CASE STUDY

Green Growth Action Plan of Lam Dong Province, Vietnam

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Foreword and Context

Vietnam has set in its National Green Growth Action Plan (NGGAP) strategies that identify specific activities and tasks to achieve reduction in greenhouse gas emissions and provides a clear mandate and ownership to all stakeholders. Different levels of government are responsible for leading the execution of tasks in Vietnam's Nationally Determined Contributions (NDCs) of the Paris Agreement, as well as submitting specific solutions for implementation until 2030.

Local-level planning, cooperation, and implementation are seen as an important entry point for solutions as 70% of global emissions come from cities (UNFCCC, 2020). Vietnam is implementing innovative green growth strategies that address their underlying socio-economic challenges while focusing on the protection and preservation of natural resources.

This case study presents the GGAP of the Lam Dong province including the implementation plans, lessons learnt and next steps. The province has been a front runner in implementing the GGAP among the provinces in the central highlands region of Vietnam.

Lam Dong's Green Growth Action Plan (GGAP)

National mandate

In 2012, the Vietnam National Government approved the Vietnam Green Growth Strategy (VGGS) and in 2014 the National Green Growth Action Plan (NGGAP) for the implementation of the VGGS from 2014-2020. The VGGS defines Green Growth (GG) as "a process of boosting the restructuring and improvement of economic development towards more efficient use of natural resources, raising the competitiveness of the economy, through increased investment in tech-

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nological innovation, natural capital, and implementation of economic instruments, thereby contributes to respond to climate change, reduce poverty and ensure sustainable economic development." Sustainable development will only be possible if GG principles are prioritized which ensures rapid, effective, and sustainable economic development and substantially contributes to the implementation of the national strategy on climate chan

According to the NGGAP, provinces/cities are given the responsibility to develop their own local GGAPs corresponding to certain activities and set under the direct lead or coordination role of provincial authorities.

Lam Dong's socio-economic profile

Lam Dong is endowed with abundant natural resources for development, strategic political and economic setting, temperate climate, large potentials of land, forest, water resources, and beautiful landscapes. The province is one of the main tourist attractions in the Central Highlands and in the country due to its natural reserves. Lam Dong has 12 townships with a relatively large population size of about 1,298,000 people in 2017, or about 23% of the population in the Central Highlands, provides a relatively young and productive population, rich in ethnic cultures, and diverse historical and religious heritages.

The province's economic structure and contribution to gross regional domestic product (GRDP) is still dominated by the agriculture sector. Despite its large contribution to the province's GRDP, the weak processing industry and product branding hampers the province in escalating the competitiveness of their products in both the national and international markets. The dependence on the agriculture sector makes the province vulnerable to uncertainty in the global agricultural market and to climate change.

According to several climate projections from the Ministry of Natural Resources and Environment (MONRE), the next decades will likely have longer droughts during the dry season and heavier flash floods during the wet season throughout the Central Highland region which will cause tremendous damages to agriculture, and threaten the livelihood of smallholder farmers in poor communities. This will also pose problems to energy-food-water supplies as well as tourism.

The agricultural sector will be challenged with unstable market prices due to climate change affecting the country's main commodities, like coffee. The total area of existing coffee plantations in the province has exceeded the total area targeted in the 2016-2020 provincial agricultural planning; therefore, further encroachment of forest lands becomes a risk. Furthermore, most of the existing coffee plantations are old, with low productivity, and need rejuvenation. Enhancing the resilience to economic and environmental shocks due to global market competition and climate change is imperative for the agriculture sector.

