



The Dasgupta Review: The Economics of Biodiversity

AUTHOR : BEN GROOM, ZACHARY TURK

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Presented by:

LORIE MEMEL

DANIEL EMECHETE

KIMLENG BUN

MAIMOUNA SIGNATE



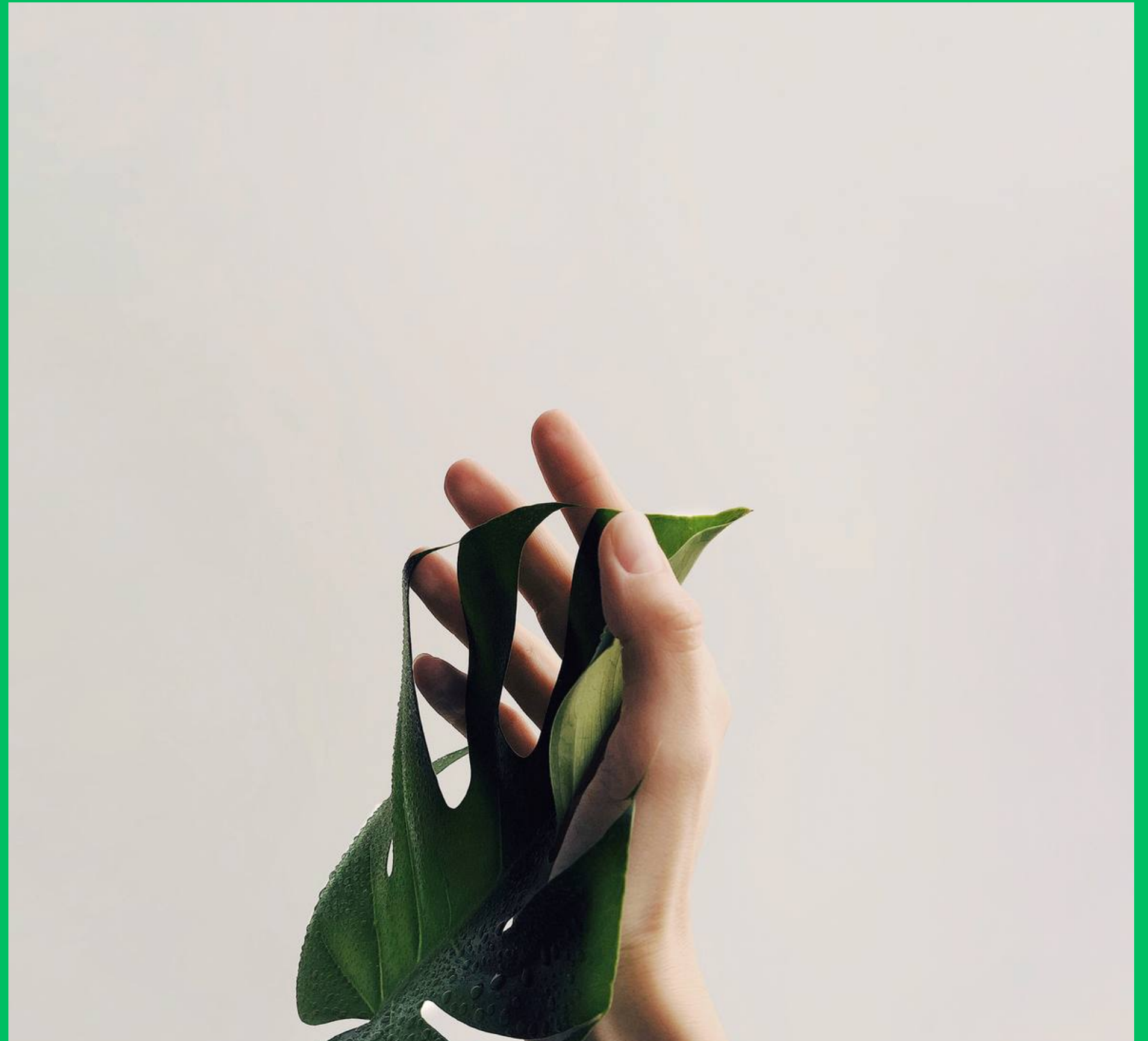
Plan

- Introduction: The Dasgupta Review
- Problem Statement
- The Formulation
- Economic Analysis and Findings
- Political Sensitivities and the Emerging Consensus
- Conclusion

The Dasgupta Review

The Review takes a global approach on the international and national policies on biodiversity while explaining the localized nature of the effects of biodiversity.

