

Policy Briefing

Growing Colombia's Sustainable Bioeconomy



Executive Summary

- As the world's second most biodiverse country, Colombia owns vast and varied natural resources that offer wealth creation opportunities long into the future. This natural capital stock will provide an excellent foundation for a bio-economy development strategy.
- The pandemic has shown the importance of maintaining a diverse natural capital as well as the integrity of the natural habitats that contain zoonotic diseases from human contact, e.g. forests and jungles.
- Public and private investment must enable the transition to a bio-economy. These green investments should facilitate nature-based solutions including biodiversity conservation and the sustainable use of biological resources.
- The switch to a bio-economy requires the holistic step-change of policies and activities across multiple sectors, sufficiently nimble to adapt to the ecosystem service losses and gains. New policies should deliver net gains for biodiversity and upward improvements in resource efficiency.

Introduction

GROW Colombia is a four-year bioscience research and capacity building project to preserve, restore and manage biodiversity through responsible innovation in Colombia. This multidisciplinary initiative is funded by the UK Government's Global Challenge Research Fund and involves a wide, international collaboration of academic and civil society partners united in a shared vision to conserve biodiversity, achieve sustainable prosperity and secure lasting peace in Colombia.

The future development of Colombia will be dependent not only on domestic policy but also the effects of international trade and global environmental governance. Colombia is the second most biodiverse (in terms of plants, animals and habitats) country on earth. Its natural capital offers

great opportunities for wealth creation and accelerated sustainable development, based on rising levels of employment and improved living standards.

Colombia's biodiversity represents a vast store of wealth, providing humanity with multiple benefits - known as ecosystem services - including food, shelter, livelihoods, cultural heritage, and other benefits, together with the life support system itself.

The GROW Colombia project has a strong socio-economic component involving the Earlham Institute, University of Sydney, Humboldt Institute, Natural History Museum, Universidad de Los Andes and led by the University of East Anglia in the UK. 🌱