Content of the GGAP

The nine orientations and the nature-economy cycle

The GGAP contains nine orientations to ensure that the provincial economy grows sustainably. The nine orientations are further elaborated into potential measures and activities. The orientations are concerned with six sectors, namely: agriculture, forestry, and tourism as main economic sectors, and with transport, water resources management, and energy as supporting sectors. The nine orientations are as follows:

- Enhance the use of renewable energy and energy efficiency
- Reduce greenhouse gas (GHG) emission from all sectors
- Control waste production and improve waste treatment
- Promote climate-smart and sustainable land use system
- Conserve water, natural resources and biodiversity
- Enhance market access and export of main commodities
- Develop green and sustainable tourism
- Promote green lifestyle and sustainable urban consumption
- Create enabling conditions for transitioning towards a green economy

The nine orientations are consistent and complementary to the priorities of existing environ-

mental and economic policies in the province. They encompass the whole nature-economy cycle where economic activities are divided into two subsets: production (supported by orientation 1 and 4) and consumption (supported by orientation 7 and 8) which are linked through trading (supported by orientation 6). The negative Impacts of economic activities on the environment such as pollution can be minimized by the implementation of orientation 3, while maintaining a sustainable supply of raw materials, energy, and other resources to the economy is supported by orientation 2. The ecosystem services function of nature to the provincial economy are supported through implementing orientation 5, through the conservation of forests, biodiversity, and water. Orientation 9 enables a green growth process in general and plays a very important role in harmonizing economic and natural systems through policies which stimulate innovation, technologies, capacity, and economic opportunities in general.

The transition towards a green economy requires large targeted investments in green economic sectors with attractive initiatives to various stakeholders. The right mix of fiscal measures, regulations, norms, know-how and infrastructure is needed. Some of these measures can only be addressed at the national level, while others can be addressed at the provincial level. Furthermore, these initiatives should be cost-effective with clear and credible guidance to investors.

The implementation of the nine orientations and their potential measures are classified into the six sectors with respective activities, targeted locations, estimated investment costs, and expected funding sources and leading agencies. To help ensure the effective allocation of available resources, prioritized measures within each sector are proposed and to facilitate the implementation, each potential measure is further elaborated into activities and implementation timeline, including expected funding sources for each, for the period of 2021-2030. Six different funding sources are considered: Central state budget (CSB), Provincial state budget (PSB), Official development aid (ODA), Foreign direct investment (FDI), Domestic private investment (DPI), and Social investment (SI) through application of economic instruments and fund-based mechanisms.

Prioritized interventions

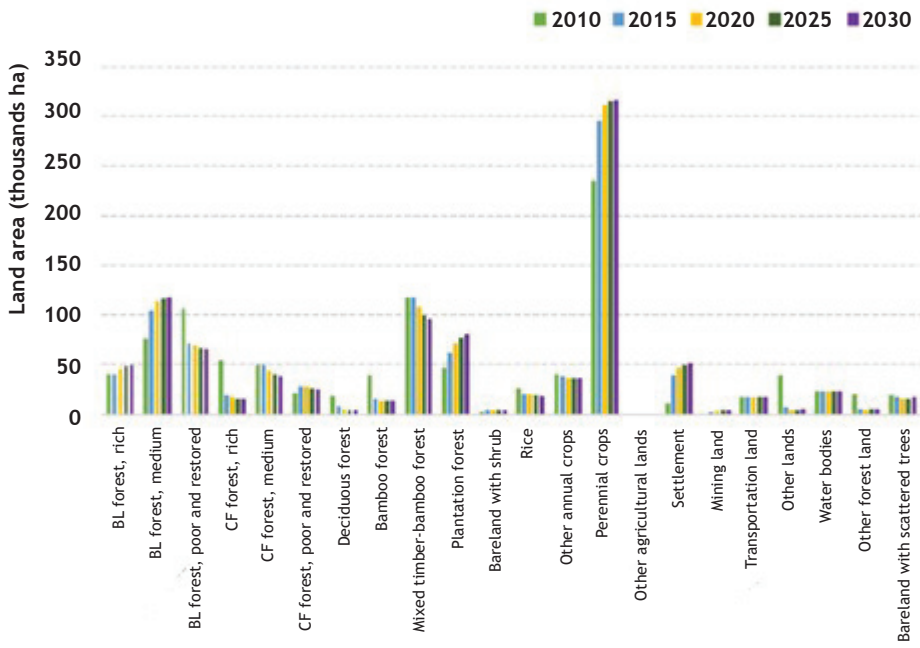
Prioritization of the potential measures within each sector will help in allocating the available resources for implementation; any potential measure that can be undertaken immediately and which yields immediate economic, environmental, and social benefits will be given higher priority.