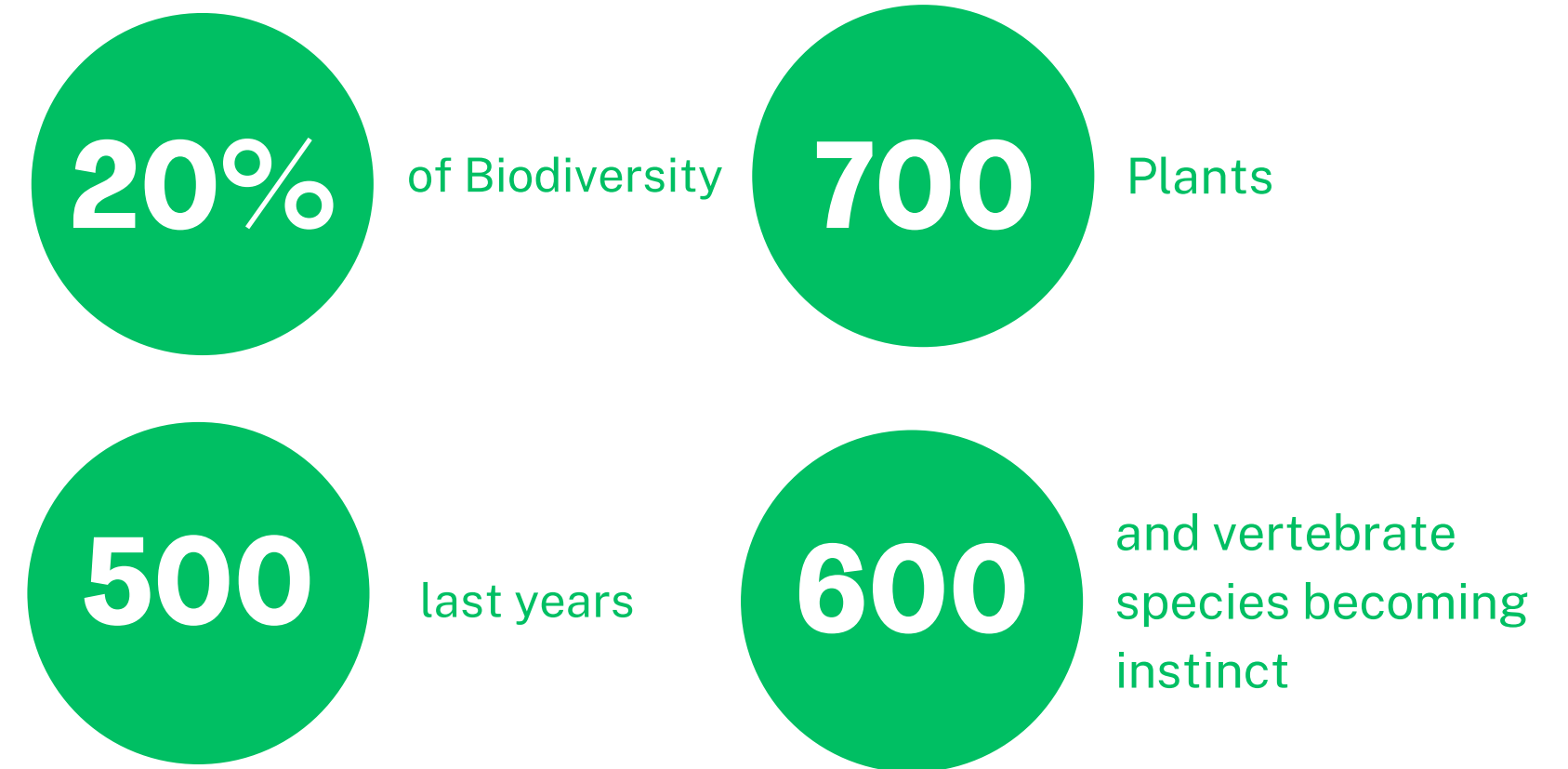
In the last 500 years, 20% of biodiversity has been lost, that includes plants and other species.



Problem Statement

The paper examines the critical problem of biodiversity loss and its interconnection with economic systems, highlighting how current economic models and practices exacerbate the degradation of natural capital.

It focuses on the misalignment between economic growth and ecological sustainability, emphasizing that the economy's demand for biosphere services far exceeds the planet's capacity to regenerate. This imbalance, termed **Impact Inequality**, serves as the central issue addressed.



Main Problems

1

Unsustainable Exploitation of Natural Resources: The overuse of biodiversity and ecosystem services due to inadequate valuation in market systems.

