Expanding the

Forestry Sector Contribution to the Transition to a Sustainable Society

POSITION PAPER –
September 2023

International Sustainable Forestry Coalition

Supporting the role of sustainable forest management in the climate, nature, social justice and circular bioeconomy transitions

THE MEMBERS OF THE

International Sustainable Forestry Coalition collectively steward

ALMOST

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of production and conservation forests

IN

27 countries

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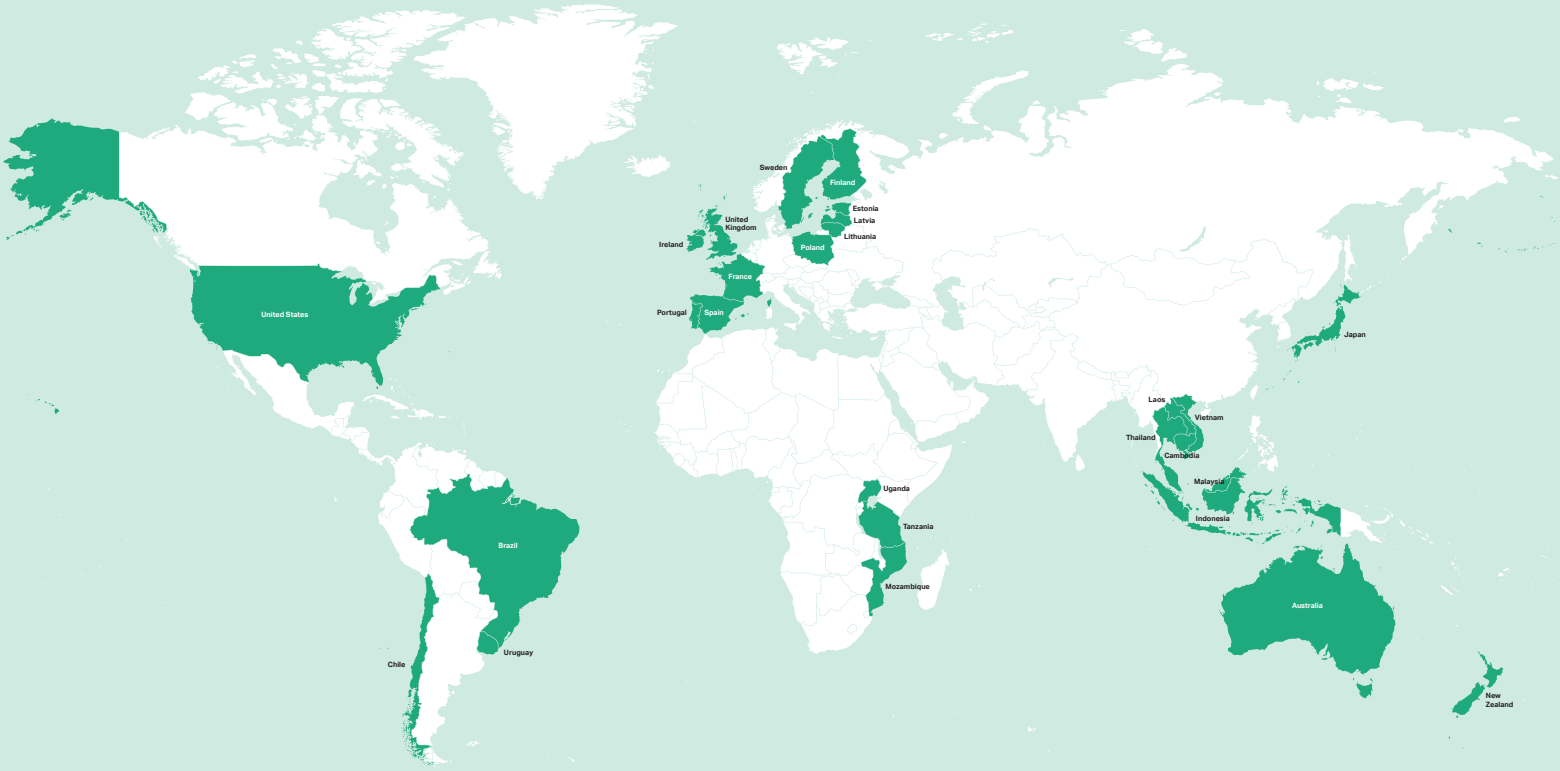

International Sustainable Forestry Coalition

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Why this Position Paper?

This Position Paper signals that the global forestry sector is interested to play a greater role in the policy processes related to our transition to a sustainable society.

It is our intention to contribute positively to these debates by bringing the global expertise, scientific knowledge, and practical perspectives of our sector to support policy outcomes that benefit both people and the planet.

Forestry, along with agriculture and other land uses, needs to contribute more to the thinking about solutions to the global challenges of climate change, deforestation and biodiversity loss, and the need for a transition to a circular bioeconomy.

The key challenge, as so many have identified, is how we move at the speed and scale that can help address these challenges in the near term, rather than decades into the future?