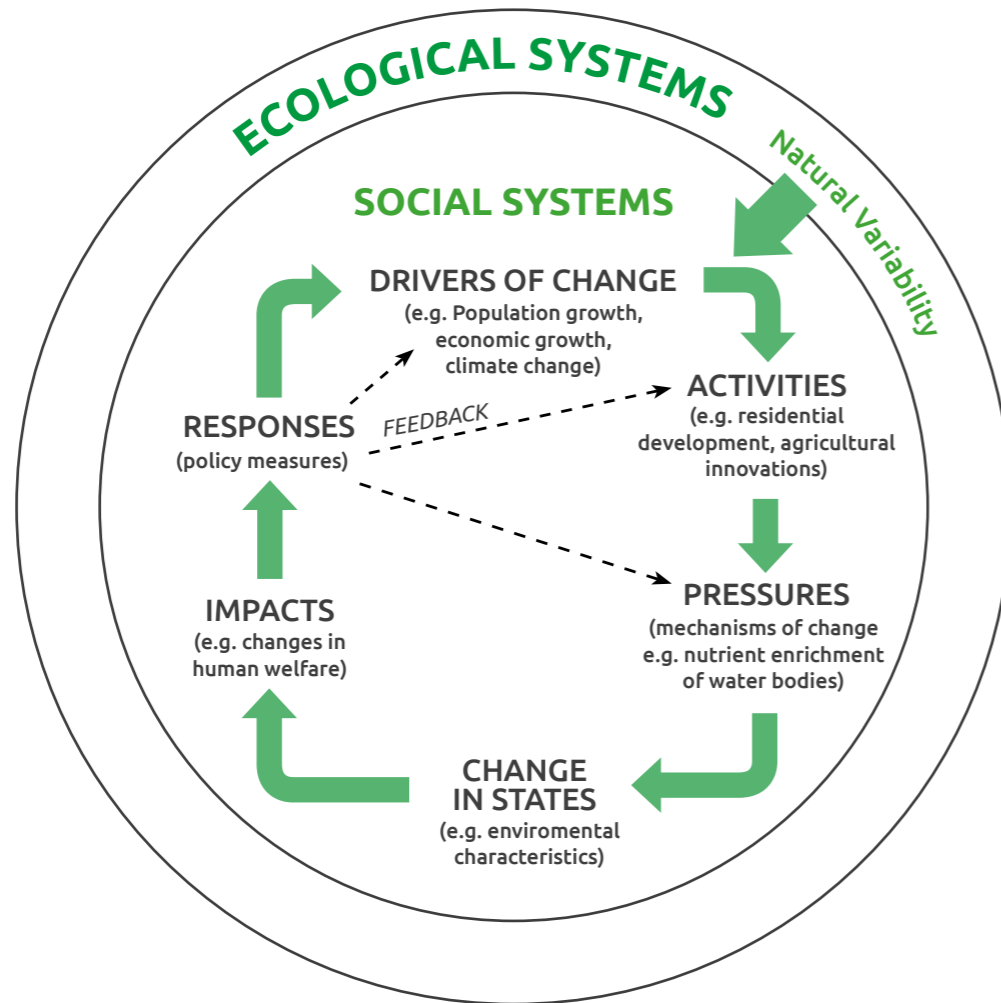


Figure 1.
Natural and ecological boundaries and the extended DPSIR framework

Socio-economic Research Activity

GROW Colombia’s socio-economic analysis was first underpinned by a scoping exercise undertaken to better understand the environmental challenges and opportunities that countries like Colombia face in the 21st-century (see Turner et al 2019¹). The project’s initial scoping analysis aimed to bring together the factors likely to cause significant environmental changes to nature and human wellbeing.

The “DPSIR” framework was used to facilitate the scoping work. The framework’s analysis is sequential and circular with necessary feedback loops; it starts with the drivers and pressures (DP) causing the state (S) of the environment to change, then examines the impacts (I) of these changes on human wellbeing (W), and completes the circle by including possible policy responses (R) to mitigate or adapt to the changing environment.

1) Turner, R. K, V. Toledo-Gallego, S. Ferrini, J. Erazo, C. Di Maria, N. Valderrama, F. Di Palma 2020. Colombia’s Natural Capital. Report 1. GROW Colombia Project Series. GROW Colombia Project UKRI GCRF Grant BB/P028098/1. Norwich, UK

Policy changes, if and when implemented, will have consequent effects on Colombia’s environment, economy and society. The main drivers of environmental change in Colombia are:

1. A changing demographic; the country has experienced a general demographic transition, through an ageing population and a relocation of people from rural to urban areas, with the loss of workforce capacity in the agricultural sector.
2. Economic growth and in particular a marked growth in the services sector of the economy.
3. Climate change exacerbated by increased GHG emissions, with heightened risks for large

sections of the population e.g. those living in coastal areas and water-scarce, elevated land in the Andes.

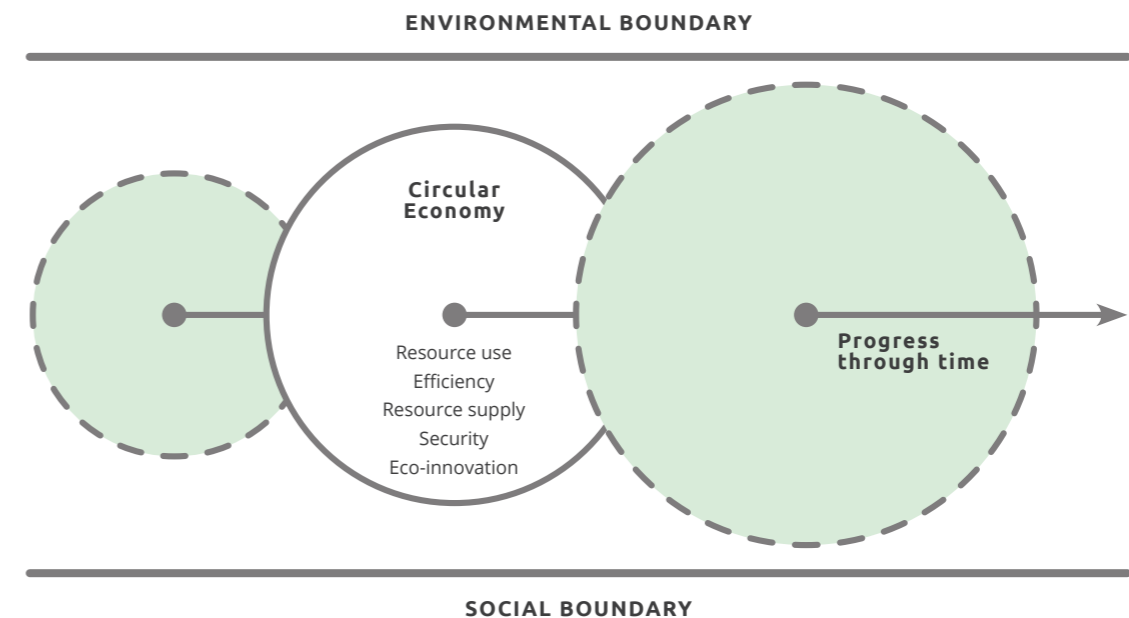
4. Biodiversity loss/deforestation/ loss of natural grasslands, caused by often unplanned and uncontrolled developments such as mining, oil extraction, logging and agricultural land use expansion into previously intact ‘natural’ ecosystems.