2

Failure of Current Economic Indicators: Metrics like GDP fail to account for the depletion of natural capital, thereby misrepresenting true economic well-being.

3

Neglect of Demographic and Consumption Dynamics: A lack of focus on population growth and excessive consumption, which drive ecological degradation.

4

Misaligned Incentives and Policies: Environmentally harmful subsidies and insufficient funding for conservation exacerbate biodiversity loss.

Why are these Issues Important ?

1

Foundational Role of Biodiversity:

Biodiversity underpins essential ecosystem services, such as clean air, water, food production, and climate regulation. Its loss threatens the very foundation of human survival and economic prosperity.

2

Economic Implications:

The degradation of natural capital erodes long-term economic stability. The inability to regenerate these resources leads to reduced productivity, increased risks (e.g., from climate change and pandemics), and heightened costs of restoration and adaptation.

3

Irreversible Consequences:

Biodiversity loss is often irreversible, with cascading effects on ecosystems. Species extinction, habitat destruction, and ecosystem collapse undermine resilience, making recovery difficult or impossible.

4

Global Inequalities and Justice:

Vulnerable regions, especially in the Global South, bear the brunt of biodiversity loss despite contributing the least to its drivers. Addressing this issue is crucial for achieving global equity and sustainability.

5

Failure of Existing Economic Models:

Conventional economic growth models prioritize short-term gains while neglecting long-term ecological and societal costs. A paradigm shift toward sustainability is essential to reconcile human prosperity with planetary health.

6

Urgency for Policy Action:

The paper underscores that delays in addressing biodiversity loss will result in escalating environmental, economic, and social crises. Immediate and collective action is needed to realign economic practices with ecological limits.

A close-up, low-angle shot of a dense field of tall, green grass. The blades are long and slender, creating a textured, vertical pattern across the entire frame. The lighting is bright, highlighting the vibrant green color of the grass.

The Formulation

Formal Model of the Embedded Economy

$$\frac{dS}{dt} = G(S) - \frac{Y}{\alpha_X} - \frac{Y}{\alpha_Z}$$

1. Material Balance Constraint

Where:

- S : Stock of natural capital (e.g., forests, fisheries, soil)
- $G(S)$: Regeneration function of natural capital, which depends on the stock S
- Y : Economic output or GDP
- α_X : Efficiency of direct resource use in production
- α_Z : Efficiency of indirect resource use (e.g., supporting services provided by ecosystems)

When demands exceed regeneration, $dS/dt < 0$, leading to the depletion of natural capital.

Formal Model of the Embedded Economy

2. Constraints on Technological Efficiency

The model assumes that technological improvements (α_x and α_z) can increase resource-use efficiency. However, these improvements are bounded, meaning that technology alone cannot disengage economic growth entirely from environmental degradation.

Examples: Water Recycling Systems, Renewable Energy, and Precision Agriculture (Use of GPS-guided machinery, soil sensors, and data analytics to optimize water, fertilizer, and pesticide use).

Formal Model of the Embedded Economy

3. Impact Inequality

Our economy is dependent on nature. And there is a limit within which economic activities should ideally stay.

According to Wackernagel et al. (2019b), the global ecological footprint suggests that the demands on NPP are approximately 170% of the supply.