The total investment cost for all potential GG measures is estimated to reach ~2.8 billion USD. If all potential measures were included, the two sectors with the largest share to total investment cost are energy (about 48%) and transport (about 36%). This stands in contrast to the province's current investment plan which allocates more to agriculture (including livestock, fishery, and forestry) at 43% followed by infrastructure and transport at 31%.

If the GGAP prioritization is pursued, the province will need very large investments if it is to move to a trajectory of inclusive GG. The financing of green economic growth should rely on different sources: national and regional government budgets, investments and partnerships with the private sectors, and grants from various sources including global investors through multilateral cooperation. This often requires strong partnerships between stakeholders connected along commodity value chains (e.g. producers, intermediaries, managers, traders, and end consumers) or by ecosystem services flows (e.g. services users and providers). Integrating GG into upstream development planning is the best entry point for promoting the transition.

Potential economic and environmental benefits

In order to assess the impacts of the interventions, the province utilized various tools to calculate the potential economic and environmental benefits for the province of Lam Dong if they effectively implement their GGAP as compared to a reference condition (REF). The REF scenario is based on the review of 43 planning documents for agriculture, forestry, tourism, infrastructure (mainly transport), water resource management, and energy sectors. The



Source: Technical Report: Green Growth Action Plan for LamDong Province for the Period of 2021 – 2030, Vision to 2050

Figure 1: Projected land cover area by LUMENS for 2010-2030 based on historical trend (BL: broadleaf; CF:Coniferous)

tools they used were the following:

- Land Use Planning for Multiple Environmental Services (LUMENS) – LUMENS is a spatially explicit tool able to handle spatial inputs such as land cover and boundaries of agricultural or forestry measures. It could also incorporate non-spatial inputs such as economic and biophysical parameters like land use profitability and carbon stock of each land cover. The LUMENS analyzes land cover changes based on historical trends and produces future land cover distributions accordingly while taking into consideration its effects on biodiversity and economic activities.
- Long-range Energy Alternatives Planning (LEAP) – LEAP is developed by the Stockholm Environment Institute and is widely used in Vietnam for energy policy analysis and assessments of climate change mitigation potentials from the energy sector. Lam Dong's GGAP uses LEAP to develop their GHG baseline scenario by tracking the consumption, production, and resource extraction of all sectors of an economy. Along with the Marginal Abatement Cost Curve (MACC) and Measure-Correlate-Predict (MCP) approach, they were able to identify and analyze mitigation options from different energy sources.
- Generic River (GENRIVER) hydrology model – watersheds have the capacity to prevent soil erosion which is one of the main issues of the province. The GENRIVER hydrology model is able to assess this capacity by measuring the impact of land cover change on watershed functions through the changes in water balance within the watershed. The model operates in a daily time step and water balance is influenced by input factors such as local rainfall, land cover types, land cover changes, soil properties, canopy interceptions, soil infiltration, and surface flow of water among others, as well as out factors like surface run-off on the day of the rainfall, subsoil flow on the next day, and base flow via the gradual release of groundwater.