Building on the environmental change scoping analysis, the socio-economic analysis then focuses on the possible policy responses to the challenges and opportunities faced by countries like Colombia in the 21st century (Ferrini et al 2020²).

The development strategy and implementation measures

2) Ferrini, S., R. K. Turner, K., J. Erazo, C., Di Maria, V. Toledo-Gallegos, N. Valderrama, S. Schlesinger, F. Di Palma 2020. Biodiversity protection in Colombia: An Economic Perspective. Report 2. GROW Colombia Project Series. GROW Colombia Project UKRI GCRF Grant BB/P028098/1. Norwich, UK.

Figure 2.
An expanded Circular Economy constrained by boundary conditions



advocated are guided by a vision of the future economy based on sustainability principles, a so-called 'Circular Economy' with low carbon characteristics.

The basic aim of this approach is to minimise as far as is feasible the throughput of matter and energy in the economy, i.e. the amounts of raw materials and energy we use to produce and consume all the items that support our livelihoods and lifestyles.

One of the core features of this type of economic system in the Colombian context is the prioritisation of biodiversity, both its conservation and management, i.e. the creation of a bio-economy core. Given the country's natural endowment, biodiversity is a strategic natural capital asset which can power a future, more sustainable development process.

The bio-economy strategy seeks to protect both natural capital and ecosystem services, which in turn provide the stock of wealth and flows of wellbeing benefits vital for future human livelihoods and prosperity.

To implement a transition towards green development objectives a macro (i.e. whole economy) economic policy based on green investments is proposed. Green investments (projects, policies and courses of action) can provide an economic multiplier effect, which will help create new business and employment opportunities.