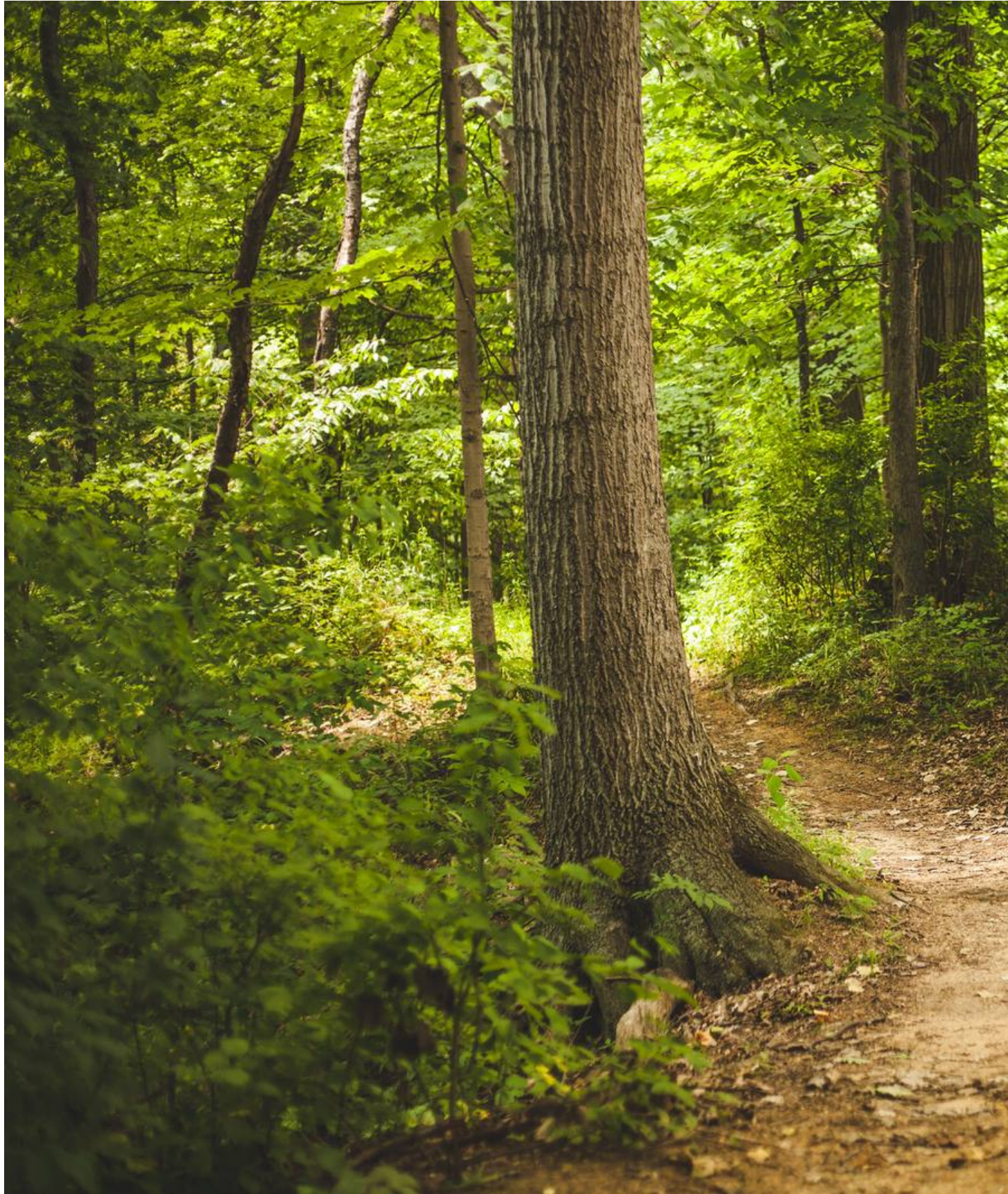
The model links natural capital dynamics to economic growth through the concept of "Impact Inequality".

$$\frac{Ny}{\alpha} > G(S)$$

Here, N: represents population size,
y: GDP per capita, and
 α : the overall efficiency of resource use.

A close-up, low-angle shot of a dense field of tall, green grass. The blades are long and slender, creating a textured, vertical pattern across the entire frame. The lighting is bright, highlighting the vibrant green color of the grass.