How can the forestry sector contribute to keeping the 1.5 degree objective alive, increase global timber and fibre supplies at the rate needed to pivot to the bioeconomy, while halting deforestation, reversing biodiversity loss and enhancing the lives and livelihoods of small holders, Indigenous Peoples and rural communities?

We submit that the forestry sector has considerable expertise to contribute to these challenges from decades of experience.

OUR POSITION PAPER IS NOT THE LAST WORD. IT IS JUST OUR FIRST ATTEMPT TO LAY OUT A VISION AND PERSPECTIVE ON HOW THE FORESTRY SECTOR CAN INCREASE ITS CONTRIBUTION TO THE SUSTAINABILITY TRANSITION.

Chair Introduction

The 21st century represents a major point in the evolution of human society. Not only will the global population likely peak at around 10 billion people[1], but if we aspire to a world with economic and social justice, the Gross World Product may need to reach $300 trillion per annum in real dollar terms. That is equivalent to putting the pressure of three of the current global economies on the finite natural resources of the world. Meeting critical challenges of mitigating and adapting to climate change, conserving and restoring nature, provisioning freshwater resources and reducing pollution and waste will require dramatic transitions in the economy and in society[2].

For these transitions to be successful, we will need more equal distribution of benefits; respect for cultural and political differences; and access to the capital, technology and know-how to implement new, more efficient, clean and sustainable forms of economic growth.

The transitions that we collectively face relate to several of our societal foundations: our systems of energy production, our built environment, the materials we use in society, our transportation systems and our land use habits and patterns. These transitions will require effective international and domestic policies; access to capital and technology; and enhanced cooperation and collaboration across the private sector, stakeholder groups and the government.

> The forestry sector has much to contribute to these transitions to a sustainable society.

Forests are important natural assets providing both essential ecological services and natural materials for society. Forestry has the potential to be part of the transitions to sustainable land use; to sustainable conservation and restoration of nature; to sustainable renewable materials in a circular bioeconomy; to a sustainable built environment; and to sustainable energy systems. While substantial innovation is occurring, the innumerable positive roles of an expanded, more wholistic forestry sector are not being fully recognised in public policy and capital allocation. The full potential of the forest sectors' role in sustainability is not yet being realised.

1 United Nations Department of Economic and Social Affairs. 2022. World Population Prospects 2022. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf

2 See for example Nicholas Stern and Mattia Romani. 2023. The global growth story of the 21st Century: driven by investment and innovation in green technologies and artificial intelligence. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/01/The-global-growth-story-of-the-21st-century-driven-by-investment-in-green-technologies-and-AI.pdf

In late March 2023, a group of forestry sector leaders from around the world met in London. In that meeting the leaders recognised the need for greater collaboration around a forward-looking vision for the forestry sector. Such a vision could guide a collective voice for the forestry sector in international policy processes related to the sustainability transition. In July 2023 after considerable discussion, a founding group decided to establish the International Sustainable Forestry Coalition (ISFC).

This paper sets out the ISFC's collective vision for the contribution of the international forestry sector to addressing the major challenges set out above.

Here we also address questions such as:

- **How can we perpetuate sustainable landscapes that contribute to climate mitigation, biodiversity conservation and rural economic benefits?**
- **How can we expand the production of sustainable, renewable, low impact materials in the transition to a circular economy?**
- **How can we attract more capital to new investment strategies and approaches?**

We see this paper as an organic document that will evolve over time, and we welcome feedback on the ideas presented here. We also invite others to join the ISFC and these combined ambitions. The larger the Coalition, the more we can achieve.

Dr. David Brand
Convening Chair
International Sustainable Forestry Coalition

Executive Summary

Forest management has been part of human society for millennia. The forestry sector provides an extensive range of resources including building materials, fibre-based materials, appearance grade products, biomass products and energy. Because it operates on an extensive land base, the forestry sector has an important role to play in nature conservation, the global carbon cycle and freshwater catchment management. Forestry is also largely a rural endeavour that can provide important sources of economic and social benefits.

The forestry sector has unique opportunities to contribute to society. It offers potential solutions for major international challenges related to climate change mitigation and adaptation, the conservation of nature, reduction in pollution and waste, and rising economic inequality. Key themes are emerging around the need for a transition to a circular bioeconomy that is based on both renewable, recyclable, and naturally decomposing materials and a rural economy that involves conservation and production systems. These opportunities are leading to a reconceptualisation of forestry as a natural capital asset class that can contribute climate and conservation solutions.

As we move toward a sustainable future, net zero emissions is a popular, ambitious and necessary goal that will require multiple endeavours and substantial investment. Reforestation and ecosystem restoration can remove carbon from the atmosphere. Sustainable land management and conservation of existing forests can reduce greenhouse gas emissions. Substituting wood and wood fibre-based materials for higher embodied energy or fossil energy-based materials reduces net emissions and can reduce waste and pollution. As investors seek opportunities to contribute to the global transition to net zero emissions, the forestry sector seeks the best avenues to channel capital to these activities.

Forest management contains particular challenges related to the impacts of climate change. Increased prevalence of wildfires, windstorms, intense rainfall events and droughts creates a need for more active forest management to create resilience to climate change. These activities will also require substantial new investment.