The Colombian Government aims to generate 10% of its national

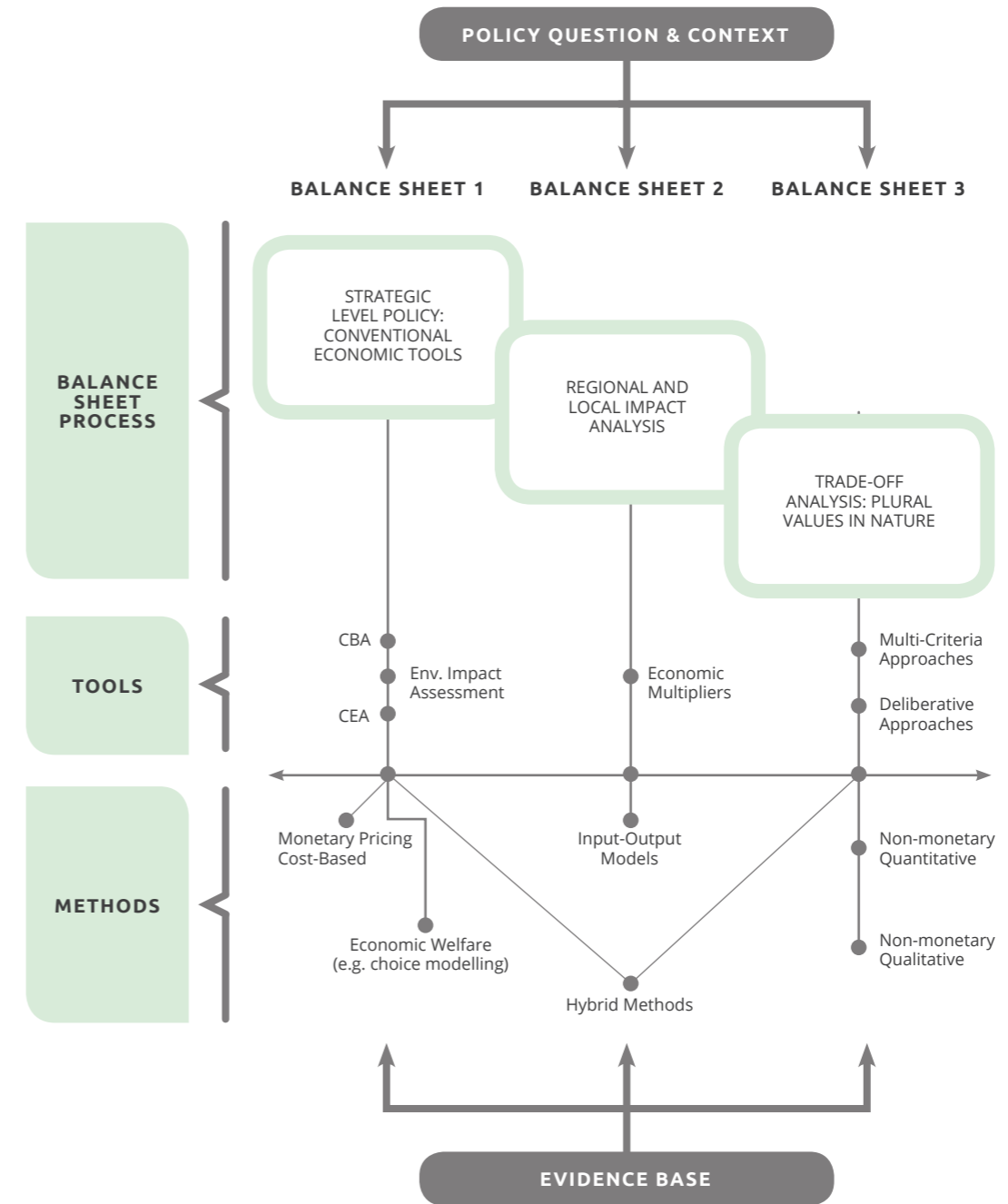
income (GDP) from the bio-economy by 2030. However, the conventional economic appraisal of investment options is based on a monetary valuation of the costs and benefits related to any given investment opportunity.

There is a danger that, for example, projects that generate a diverse range of costs and benefits, some of which lack monetary price values, do not fit easily into this appraisal procedure. These opportunities may therefore be given less weight by policymakers and not get the attention and finance that they deserve. It is the case that valuing nature is a multidimensional concept and the assigned values are plural, i.e. nature in all its aspects means different things to different people and communities. While we recognise that not all aspects of nature can be assigned monetary values, we argue that as many as possible should be valued in this way to avoid zero value status.

Balance Sheet Approach

Policymaking inevitably involves choices and trade-offs. Green investments will have to compete with each other and with other options for a share of a finite overall budget. To assist the policy choice process, GROW Colombia's analysts have devised a number of decision support systems to provide an evidence base for policy making. GROW Colombia supports the Balance Sheet Approach for decision support.

This is both a process and a set of tools which can encompass multi-



disciplinary data across a range of spatial dimensions and plural assessment criteria, including distributional equity, as well as conventional economic efficiency. The tool-box therefore includes both monetary and non-monetary valuation methods and techniques. We apply components of this toolbox, e.g. extended cost benefit analysis to selected policy areas.