Economic Analysis & Findings

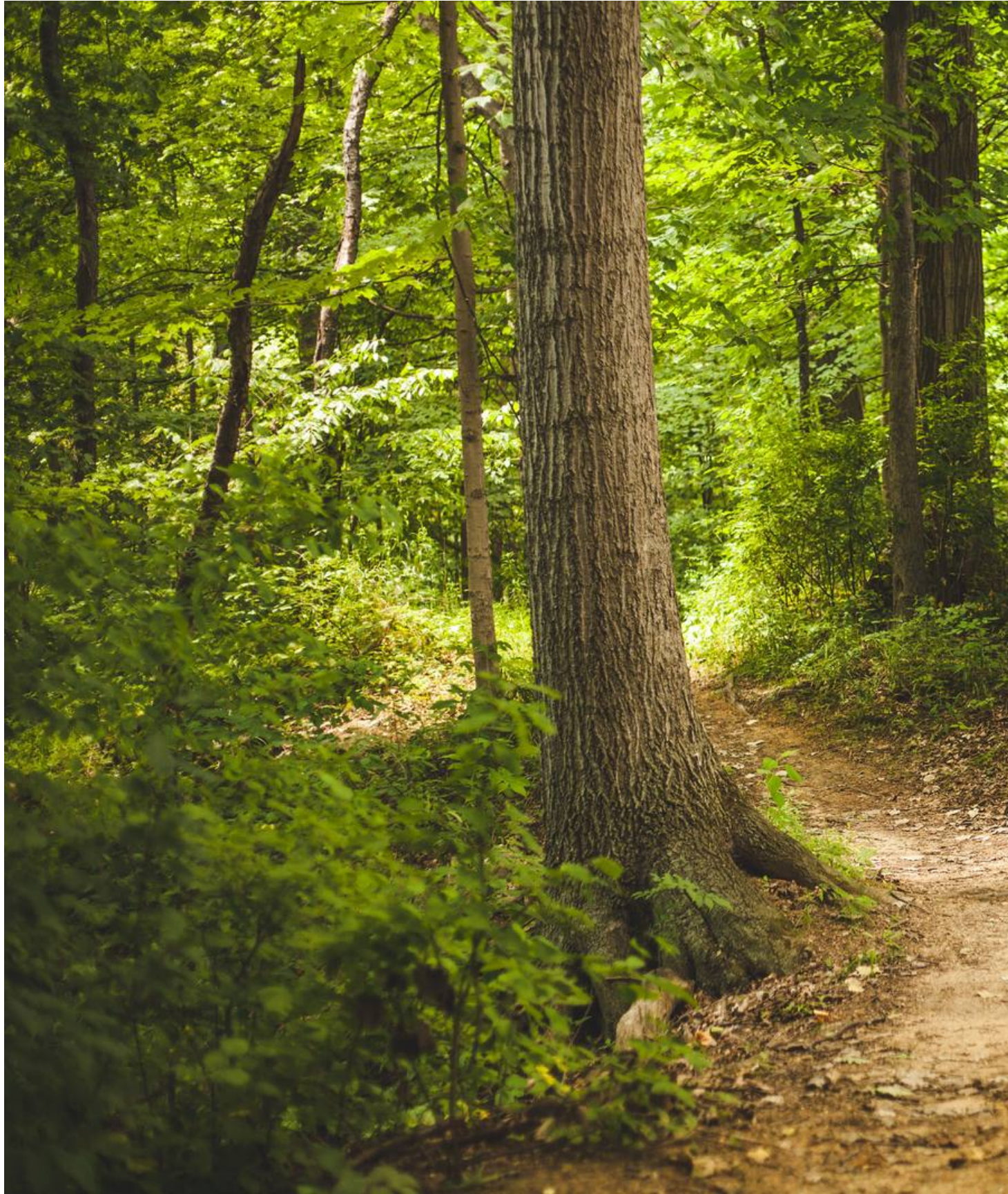


1. Impact Inequality and Natural Capital Depletion

The paper highlights the concept of **Impact Inequality**, which reflects the imbalance between humanity's demand for biosphere services and the biosphere's capacity to regenerate.

Global ecological footprints exceed the planet's regenerative capacity by approximately 70%, indicating that humanity is in ecological overshoot.

The depletion of natural capital is unsustainable, particularly as these assets are largely non-substitutable, and their loss directly impacts long-term economic well-being.