Nature conservation and restoration also has a role to play in our sustainable future. Not only do we need to ensure a comprehensive network of protected areas, but we also need to embed more conservation management into landscapes used for agriculture and forestry production. The added pressure of climate change means that we need landscapes that facilitate resilience to severe weather and allow for the migration of species over time.

The nature of the forestry sector is evolving, and it is widely recognised that if we want a transition to a circular bioeconomy, we will need more forestry feedstock to be produced.

We will need to accomplish this primarily by carefully intensifying plantations and semi-natural forests, not by extending the amount of timber harvested from virgin forests. There has been steady progress in increasing the amount of timber that can be grown on each hectare annually, ranging from 1-3% per annum. Increasing productivity of timber plantations and managed semi-natural forests allows for part of the increased demand for wood and wood fibre to come from an existing forest resource, but expansion will also be necessary and can be achieved on existing marginal agriculture lands and degraded lands. Around the world there are substantial areas of undercapitalised land that can become more productive and generate greater rural economic benefits from forestry plantation operations.

These transitions towards resilience, towards landscapes that balance and perpetuate conservation and production functions and towards intensive production of woody biomass feedstocks for a circular bioeconomy will require substantial capital investment and substantial capital re-allocation. Moving to a more natural capital-based economy can be facilitated by the standardisation of carbon and wider natural capital accounting, by the implementation of market-based mechanisms that reward the conservation and enhancement of ecosystem services and by the introduction of new innovations in finance and investment such as blended finance and public payments for privately produced public ecosystem benefits.

New technology is also arising that will allow more sophisticated land management and more granular allocation of land use across food, timber, conservation and renewable energy systems. All of these transitions to sustainable land use and sustainable materials will need partnerships with local communities including Indigenous communities, small-holders and farming communities.

The International Sustainable Forestry Coalition seeks to put forward a comprehensive picture of a future where the forestry sector contributes more to society and to our planet. We have consciously tried to tie a set of themes together into a coherent, workable transition to sustainable land use and a circular bioeconomy. This may provide a template for investment in the forestry sector alongside similar approaches in energy, transportation and the built environment.

Image: A nursery in Africa

1.

An Introduction to the Global Forestry Sector – Committed to the Transition to a Sustainable Future

The use of forests has been part of our culture since ancient times, first as a source of food (via hunting and gathering) and subsistence energy and then as a source for building materials. Throughout history, people around the world have managed forests to provide and conserve myriad benefits related to food, culture, materials and ecological services. Examples range from 'fire stick farming' by Australian First Nations over tens of thousands of years[3] to early commercial forestry plantations of chestnut and walnut in the Roman empire[4] or Sugi and Hinoki in Japan[5] to the central role of western red cedar in the historical culture of the First Nations on the West Coast of Canada[6] to European conceptualisation of sustainable harvest rates in the 18th century[7]. Most of the world's forests have been influenced by human intervention.

The global forestry sector has historically been an important source of materials. From firewood to building construction materials, furniture to shipbuilding and pulp and paper to packaging, wood has been ubiquitous in society.

3 Gammage, Bill. 2011. The Biggest Estate on Earth. Allan & Unwin. Sydney.

4 Pestalozzi, Gottardo. 2022. Chestnut culture—the pollen tells a Roman story. https://www.wsl.ch/en/news/2022/11/chestnut-culture-the-pollen-tells-a-roman-story.html

5 Totman, Conrad. 1986. Plantation Forestry in Early Modern Japan: Economic Aspects of its Emergence. Agricultural History 60:3 pp 23-51.

6 https://indigenousfoundations.arts.ubc.ca/cedar/

7 See for example, Grober, Ulrich. 2007. Deep roots: A conceptual history of 'sustainable development'. https://bibliothek.wzb.eu/pdf/2007/p07-002.pdf

Today, the forestry sector is evolving into a sophisticated source of these traditional materials as well as new innovations in biochemicals, fabrics, engineered construction materials and even pharmaceuticals and foodstuffs. Also, forest management is increasingly setting objectives around nature conservation, freshwater regulation and climate change mitigation and adaptation. Management models are becoming more complex; they are more directly engaged with Indigenous and rural communities while also integrated with global supply chains and manufacturing. Wood processing is rapidly evolving to concepts like bio-processing facilities and processing ecosystems where diverse products are created from flows of wood feedstock. As we conceptualise a sustainable future, it is clear that the forestry sector will have an increasing role to play.

It is also clear that today, with a population of almost 8 billion people and a Gross World Product nearing $100 trillion[8], forests and all natural ecosystems are under pressure. Deforestation to provide land for agriculture, physical impacts from climate change, disputes over land use and land rights, loss of species and degradation of freshwater quality and flows are all becoming widespread problems.

The global forestry sector needs to be part of the solution to these problems.

This will involve thinking about how to create stable landscapes that incorporate production and conservation functions. It will require investment models that can perpetuate conservation functions ending deforestation, restoring degraded lands, and increasing the productivity of lands already under agriculture and forestry production. And it will require a new economic system around the value of natural capital[9] and social capital as key to supporting a transition to sustainable land use systems.