Cattle, Cocoa and Ecotourism

GROW Colombia's more detailed analysis of potential policy switches to foster the bio-economy and combat biodiversity loss and climate change in Colombia, has been focused on three broad policy areas:

Figure 3. Policy Questions and Context flow diagram: the Balance Sheet Approach

1. An examination of cattle ranching activities and the impacts on biodiversity, with a particular emphasis on deforestation impacts; and the benefits/costs related to a switch to cattle regimes within a silvo-pastoral setting;
2. An expanded production of cacao for high quality chocolate feasibility study, to include an assessment the national and international potential market demand and farmer production opportunities and constraints;
3. An examination of ecotourism opportunities, both from the market demand (national and international) side and the supply side.

In this policy brief we report on the cattle ranching policy area (Erazo et al 2020³). The green investment strategy encompasses, among other things, policy enabling response measures to combat biodiversity loss and climate change, while simultaneously stimulating livelihoods and improving wellbeing.

The response measures, as part of an overall package of changes including 'institutional' change, seek to enable the country to transition towards a bio-economic development path. This low carbon strategy will help the country to meet its 2030 GHG reduction target.

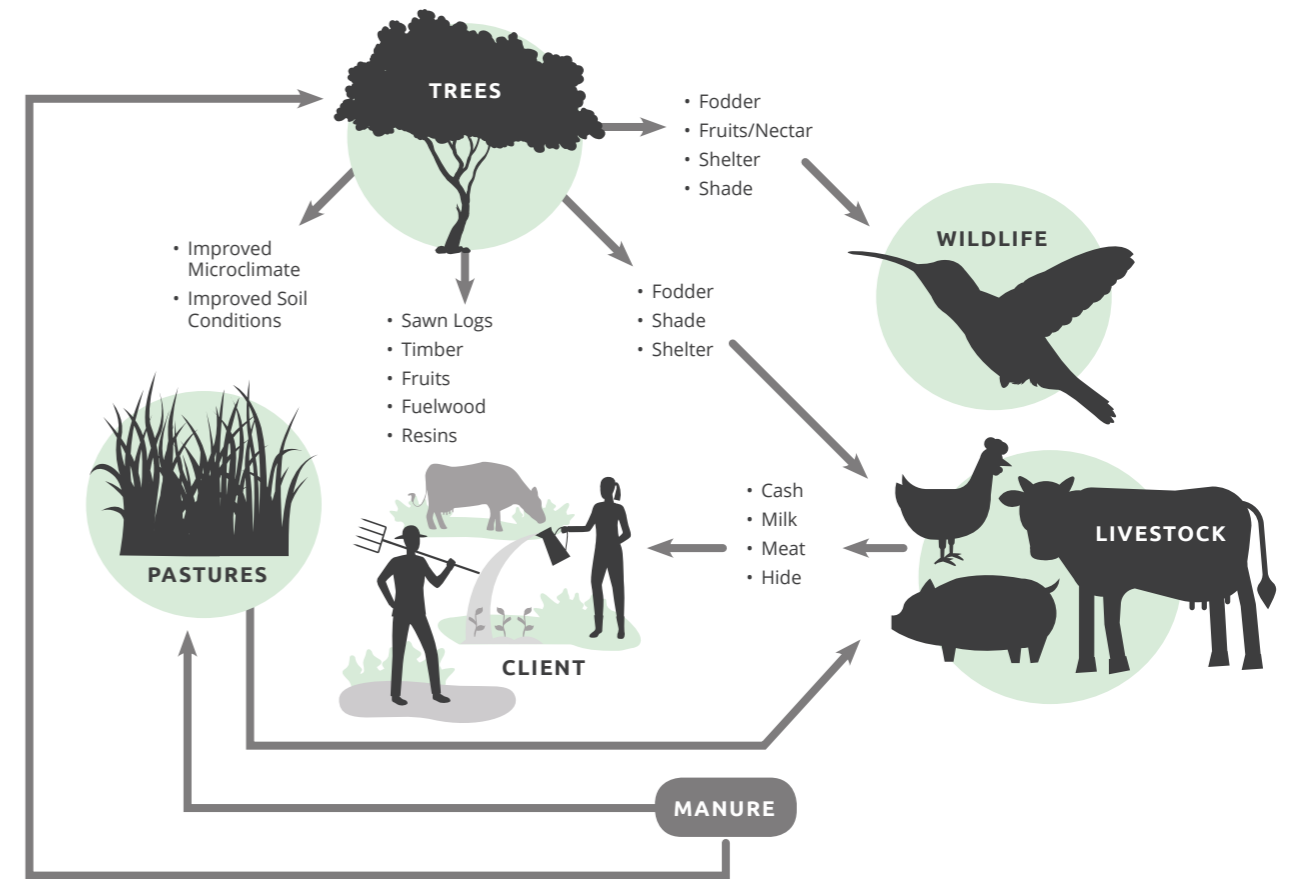
3) Erazo J., G. Grilli, S., Ferrini, K.R., Turner, C. Di Maria, N. Valderrama, F. Di Palma, 2021. Perspectives on a Bio-Economy Development Path for Colombia. Report 3. GROW Colombia Project Series. GROW Colombia Project UKRI GCRF Grant BB/P028098/1. Norwich, UK.

