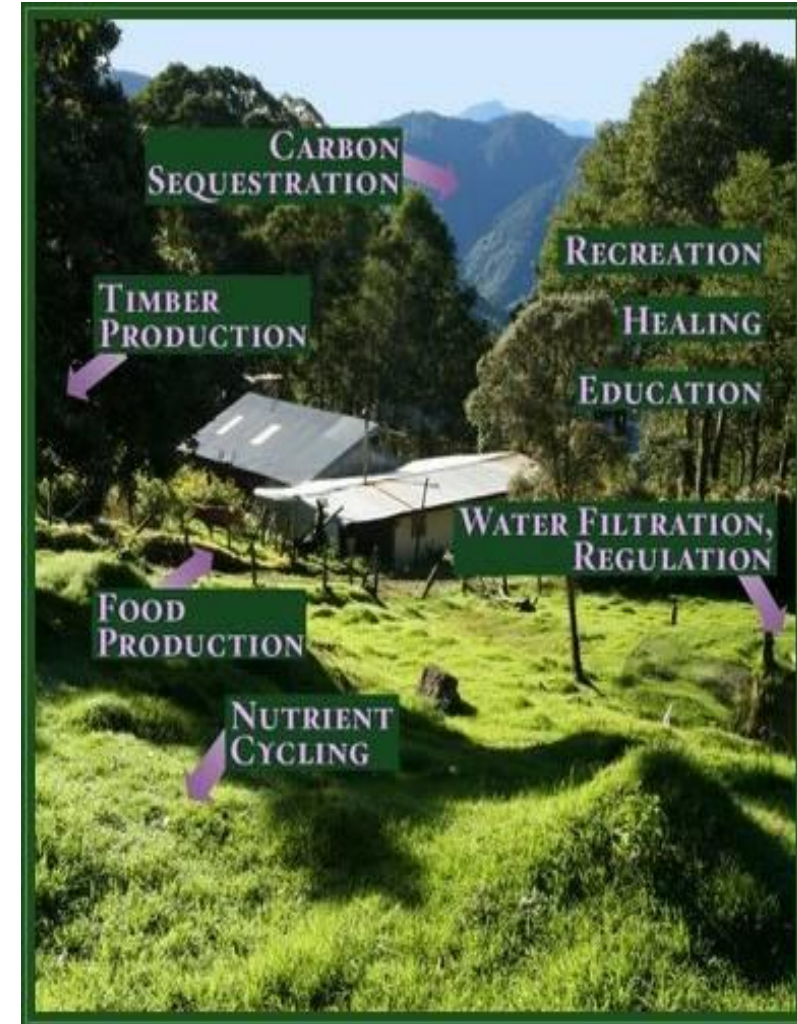
Policies to support ES from planted forests

- Regulation of land uses to protect water quality, erosion, activities on steep slopes or erodable soils and conservation of biodiversity
- Direct investment in improved land uses through catchment protection/management authorities or soil conservation services
- Performance based incentives and payments to discover private actors WTP and for efficient allocation of public resources
- More effective communication of ES concept to policy makers
- A new paradigm – linking ES outcomes in international development investment



Key messages

- Planted forests can provide wide range of ecosystem services
- Quantity and quality of ecosystem services may differ – depending on type of planted forests, position at landscape and management options
- Wide range of approaches and tools available to quantify and value ES from planted forests
- Policy instruments play important role to encourage landowner to enhance ES from planted forests





Thank you

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