The global forestry sector is ready for this challenge and is seeking to engage with governments and stakeholders to find solutions that incorporate the necessary innovation, capital, partnerships and new market concepts. There are already success stories in this arena. We want to build on those successes and scale them so that the forestry sector can be a major actor in the transition to a sustainable future.

8 https://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/

9 See for example https://seea.un.org/home/Natural-Capital-Accounting-Project

Image: Mount Shasta United States

2.

Sustainability as a Central Imperative for Continued Global Economic Growth

The level of impact our existing economy puts on the atmosphere and biosphere is not sustainable, especially in the face of an expectation of continued economic growth. Without change we face runaway climate change; mass extinctions; and human suffering, displacement and conflict[10]. The ISFC foresees a future that can avoid these catastrophic outcomes and create transition pathways to new socio-economic models. There has been considerable emphasis on transition in the energy sector, focusing on the need to move away from fossil fuels to renewable sources of energy like solar, wind, hydro-electricity and certain forms of biomass and biofuels.

The shift to more sustainable materials in society, also called the circular bioeconomy transition, has significant challenges[11]. As we recognise the increasing need to move away from plastics for packaging, polyester fabrics, the petro-chemical industry and high emitting and poorly recycled materials, the forestry sector has an important role to play. Forest materials such as biomass, wood fibre, and timber can replace most of these fossil fuel dependant materials with renewable, recyclable and naturally decomposing materials. There have been policy initiatives to incentivise this circular bioeconomy transition[12], but much more needs to be done to accelerate the growth of bio-based substitutes.

10 See for example the sixth assessment report of the intergovernmental panel on climate change https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf or work by the World Bank on social consequences of climate change https://www.worldbank.org/en/topic/social-dimensions-of-climate-change

11 Nagarajan, Diilrani et al. 2021. Circular Bioeconomy: An Introduction. Elsevier. Available at: https://www.sciencedirect.com/science/article/abs/pii/B9780128218785000064

12 See for example the progress report on the European Union bioeconomy strategy: https://op.europa.eu/en/publication-detail/-/publication/ae0a36d3-eac3-11ec-a534-01aa75ed71a1

Linked to the circular bioeconomy transition is the need for a sustainable built environment. Urbanisation is part of a sustainability transition. Concentrating human populations can help reduce pressure on nature, but the scale of the urbanisation over this century is daunting and will require innovations in building systems and the materials used in those buildings[13]. Developments occurring in engineered wood construction or hybrid building with wood, concrete and steel components can reduce the embodied energy and emissions in new buildings. New innovations like cross laminated timber (CLT)[14], glue laminated timber (GLT), stranded timber[15] and other engineered wood materials not only benefit the emissions balance of the built environment but also ensure more complete utilisation of harvested wood and more capacity to recycle wood into higher value materials, a concept known as 'up-cycling'[16].

Land use is another area that requires a substantial transition. Current land use systems can create systemic degradation of natural ecosystems, high greenhouse gas emissions, soil erosion and loss, excess nutrient pollution and high use of synthetic pesticides. We need to create landscapes that can stabilise and restore nature, that have a net removal of carbon dioxide from the atmosphere and that conserve natural hydrological and nutrient cycles.

This needs to be done in the face of rising demand for food, as well as the imperative for expanded wood production to support the transition to a circular bioeconomy and sustainable built environment. It calls for sustainable intensification, where production systems expand by growing more on the existing land base or expanding production onto degraded lands, rather than converting more natural ecosystems to production systems. Forestry and agriculture managers may become more fully engaged in sponsoring natural ecosystems conservation in an integrated landscape context that is perpetuated by economic sustainability. Indigenous and rural community aspirations will also guide the management of these sustainable landscapes. These ideas will be expanded on in the following sections of this paper.

13 https://worldgbc.org/advancing-net-zero/embodied-carbon/

14 https://www.archdaily.com/996319/the-meteoric-rise-of-cross-laminated-timber-construction-50-projects-that-use-engineered-wood-architecture

15 https://techforimpact.asia/building-the-future-with-timber-as-strong-as-steel/

16 See for example wood plastic composites: https://www.architectureanddesign.com.au/suppliers/decker-composite-decking/wood-plastic-composites-a-growing-alternative-to-t

3.

The role of forestry in climate mitigation and adaptation

Forestry, agriculture and land use are substantial sources of greenhouse gas emissions, but they also have important potential opportunities in climate change mitigation and adaptation[17]. Most studies suggest that about 13-21% of greenhouse gas emissions come from land use, with almost half being attributed to deforestation and the rest to agricultural emissions. Over the past several years, researchers have noted that forestry and land use could be significant in the transition to net zero emissions, accounting for as much as approximately 20-30% of the decarbonisation process[18]. This would include both reduced emissions and emissions removals (the absorption of carbon dioxide out of the atmosphere and into the biosphere).