This was formally recognised in 2018 when the Colombian Government issued its policy document CONPES 3934. This sets out a green growth strategy supported by payments for ecosystem services and policy switches which included the agriculture sector and activities like cattle ranching.

COVID-19 Pandemic

Contemporary contexts around the globe and including Colombia, are heavily conditioned by the continuing COVID 19 pandemic. The pandemic has, among other things, underscored the lack of resilience in economies and societies. But the pandemic has also served to remind us of the importance of biodiversity conservation and management, to maintain the store of natural capital and related ecosystem services benefits that habitats such as forests provide.

One particular ecosystem service is intimately linked to the pandemic problem. Biodiverse forested areas act as virus reservoirs, which if left intact, contain the virus pool and keep it distant from human populations and settlements. Increasing domestic and international food demands and lifestyle changes have led to land use change pressures with cattle ranching, plantations and resource extraction activities all impinging on previously intact forests. As human encroachment into



formerly remote forests expands there is an increasing risk that species could interact with humans in novel and dangerous ways. Zoonotic diseases are hard to predict but human induced land use changes together with wildlife hunting and trade seem to be key drivers. So the pandemic provides a further rationale for more biodiversity conservation now and into the future.

In the agricultural sector, as elsewhere, regime changes require economic actor (farmer) cooperation. The co-designing of switches can help to build trust in institutions, and payment for ecosystem services (PES) schemes and other innovative financial support measures are also important.

Sustainable Cattle Ranching (SCR)

In this policy brief, we focus on cattle ranching and the potential green policy switch away from traditional extensive ranching activities into more environmentally friendly sustainable cattle ranching (SCR) systems. These systems may be able to increase enterprise efficiency/profitability and provide important ecosystem services benefits such as forest biodiversity protection. But the switch often requires relatively substantial implementation costs, which can act as a barrier to take up, hence the need for financial support from government.

Figure 4. Benefits generated by a silvo-pastoral system
Source: Calub (2003)

This policy switch is only one illustrative example, but it is used to show how the transition towards a bio-economy can be initiated. Future reports will look at cacao production and ecotourism as other green investment candidates.

The background context to this cattle ranching case study is that over time the extensive 'business as usual' (BAU) cattle ranching practices suffer from declining productivity which results in herd size increases and overgrazing of pasture land. The overgrazing phenomenon then cascades into land holding expansions which in some cases (especially where 'land grabbing' is prevalent) pushes back the boundary between settlements and pristine forest areas. Besides the direct negative impacts due to the loss of biodiversity, this could further expose humans to increased virus-related disease risks as the forest virus reservoir is breached.

The case study analysis is based on an extended cost benefit methodology and technique.

The model is populated by survey data from 300 farms located in the Valle del Cauca collected in 2015 by the International Centre for Tropical Agriculture (CIAT) and the University of Cauca. This data set is supplemented by additional data on input costs, output prices, herd dynamics, productivity and SPS implementation/maintenance costs from other Colombian sources.