Based on the results of the tools, Lam Dong was able to come up with the following economic and environmental benefits from the implementation of the GGAP with a summary provided in Table 1 below:

a. Lower GHG emissions from all sectors - A GG scenario where a total reduction of 19.2% in GHG emissions is predicted compared to REF conditions taking into consideration land cover change, agricultural practices, forest conversion, tourism activities, transport, waste, ener-

gy production and consumption.

b. **Higher product diversification per unit land** - The resilience of the province and smallholder farmers to economic shock depends on product diversification and quality of produce. Higher dependence on a single crop can lead to a high economic risk under market uncertainty. In the GG scenario, higher product diversification is targeted through land sparing and by integrating different types of plants in the same land.

c. **Lower risk of soil erosion within the watershed** - surface flow is higher in the REF condition due to less tree cover and lower canopy interception to the rainfall, thus, more rainfall drops directly on the ground. This and the water holding capacity of the soil determines the intensity of the surface flow and the risk of soil erosion. In the GG scenario with higher tree cover, the one-year cumulative surface flow in the GG scenario can be potentially lower by 18% compared to REF condition. Furthermore, due to higher base flow, the GG scenario has the potential to provide cleaner water and make water available during the dry season.

d. **Lower risk of water shortage** - The agricultural area in Lam Dong province is about 340 thousand hectares in total and generates water demand of about 990 million m3 per year. Assuming equal rate per hectare for annual and perennial crops, the water demand equals 2,900 m3 per hectare per year. From the total agriculture area, about 82% are cultivated by different perennial crops such as coffee and tea. Therefore, water demand for perennial crops reaches about 814 million m3 per year. If 30% of areas of perennial crops were converted into agroforestry with potential water saving of 15-40% compared to monoculture, there is a potential

Table 1. Performance indicators for REF and GG scenarios

	Indicators	Unit	GG	REF	Benefit (%)*
1	Total GHG emissions#	million tons CO_2e	6.13	7.59	-19.2
2	GHG emissions per capita	ton CO_2e	3.98	4.92	-19.2
3	Total energy demand	ktoe	1,169	1,266	-7.7
4	Province's GRDP	billion VND	85,019	81,167	4.8
5	Income from main agricultural productions	billion VND	17,042	13,288	28.3
6	Total labor demand	people	1,530,339	1,385,648	10.4
7	Area of cultivated lands under sustainable practices	Hectares	37,680**	10,400	262.3
8	Area of greenhouses	Hectares	7,031	9,663	-27.2
9	Forest cover	%	56	54	3.7
10	Area of tree outside forest	%	3.85***	1.07	260
11	Area of forest for conservation and research##	hectares	84,119	84,119	0
12	Area of forest under sustainable management	hectares	169,977	67,119	153.2
13	DIFA index (broadleaf forest)	[]	17.85	15.29	14.9
14	DIFA index (coniferous forest)	[]	1.55	1.5	3.3
15	DIFA index (deciduous forest)	[]	11.84	11.29	4.9
16	Water used for irrigation	million m3/year	917	983	-6.7
17	Total surface flow for all sub-watersheds	mm/year	1,307	1,584	-17.5
18	Total base flow for all sub-watersheds	mm/year	176.9	143.8	23.1

 # Including emission from land use, agricultural practice, greenhouse, livestock, energy and waste

Excluding new conservation areas and biodiversity corridors under the Biodiversity Conservation Plan to 2020 of Lam Dong Province

** calculated as (GG-REF)/REF x 100%*

*** if including timber-based system in the encroached forest area: 81,700 ha*

**** calculated as % of agroforestry area from the province's total area. If the timber-based system in the encroached forest area is included: 8.37%*

Source:*Technical Report: Green Growth Action Plan for LamDong Province for the Period of 2021 – 2030, Vision to 2050*

of reducing water inputs by 36-97 million m3 per year or 129-346 m3 per hectare per year (IDH, 2019).

e. **Higher capacity to conserve biodiversity** - The GG measures in the forestry sector, when implemented from 2021, can slightly increase the Degree of Integration of Focal Area (DIFA) index of the three types of forest in 2021-2030. The DIFA is used to measure the capacity of a landscape to conserve biodiversity based on the Total Edge Contrast Index (TECI) or the measurement of the fragmentation of habitat such as forests and their contrast with surrounding land uses.