Forestry has unique opportunities. Sustainable forest management can increase carbon stocks by extending rotation lengths (the number of years the trees are grown before harvesting), by putting forest areas with limited commercial potential under conservation management and by establishing new forestry plantations on areas of marginal farmland or degraded land[19]. Forestry management practices can also contribute to emissions reductions and removals. Some examples of practices that can help reduce and remove emissions include, where practical, avoiding burning of sites after harvesting to retain organic matter, using firebreaks to manage the risk of catastrophic wildfire, operating cool season prescribed fires and managing stand density[20].

Most important, however, is the role wood products play in carbon storage in the built environment and the substitution of wood products for higher embodied energy or higher emissions materials such as concrete and steel[21]. Wholistic carbon accounting that considers the carbon stock and carbon stock change in the forest and in the wood products pools can create a stair step of emissions reductions over time. For example, a pine plantation might be grown for thirty years, then harvested with 50% of the timber going into long-lived timber products.

17 https://unfccc.int/topics/land-use/workstreams/land-use--land-use-change-and-forestry-lulucf

18 See for example Roe et al. 2021.Land-based measures to mitigate climate change: Potential and feasibility by country. Global Change Biology. https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15873 and Griscom, Bronson et al. 2017. Natural Climate Solutions. Proc. Nat. Acad. Sciences. https://www.pnas.org/doi/full/10.1073/pnas.1710465114

19 https://law.stanford.edu/press/report-from-stanford-law-school-policy-lab-and-bezos-earth-fund-makes-recommendations-to-advance-climate-smart-forestry-practices/

20 For example Smyth et al. 2020. Climate Change Mitigation in British Columbia's forest sector. GHG reductions, costs and environmental impacts. https://cbmjournal.biomedcentral.com/articles/10.1186/s13021-020-00155-2

21 Leskinen, Pekka et al. 2018. Substitution effects of wood-based products in climate change mitigation. European Forest Institute. https://efi.int/sites/default/files/files/publication-bank/2019/efi_fstp_7_2018.pdf

The forest is then replanted and regrown, maintaining the overall carbon balance from rotation to rotation, while continuing to build the stocks of carbon in the built environment. This comprehensive accounting for the greenhouse gas removals and emissions in forestry is being standardised as part of the overall carbon accounting protocol[22]. It is also putting pressure on the forestry industry to reduce their emissions. If wood fibre is sold to a pulp and paper mill that uses coal-fired electricity, for instance, the scope 3 emissions from that electricity can overwhelm the carbon removed during the growth of the forest.

With the world approaching the 1.5 degree C increase in land-sea surface temperature, we are already seeing corresponding rising direct climate change impacts. Shorter winters, increased droughts, more extensive wildfires, severe rainfall events and windstorms appear to be effects of climate change[23]. Recent extensive wildfires in Australia, Canada, Europe and the Western United States may fundamentally shift ecosystems[24], pointing to the severity of these events. The concept of landscape resilience is central to climate change adaptation[25]. Forestry management will need to consider active management of fire risk, particularly with both fire risk reduction (via prescribed burning and careful thinning) and improved fire management response. Forestry can also contribute to adaptation strategies in rural communities; for example, agroforestry can help rural farmers create alternative incomes where crop failures have occurred.

Forestry will need to adjust and help compensate for climate change; in fact, that may become a central purpose of forest management in the future. Many Indigenous peoples actively managed landscapes for resilience for millennia, and their traditional knowledge may need to be recovered[26] to maximise sustainability.

22 https://ghgprotocol.org/blog/land-sector-and-removals-guidance-where-we-are-now

23 UN Chief Antonio Guterres states world has entered era of Global Boiling https://news.un.org/en/story/2023/07/1139162

24 https://www.noaa.gov/noaa-wildfire/wildfire-climate-connection

25 See Thacker, Fiona, et al. 2023. What is a fire resilient landscape? Towards an integrated definition. Ambio. https://link.springer.com/article/10.1007/s13280-023-01891-8

26 See for example the emphasis on restoring Indigenous fire management practices in Australia following devastating bushfires. https://naturaldisaster.royalcommission.gov.au/publications/html-report/chapter-18

Image: Southeast Asia

4.

The role of forestry in conserving nature and perpetuating sustainable landscapes

The current size and continuing growth of the global economy drives consumption of all kinds. This puts pressure on ecosystems both directly via deforestation and degradation of land and indirectly through climate change, pollution, excess nutrients and synthetic chemicals. Conservation is a way to combat the pressure applied by that consumption. In the past, the approach to conservation was to create large, protected areas that would serve as refugia for key species. As development progresses, these protected areas can become islands or can be degraded through illegal land use, wildfire or other threats. In many cases the protected areas are not fully representative of the diversity of ecosystems in a region and were chosen for conservation based on a lack of value for other land uses[27].

This is leading to a concept of linking protected conservation areas with wider landscapes to integrate conservation and production systems and provide more scope, helping to ensure all major ecosystem types have a capacity to be represented in a comprehensive conservation framework. It was notable at the major COP15 to the UN Biodiversity Convention, that the 30% conservation target included both strictly protected areas and other effective area-based conservation measures (OECM)[28], much of which will need to be on private land.