The cost benefit analysis (CBA) results are based on regime

switching from extensive ranching to any one of three main options, presented as plausible implementation scenarios. The options are grouped around:

Scenario 1. Pastures enhancement

Scenario 2. (SCR) Agroforestry silvo-pastoral systems

Scenario 3. (SCR) Restoration/ reforestation systems

The CBA compares these options against a BAU extensive cattle ranching baseline, over a 20-year time horizon. Results report current private profitability (enterprise profits) and economic benefits (wider society benefits) that account for GHG emission reduction and soil nutrient retentions. Other similar benefits can also be linked to SCR, including water quality improvements and biodiversity conservation benefits. The latter encompass a range of values: insurance/option value, bequest value and, in the COVID 19 context, virus reservoir maintenance benefits. While these benefits are not formally costed in the CBA they are all likely to be positive values and serve to reinforce the direction of the costed main results.

Uptake of SCR has been inhibited by the relatively high implementation/maintenance costs. But the CBA results indicate that when the ecosystem services benefit values are included (albeit on a limited scale) some SCR options generate positive enterprise profits and economic returns; and a smaller number have returns which outperform the BAU returns.

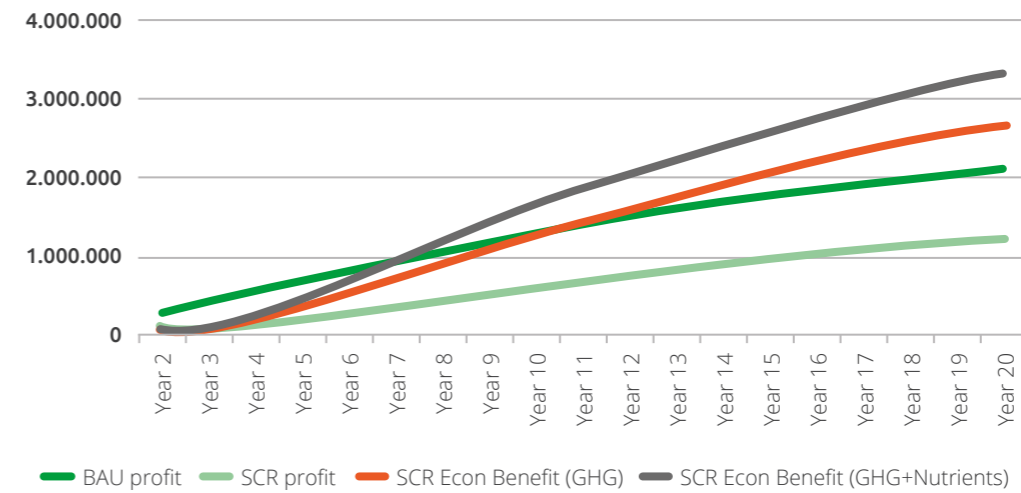


Figure 5. Trend of the Net Present Values for Scenario 3 implementation

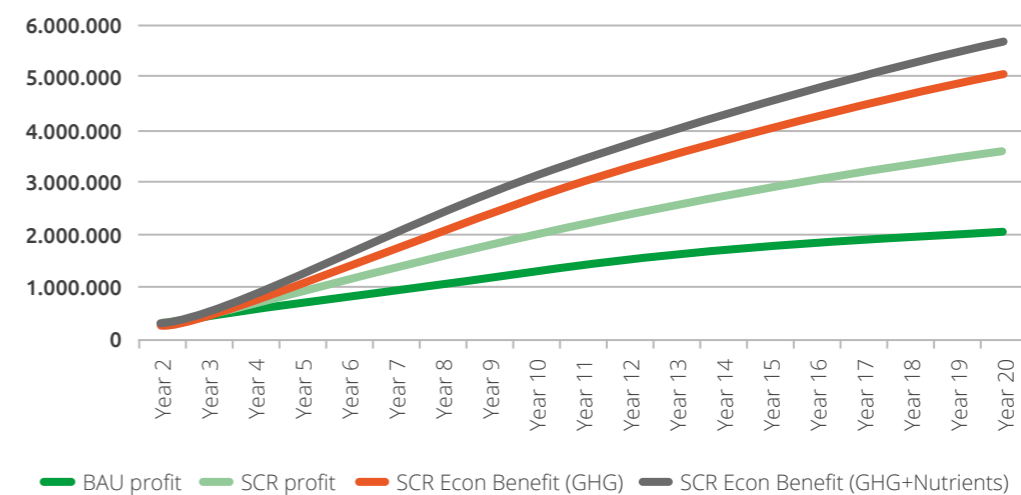


Figure 6. Trend of the Net Present Values for Scenario 4 implementation

In more detail: Scenario 1, conversion to enhanced pastures only, did not yield net gains over BAU for farms or society. Scenario 3, conversion to enhanced pasture and a larger silvo-pastoral area, gave yields which represented net gains over BAU after year 10 but GHG net emissions benefits needs to be included in the calculations and compensated to farmers.

Scenario 3, focuses on partial reforestation of farming land and produces net gains over BAU. However, this form of conversion involves high upfront

implementation costs which would have to be mitigated by some form of subsidised government loan scheme.

Key Findings

In conclusion, we argue that the challenges posed by climate change, biodiversity loss and the virus release risk can to some extent be countered by implementation of a bio-economy development strategy. This strategy would also make a positive contribution to poverty alleviation and food security,

improving the sustainability of livelihoods and social wellbeing.

The transition process can be enabled by, among other factors, a willingness to invest public funds into a green investment stimulus package of measures. Given Colombia's rich biodiversity store of wealth, the continued protection of this asset can deliver a range of economic and social benefits with improved national resilience.