f. **Higher contribution to province's GRDP** - In the REF condition, the GRDP will potentially reach 81, 467 billion VND by 2030 (driven by economic activities in the current provincial planning of the six assessed sectors). In the GG scenario, the province's GRDP by 2030 will reach 85,019 billion VND, or about 3,850 billion VND higher than the REF scenario. If the province's GRDP in 2030 is estimated using the historical trend (by assuming a constant annual growth of 8.3% from 2021 to 2030), the GG scenario can contribute to attain up to 46% of the projected GRDP.

Indicators for monitoring and evaluation

In order to properly monitor and evaluate the progress and performance of the GGAP in Lam Dong province, there is a need to set up a baseline and collect data for periodical monitoring. Conventional economic indicators like the GRDP provide a distorted lens of economic performance because they fail to account for the negative impacts to the environment caused by production and consumption activities. There is an urgent need for a new set of indicators that can capture impacts on employment, resource intensity, emissions, natural assets, and ecological impacts. These indicators also need to raise awareness of GG issues in the public debate and gauge how well policies are performing with respect to GG.

Lam Dong's GGAP proposes a preliminary set of indicators based on existing works and experience by The United Nations Environment Programme (UNEP), The Organisation for Economic Co-operation and Development (OECD), MPI (draft proposal on national level GG indicators, 2018), and other international and national organisations. These selected indicators were considered because they offer a balance between the desire to be exhaustive and the need for simplicity, and the need to be flexible so that the province's indicators can be later adapted to national context. The three generic criteria (policy relevance, analytical soundness, and measurability) of OECD for selecting GG indicators were found relevant and explained as follows:

1. **Policy relevance:** the set of indicators should have clear policy relevance, aligned with existing socio-economic, development, monitoring and reporting systems in the province. The indicator must be easily understood, and the results must be easily interpreted by policy makers.
2. **Analytical soundness:** the indicators should be analytically sound and can be easily verified and validated. They should be easily linked to economic and environmental modelling and forecasting.
3. **Measurability:** The selected indicators should be based on data that are available or that can be made available at a reasonable cost, and that are of known quality and regularly updated.

Five areas have been chosen to capture the main features of GG: (1) Environmental and natural resources productivity (2) Economic and environmental assets (3) Green lifestyle and sustainable consumption (4) Economic opportunities and policy responses and (5) Social sustainability.

A monitoring system consistent with the national government systems needs to be jointly developed by provincial government agencies and relevant stakeholders including NGOs, companies, communities, etc. Policies on the development of primary and key performance indicators should be made as reference in order to mainstream green economic growth achievement indicators into existing systems rather than separating them. Multi-level climate governance/ coordination between various stakeholders is a critical factor in developing a data collection period and methodology for each indicator.

Implementation of GGAP

Two pilot district-level authorities (Di Linh and Lac Duong) have translated the Green Growth targets into District targets in their Protection – Production – Inclusion (PPI) compact targets in agriculture. The targets have been shared and agreed among public-private-Civil Society Organizations (CSOs) in formal agreements (so called PPI Compact Memorandum of Understanding), implementing in 2 phases: Phase 1 from 2019 to 2020 covers 4,700 ha; Phase 2 from 2021 to 2025 covers roughly 250,000 ha Cropland and Forest land in the two districts. Signing the PPI compact MOU are the Compact Partners with representatives from the local and central government, Management Board of Forest protection unit, International coffee companies, Domestic agricultural/pharmacy companies, Middlemen, Farmers cooperative, and Input providers.