27 Hoffmann, S. 2022. Challenges and opportunities of area-based conservation in reaching biodiversity and sustainability goals. *Biodivers Conserv* 31, 325–352. https://doi.org/10.1007/s10531-021-02340-2

28 See for example the emphasis on restoring Indigenous fire management practices in Australia following devastating bushfires. https://naturaldisaster.royalcommission.gov.au/publications/html-report/chapter-18

Integrating conservation and production within landscapes allows commercial production systems, such as forestry plantations, to be ongoing systems that can also perpetuate conservation functions. If, as will be discussed in later sections, there are price signals for enhancing carbon storage, habitat supply or restoration of degraded habitats, linked conservation areas might also enable conservation finance, forestry and agriculture investments to be integrated together.

Facing the implications of climate change, biodiversity conservation must also consider resilience. This includes the need for connectivity and the ability for species to evolve and migrate as climate change and extreme weather events change ecosystems and the habitat supply[29]. Forestry can help meet this need by ensuring that riparian systems alongside rivers and streams have natural vegetation and that unique features like wetlands, remnant natural vegetation areas, and corridors of natural vegetation remain intact. Forestry can also offer a better conduit for species migration between areas of natural vegetation because it provides cover and shelter.

5.

The circular bioeconomy transition

The range of products from forests used in our daily life is extraordinary. Products from the forestry sector can be broken into a number of segments – appearance grade materials, building materials, fibre-based materials and biomass-based products. Appearance grade materials are a category based on the colour, grain and durability of wood and are represented in flooring, furniture, cabinetry, boatbuilding and artworks. Building materials include construction timber, plywood, wood panels and various engineered wood products that are used in the built environment. Fibre-based products include pulp and paper; sanitary goods including tissues, toilet paper, paper towels and baby diaper fillings; packaging materials including paper bags and cardboard boxes; and cellulosic fabrics like rayon or Tencel. Biomass can be used for fuelwood, refined energy products like wood pellets or bio-fuels, bio-char, and biochemical industries.

A tree is about 50% water and its dry matter is about 50% molecular carbon[30]. The tree is an amazing construct of nature, based on fibres that transport water and nutrients from the roots to the foliage (the xylem) and carbohydrates from the foliage to the roots (the phloem)[31]. In simplistic terms the tree is a series of cellulosic fibres held together by a glue called lignin. Combined together, this wood has great strength and flexibility, making it ideal as a building material. Separately the cellulosic fibres are flexible and readily processed into the multiple products listed above. We are only beginning to understand lignin as a potential source of a new biochemical industry that could largely supplant the petrochemical industries[32].

29 See for example Anderson, Mark et al. 2023. A resilient and connected network of sites to sustain biodiversity under a changing climate. Proc. Nat. Acad. Sci. https://www.pnas.org/doi/10.1073/pnas.2204434119

30 https://www.fs.usda.gov/sites/default/files/Forest-Carbon-FAQs.pdf

31 https://basicbiology.net/plants/physiology/xylem-phloem

32 See for example work from the Research Institute of Sweden: https://www.ri.se/en/our-stories/lignin-on-the-ascendancy-with-swedish-technology

The wide range of materials being produced from a tree leads to the wood being broken down into multiple products, often with a primary breakdown (e.g. lumber) followed by the remaining wood going into fibre-based applications or biomass-based uses.

Over recent decades, society has been systematically substituting plastic bags for paper bags, plastic straws for paper straws, concrete and steel for wood in construction, and polyester for natural fibres. Now we recognise that these synthetic materials do not decompose, are poorly recycled and cause multiple impacts in nature. Ninety percent of plastic waste is not recycled and can remain in the biosphere for hundreds of years[33]. Wood and wood fibre, on the other hand, are renewable natural resources; can be recycled, re-used or reprocessed; and ultimately biodegrade naturally. There is an increased emphasis on the role of wood in society under the broad concept of a transition to a circular bioeconomy. (Circularity means the cycle of re-using and recycling the materials in society, rather than the linear process of using and disposing.)

This increased emphasis on wood has led to the concept that anything made from fossil energy materials can be made from a tree[34]. Transitioning to a sustainable society will require transitioning to increased use of circular biomass-based materials in place of plastic. This large-scale substitution will require an expansion of sustainably produced woody feedstocks from both plantations and carefully managed natural forests. For example, the world produces about 200m tonnes of wood pulp per annum[35] and about 380m tonnes of plastic per annum[36]. Substituting biomass-based fibres for all plastics will require a tripling in the size of the bio-processing sector.

33 https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm

34 https://www.storaenso.com/en/about-stora-enso/our-purpose-and-values

35 https://www.statista.com/statistics/240570/consumption-and-production-of-fibrous-material-worldwide

36 https://plasticoceans.org/the-facts

Image: Forestry estate Australia

6.

The Need to Sustainably Increase Wood Production

A circular bioeconomy will need increased feedstock, particularly over the next 50 years as we move to a global population peak. As noted earlier, this expanded feedstock production will need to come almost entirely from intensively managed timber plantations[37]. The expanded forestry production will come from two central factors: the productivity per hectare per year and the area being managed for production. Increased production can come from either increasing productivity per hectare or increasing the plantation area base. It is likely that both will be needed in the coming decades as part of the transition to a circular bioeconomy.