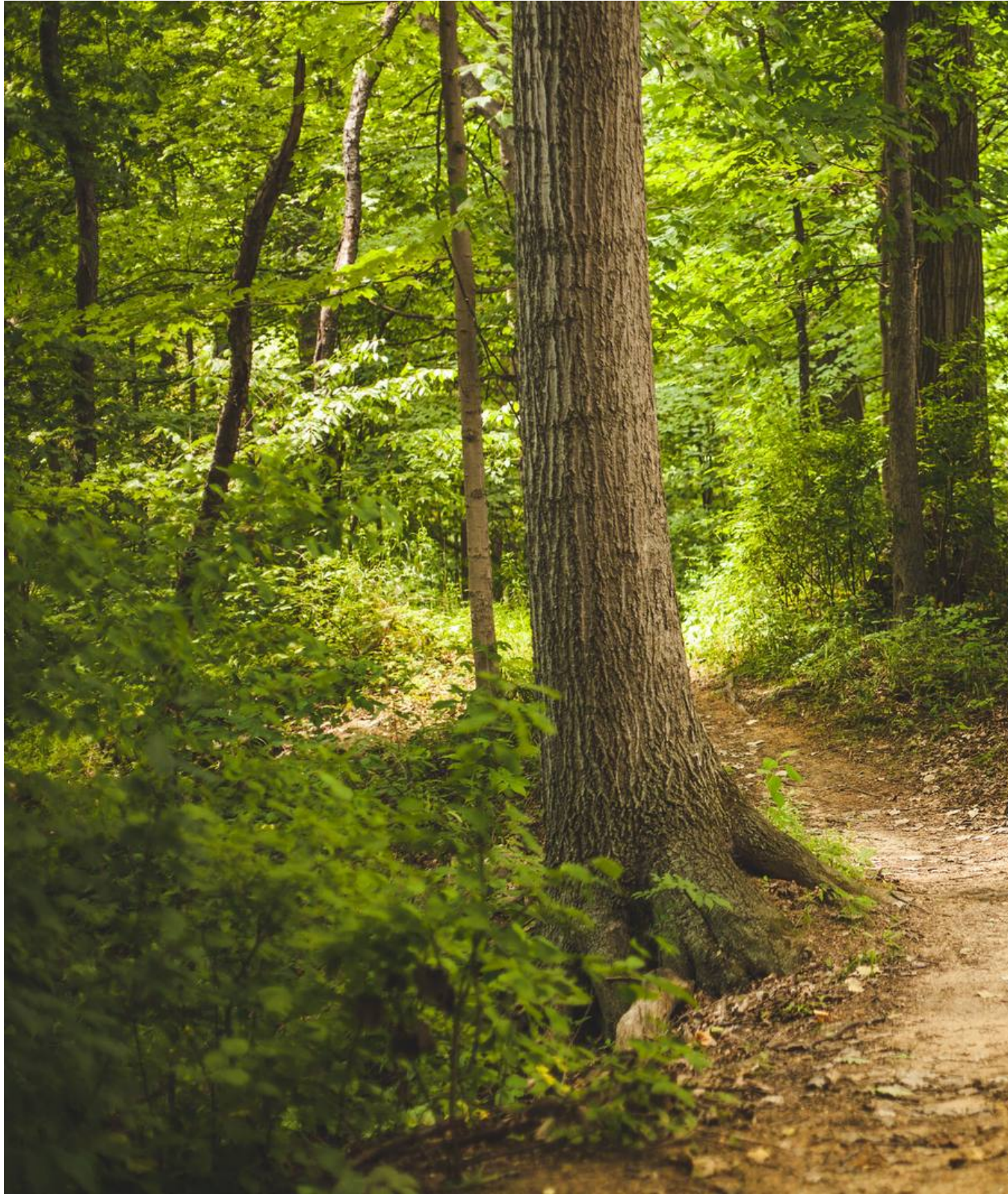


2. Limits to Growth and Embedded Economy

The economy is inherently embedded in the biosphere, which imposes limits on economic growth.

Infinite growth, as envisioned by mainstream economic models, is not feasible when natural capital stocks are finite and bounded by planetary boundaries.

The review emphasizes the need for a steady-state economy where growth is constrained within ecological limits.