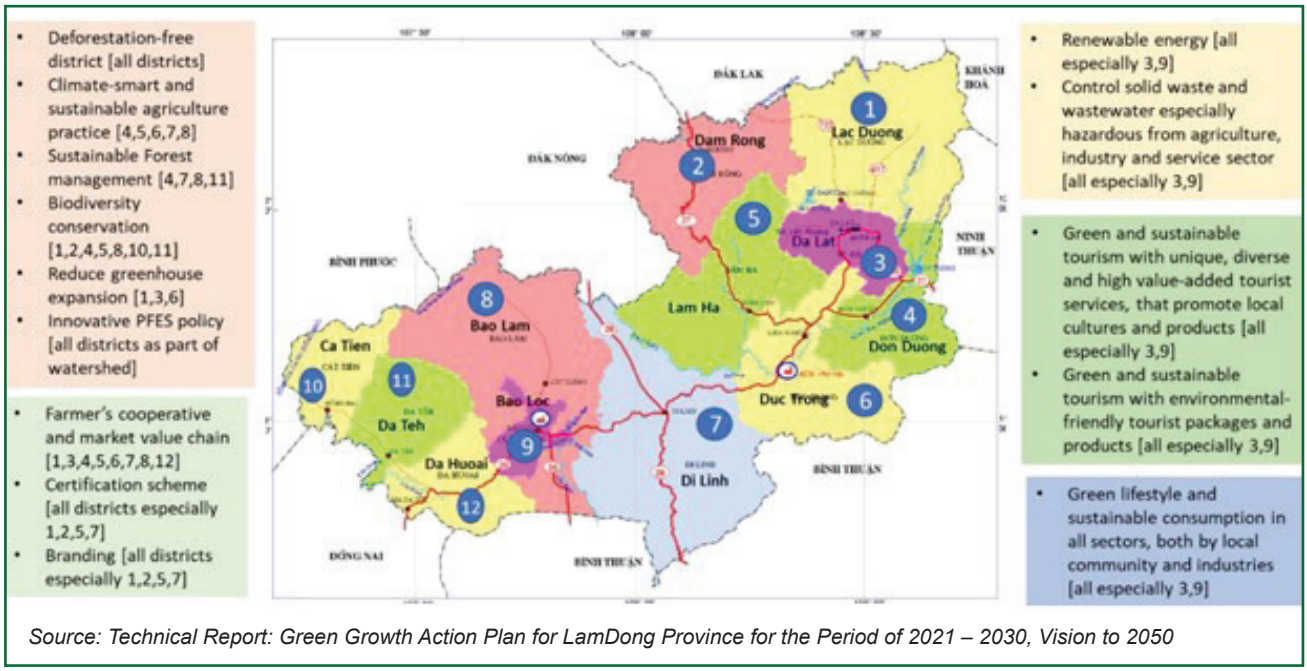
Public and Private Partnership (PPP) governance and the development of PPI compact agreements

The purpose of the PPI compact is to highlight the shared vision for sustainable agriculture based on green growth and sustainability for the two districts in Lam Dong province in a coordinated and time bound manner. With a target that by 2025, the Compact stakeholders have set forth key interventions following the three pillars below:

- Protection – reduce the use of water to carrying capacity, promote use of surface water instead of underground water, reduce the over-use of agrochemicals and switch to organic and biological solutions, protect water and soil from solution, mainstream agroforestry to conserve the entire ecosystem, increase tree cover to mitigate climate change
- Production – develop integrated land use plans for the districts aligned with the Green Growth targets agreed upon by multi-stakeholders, promote the adoption of sustainable production practices, develop sourcing and traceability system for key commodities, promote PPPs in sustainable production, protection of natural resources and income diversification
- Inclusion – improve small farmer income by diversification, empower women in the production and protection activities, engage smallholders and ethnic minorities to the supply chain of agricultural production with companies.

For each Compact, the Compact Partners have identified specific goals for each pillar while also developed an indicator framework to represent progress on their Green Growth targets and the Sustainable Development Goals (SDGs). Overall, both Di Linh and Lac Duong aim to achieve no-deforestation forest-based coffee and intercrop ecosystems that conserve and protect natural resources, and raise farmers' income by 30%.