Global wood supply today comes from a continuum of forest management contexts. At one end are slower-growing extensive forests, often in the northern hemisphere and tropics. These forests may be growing at production rates of 1-5 cubic metres per hectare per year, and harvest replanting cycles of 40-100 years. This system has operated well for hundreds of years and can continue into the future with even greater gains in biodiversity, watershed and carbon benefits as management tools continually improve. At the other end of the spectrum there are the intensively managed plantations, such as pines and eucalyptus, that can grow at over 50 cubic metres per hectare per annum with a 5- or 6-year harvest cycle[38]. The global need for fibre requires that we use all the options we have noting that these will vary from country to country.

37 McEwan, Andrew et al. 2020. Past, present and future of industrial plantation forestry and implications for future timber harvesting technology. J. Forest Research. https://link.springer.com/article/10.1007/s11676-019-01019-3

38 Binkley, Dan et al. 2017. The interactions of climate, spacing and genetics on clonal Eucalyptus plantations across Brazil and Uruguay. Forest Ecology and Management. https://www.ipef.br/techs/2017-binkley_et_al-techs.pdf

Forest productivity is driven by temperature and moisture. Regions like Latin America that have good rainfall and temperature and abundant land have been the main area of forestry growth in recent years[39]. The choice of species is also important, as some species are inherently more productive than others. For example, some species have very conservative growth patterns, holding substantial starch reserves to withstand periods of stress. Other species, known as pioneer species, have a high growth strategy that involves devoting all of their carbohydrates to growth then simply dying if they are outcompeted in growth[40]. These latter species prove to be best suited to intensified production.

Tree breeding, silvicultural management and protection programs have proven highly successful at increasing productivity per hectare. Studies of the US South have shown productivity increases in pine plantations have quadrupled since the 1940s[41]. Brazil has also shown impressive change, with 300% productivity increases from 1970 to 2005[42]. This is important because the more productivity can be enhanced on the existing land base, the less new plantation area is needed. Industrial roundwood production is currently about 2 billion cubic metres per annum. If we need to double that production to 4 billion cubic metres per annum over 20 years, the incremental production could come from either doubling productivity or doubling the land base of plantations. In reality, it is likely to be a combination of the two.

If we take the hypothesis that we need to double production of forestry feedstocks for the circular bioeconomy transition and we assume that 50% of that increased production comes from improved productivity per hectare and 50% comes from new plantations, then we would need 40 million hectares of new plantations at a growth rate of 25 cubic metres per hectare per year. That means we need about 2 million hectares of new plantations per annum over the next 20 years. Those plantations should be established on marginal agriculture land and degraded lands. Often forestry expands on areas where agriculture, especially grazing, has proven marginal both because these lands are low cost to acquire and because their conversion to forestry is more socially acceptable. Other major expansion opportunities exist in regimes like agroforestry, community forestry, out grower schemes, etc. Geospatial modelling can show areas where agriculture is not profitable, and these areas may be considered for forestry in partnership with local farmers and communities. These new, more granular approaches to land use allocation can increase the total economic benefit, diversify revenues for farmers and contribute to climate change adaptation.

39 Ibid Binkley et al. 2017

40 Margolis, Hank A., and D. G. Brand. 1990. An ecophysiological basis for understanding plantation establishment. Can. J. For. Res. 20 (4) 375-390.

41 Fox, Thomas R. et al. 2007. The development of pine plantation silviculture in the southern United States. J. For. https://rothforestry.com/Resources/Fox%20et%20al.%202007.pdf

42 Stape, Jose Luis et al. 2010. The Brazil eucalyptus potential productivity project: Influence of water, nutrients, and stand uniformity on wood production. For. Ecol. Mgmt. 259: 1684-1694.

7.

Ways to increase the forestry sector's contribution to the global sustainability transition

A. **Natural capital and natural capital accounting, forestry and land use carbon accounting.** The rising demand for Natural Climate Solutions, and more broadly the concept of Nature Based Solutions, is driving a demand for standardised systems of natural capital accounting including carbon accounting, biodiversity metrics and accounting, and freshwater provisioning. The capacity to standardise these accounting systems will provide a route to the ultimate monetisation of these attributes and then attract financial capital to conserve and enhance this natural capital. The forestry sector is an important partner in setting these standards as it manages tens of millions of hectares, often with integrated conservation and production areas.

B. **Market-based instruments, incentives and policy measures.** A major challenge for conservation is the lack of economic value ascribed to ecosystem services like carbon sequestration and storage, habitat supply, biodiversity conservation and enhancement, and freshwater catchment management. Instruments that recognise the value of nature will attract great investment interest and management effort. A range of instruments including carbon and biodiversity markets, pay-for-performance systems, sponsorship models and government payments or tax incentives have all shown promise. While governments can regulate to require conservation, experience shows that incentive-based systems that drive economic benefits for delivering conservation outcomes are much more effective.