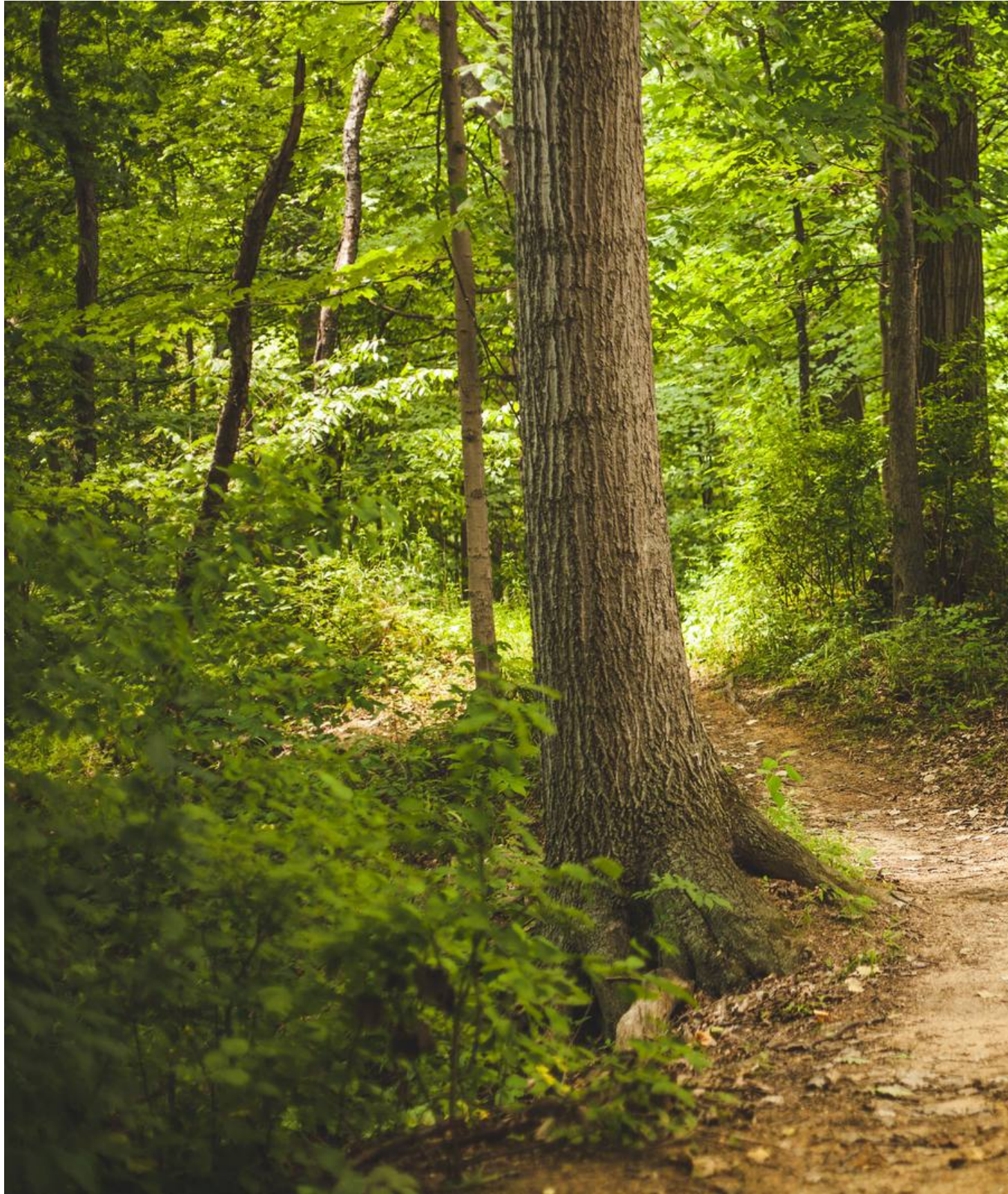


3. Mispricing of Biodiversity and Externalities

Market failures, including the absence of proper pricing for biodiversity and ecosystem services, lead to the misallocation of resources.

Negative externalities, such as environmental degradation, are not reflected in the costs of economic activities, resulting in overexploitation of natural resources.

Corrective mechanisms, such as **Pigouvian taxes** and **payments for ecosystem services**, are proposed to internalize these externalities.