To monitor the progress of each Compact, a Steering Committee that includes leaders from all signed Compact Partners has been established.



Source: Technical Report: Green Growth Action Plan for LamDong Province for the Period of 2021 – 2030, Vision to 2050

Field level impact

The implementation of PPI compacts to deliver green growth targets: carbon emission reduction, biodiversity, carbon sequestration improvement is reflected in the impacts achieved in the activities done in the pilot districts.

Following a forest-based coffee ecosystem approach, the two Compacts have focused on rolling out proper land-cover management and increasing green cover via both afforestation and agroforestry systems. By applying drone/flycam and satellite imagery to identify the border between Forest and Cropland area, in Da Chais commune, 109 agricultural households, of which 97% are of an ethnic minority, have been convened to stop forest encroachment; 6km green fence have been planted between forest and agricultural land. In both Di Linh and Lac Duong, no cases of deforestation were found. Forest encroachment was reduced significantly while the afforestation doubled and this achievement has attracted investment from other private local companies in the region.

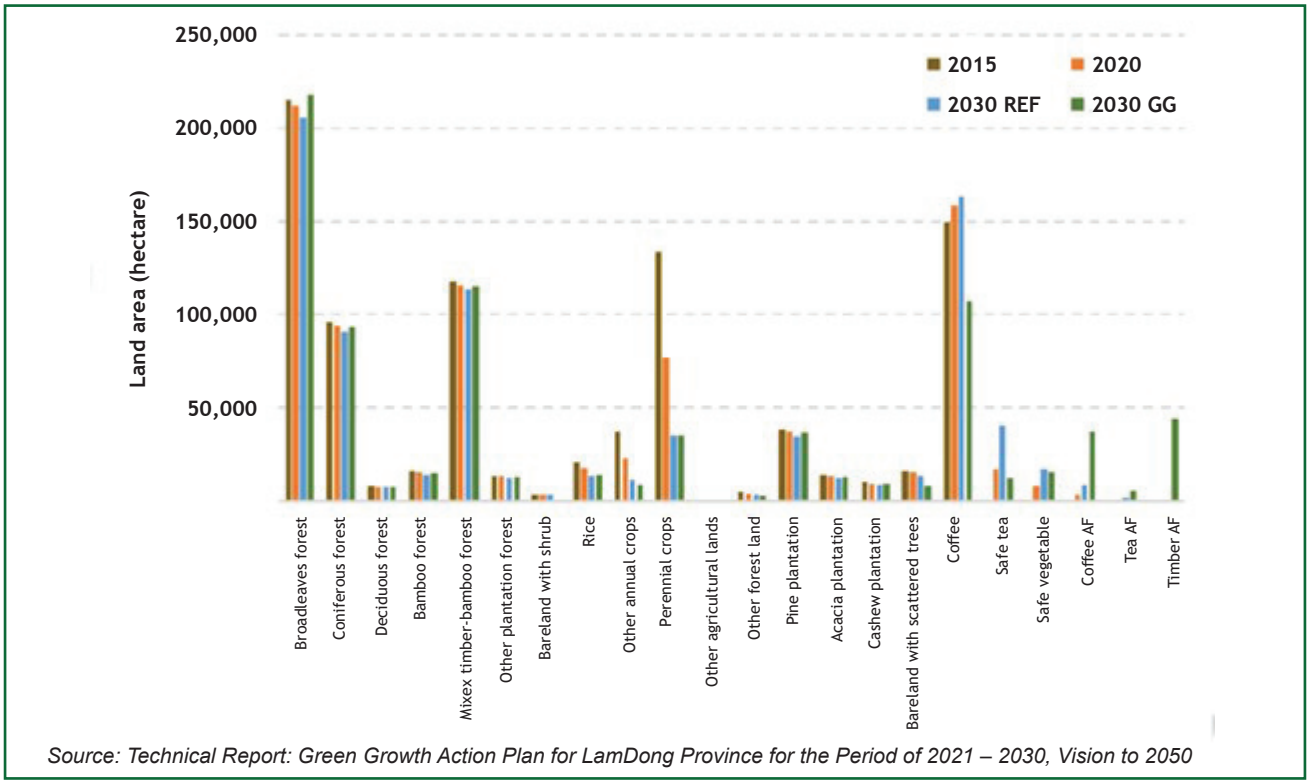
According to the recent reports, the intercropping rate from 2018 to 2020 in the two Compacts has increased three times in Di Linh (from 10.5% to 39.0%) and five times in Lac Duong (from 6% to 31%). This has suggested a greater contribution to carbon sequestration in the coffee sector. The number of farmers that have access to training in Lac Duong has quadrupled (from 21% to 80%) while the adoption rate of intercropping by farmers in both Compacts reached 70%.