C. **Finance and investment innovations – blended finance, option value, landscape investments.** There is currently an estimated $100 billion in private investment capital in the forestry sector. There are tens of billions of dollars more in listed companies holding forestry assets, and demand for forestry investment opportunities is rising. The challenge is to organise investment capital at a scale that can increase the forestry plantation base, create investments that support the whole landscape of conservation and production, and support the bio-processing and logistics systems needed to expand the role of forestry in both the circular bioeconomy imperative and the natural capital investment imperative. Investors in forestry and broader land use see rising opportunities in option value, where multiple price signals for timber, agriculture, carbon value, biodiversity value, water rights, windfarm leases, solar farm leases and more drive value creation and improved land use allocation. As these new investment models develop a successful track record, they will provide more access to capital for rural economies that have often failed to reach their potential because of undercapitalisation of land management.

D. **Technology to support new models of forestry and land use – e.g. remote sensing, geospatial modelling, AI, sustainable high efficiency production systems.** The new paradigm of forestry playing a more central role in supporting the transitions to sustainable landscapes and a bioeconomy will require sophisticated information and analytical capacity. Optimal land use and land management will need information layers on productivity, biodiversity and biodiversity potential, carbon stocks, hydrology, soils, climate and weather, wind profile and solar profile. New satellite and airborne remote sensing instruments allow daily monitoring of ecosystems at high resolution. Geospatial and temporal optimisation modelling tools allow a more granular analysis of land allocation and management strategies, which will create substantial value for investors and landowners. Advances in materials science, genetics, and information technology all help enhance productivity and maximise feedstock values. The forestry sector invests in these technological innovations, but there is also need for government support and new partnerships to speed the development of the tools that will support a sustainable land use transition.

E. **Supporting the circular bioeconomy transition – policies and measures including research and development, wood first construction.** There are a number of impediments to rapid expansion in the use of wood, wood fibre and biomaterials in the built environment and in society generally. There is neither a proper charge for the impacts of unsustainable materials like plastics, nor a payment for the sustainability improvements of wood construction and biomaterials. There is also often slow progress on standards, education programs and public awareness campaigns related to the circular bioeconomy transition. While more and more countries are developing bioeconomy transition strategies, the forestry sector needs to be a partner in these policy processes so that feedstock can be organised and international supply chains established to support the rising demand for sustainable materials in society.

F. **Community engagement and benefit sharing models, including central roles for Indigenous peoples, women, youth and forest-dependent communities.** Successful transitions also have important social dimensions. A transition to sustainable land use needs to be done in partnership with rural communities, Indigenous peoples and rural landowners, especially small family farmers. Sustainable social outcomes also need to ensure engagement with all elements of society including women, youth and the disadvantaged. Land use changes that are not designed to create fair benefit sharing and new opportunities for rural communities will likely fail. The goal of community engagement and benefit sharing models is to use capital to increase productivity, perpetuate sustainable landscapes and allocate risk to the right party. A farming family living from year to year on their agricultural production might benefit from the income diversification created by agroforestry or carbon credit markets. Indigenous communities could benefit from conservation finance to support their cultural and traditional forest management regimes. Some communities and landowners may see leasing land for long-term investment as providing a base fixed income for their family. The forestry sector is potentially an attractive partner in providing this capital and economic opportunity. Governments can help intermediate these new investment flows, and can support clarification of land use rights, infrastructure, and the investment rules. The new complex and multi-objective management regimes will have the potential to provide new opportunities but will also need security for investors.

8.

Conclusion - the International Sustainable Forestry Coalition and how it can help support a greater role for the forestry sector in the sustainability transition

This paper represents our initial endeavour to set out the challenges and opportunities the forestry sector will face as it seeks to support a global economic transition that promotes a more sustainable future. Forest management needs to evolve to encompass emissions reductions, carbon removals, landscape resilience and community engagement. There are already extensive efforts in this direction, and the members of the International Sustainable Forestry Coalition are good examples. Across the companies engaged in this initiative, there have been efforts at carbon accounting and reporting across forests and supply chains and, on a broader level, at natural capital accounting to try to understand the value to society provided by sustainable forest management. Most companies now have engaged with carbon markets and other environmental markets, and most have also explored how windfarms, solar farms and water rights can interact with forestry and land use. Most companies have substantial conservation areas under management and have engaged in restoration programs. And of course, most of the Coalition members have been actively supporting the circular bioeconomy transition as feedstock suppliers, supply chain operators or wood processors and manufacturers.

We believe there is a new model for forestry in the context of sustainable landscapes, but we also believe we can substantially expand forestry through both enhancing productivity and expanding forestry plantations on marginal agriculture and degraded lands. Doubling the forestry feedstock production over the next twenty years is possible and could make a concerted impact on substitution for unsustainable and difficult to recycle materials. The forestry sector is global with feedstock production and processing occur around the world. Investors are also seeking opportunities to participate in the sustainability transition, and we have already seen increased interest in climate and nature friendly investment opportunities. We have strived to put this together as a wholistic investment opportunity that provides economic opportunity as well as, environmental and social benefits supported by an enabling policy environment to support long-term climate resilience.

We welcome your feedback and input. We will inevitably face challenges and course adjustments along the way, but ultimately, we believe that there will be a larger and more important role for the forestry sector to play in the coming decades.

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