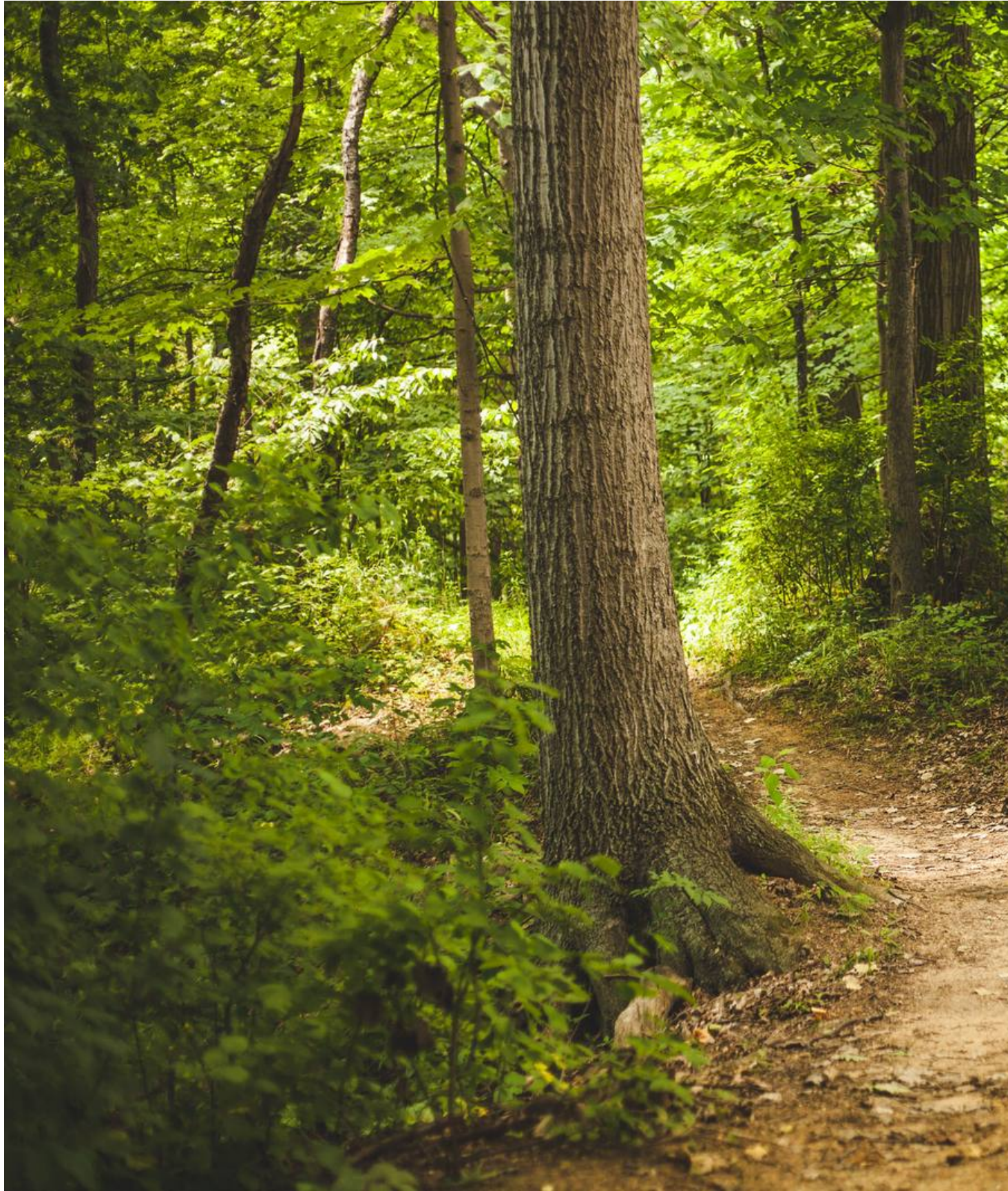


4. Demography and Consumption Dynamics

The paper critiques the lack of attention to population dynamics and consumption patterns in global sustainability discussions.

Rapid population growth in regions like sub-Saharan Africa, combined with high consumption in affluent countries, exacerbates ecological pressures.

Addressing these challenges requires investments in family planning, education, and the promotion of sustainable consumption practices.



5. Inclusive Wealth as a Metric

The review advocates for shifting from GDP-centric measures of progress to the Inclusive Wealth Index (IWI), which accounts for produced, human, and natural capital.

This approach provides a more accurate reflection of sustainable economic growth and highlights the costs of natural capital depletion.

Policy Recommendations

● Subsidy Reform

The review identifies environmentally harmful subsidies in sectors like agriculture and fossil fuels, amounting to \$4–6 trillion annually. These subsidies should be redirected to conservation and restoration efforts.

● Global Cooperation

Addressing global challenges like biodiversity loss and climate change requires coordinated international efforts, particularly in funding conservation initiatives in biodiversity-rich but economically vulnerable regions.

● Ecosystem Restoration and Protection

Active and passive investments in restoring natural capital are necessary to reverse ecological damage. Protected areas and ecosystem restoration are key strategies.

The background of the image is a close-up, high-angle shot of a lush green field. The grass blades are long, narrow, and densely packed, creating a textured, vibrant green surface. The lighting is bright, highlighting the individual blades and their natural curves.

Political Sensitivities and the Emerging Consensus

Political Sensitivities

Controversies over Economic Growth :

Ideas that are sources of controversy, notably the concept of limits to economic growth. This notion can be criticized by some economists who advocate for perpetual growth supported by technological transformation.

Strategic Integration of Environmental Issues:

Integration of biodiversity concerns into the strategic and economic policies of ministries of economy and finance, as well as national and international financial institutions such as central banks.



Emerging Consensus

Economic paradigm shift:

A shift in the economic paradigm, aimed at integrating environmental limits into economic growth policies

Structural and institutional change:

The need for structural, institutional, and political changes to achieve biodiversity preservation goals.



Conclusion

Dependence on Nature:

All our actions on Earth depend on this common good, which is nature. However, our actions and daily practices are destroying this surrounding nature day by day.

Prosperity and Consequences:

Today, it is undeniable that the immense prosperity the world has experienced in recent years has brought its share of disastrous consequences on biodiversity

Economic Failures:

Highlighting the economic shortcomings that have led to the critical state of global biodiversity.

Call for Social Change:

It also calls for addressing social norms, particularly the importance of changing consumption and fertility habits to minimize the consequences on biodiversity.

Thank you!