In this brief, we have focused on just one illustrative policy switch (green investment) the conversion of traditional extensive cattle ranching to SPS practises, in order to demonstrate the potential private and public gains that could be delivered.

The extended cost benefit analysis uses a 'generic' farm model and conversion process based on a mixture of empirical data from field surveys and the existing literature. Four conversion scenario simulations were shown, but the model and the accompanying on-line spreadsheet tool has been designed to allow access to a range of users with different data inventories. It can also be extended to take into account a wider range of ecosystem service benefits and agricultural regimes e.g. the inclusion of agri-tourism on farms.

Recommendations

At the macro-economic level, an evolutionary rather than a revolutionary transition is required towards the establishment of a Bio-Economy core in Colombia;

Biodiversity must continue to be seen as a strategic natural capital asset, a store of wealth, which can power a more sustainable development process;

Both public and private funds must be made available to support a targeted green investment strategy to enable the transition towards a bio-economy, which will help to combat biodiversity loss and climate change, whilst simultaneously stimulating better livelihoods and wellbeing across all socio-economic groups;

A switch to the bio-economy requires changes in current agricultural and economic activities, but enabling projects, policies or courses of action must be appraised in an holistic way to account for not just financial but also all relevant ecosystem services gains and losses;

Not all aspects of nature and its ecosystem services can be assigned a monetary economic value, but as many as possible should be meaningfully valued this way to avoid zero value status in the political economy;

The COVID19 pandemic provides another reason to promote biodiversity conservation. Biodiverse forests, for example, act as virus reservoirs which if left intact contain the virus pool and keep it distant from human population and settlements, reducing future risk and significant damage costs;

Containment of zoonotic diseases will necessitate better regulation of land use change in natural

grasslands and near forest margins, together with strict controls/bans on wildlife hunting and trade.

Cattle ranching regime changes, away from extensive practices, to enable more efficient and sustainable production need to be radical i.e. changes beyond pasture enhancement to full silvo-pastoral systems.

Next Steps

The GROW Colombia socio-economic research will continue by extending the cost benefit analysis to take into account a wider range of ecosystem service benefits and agricultural regimes e.g. the inclusion of agri-tourism options on farms. Future reports from the GROW Colombia socio-economic team will cover other green investment options, such as cacao production for high quality chocolate products and ecotourism in Colombia. 🌱

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For more information visit

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