Recent analysis of 4,000 farmers in Di Linh and Lac Duong also show a more optimal use of inputs in the coffee sector, which has contributed significantly to lower carbon emissions from coffee farms. The CO2 emission equivalent figure recorded for each metric ton of green bean coffee has been reduced by 75%, from a significant 2,86 Mt CO2 to only 0.75 Mt CO2.

Income of farmers in Di Linh has increased by 20%, achieved by 10% of cost reduction and 70% of increased income from intercropping. Production costs of farmers in Lac Duong have also been reduced by roughly 10% via better access to inputs and credit.

Business transformation

Via Compacts, the private companies have the opportunity to strengthen their supply chain sustainability program by leveraging sustainable action at the local level. 100% of the coffee production in the PPI compact areas will be sourced



Source: Technical Report: Green Growth Action Plan for LamDong Province for the Period of 2021 – 2030, Vision to 2050

Figure 2: Areas of different land covers in Lam Dong province across year (AF: agroforestry)

through the Compact partners (Middlemen and companies).

Lessons Learned and Next Steps

Challenges encountered and solutions

The use of the assessment tools for the cross-sectoral, quantitative, and integrated analysis of the impacts of the GG measures on the provincial economy and ecosystem services is a novel approach in Vietnam. The biggest challenge was the availability of input data (spatial, carbon stock of different land covers, cross-sector economic data, investment cost estimations) from the different sectors. Spatial data from the province were often available in different formats and took a considerable amount of time to standardize and be made usable. When feasible, new digitized versions of maps were produced based on the information found in provincial documents.

On the financing front, green economic growth should rely on different sources: national and regional government budgets, investments and partnerships with the private sectors, and grants from various sources including global investors through multilateral cooperation. This will require strong partnerships within the commodity value chains (e.g. producers, intermediaries, managers, traders, and end consumers) or by ecosystem services flows (e.g. services users and providers). Integrating GG into upstream development planning is the best entry point for promoting the transition. In addition, Green growth also offers Lam Dong a unique opportunity to move towards a carbon neutral economy, creating advantages for the province to join the domestic carbon market, implementing the new Law on Environment 2020, and be a front-runner to reach out to the international markets in the country.

In terms of implementation, the main challenge is the need for the province to adjust its investment structure and project orientation, to focus more on green growth. For example, in the past decade, the share of provincial budget for the energy sector was small compared to those allocated to other sectors, especially agriculture. In contrast, in Lam Dong's GGAP, the energy sector has the largest share of the total investment cost to support an enhanced use of renewable energy. If the current prioritization in investment structure and project orientation continues, the province will need a considerable investment to move to a trajectory of inclusive GG, and to accelerate its economic restructuring towards a modern and green economy. These priorities will likely lead to an investment reduction in agriculture sectors, which brings most of the income to Lam Dong. Therefore, the agriculture sector needs an integrated public-private mechanism which allows the province to mobilize the available resources efficiently at scale.

Future improvements planned

A series of consultation workshops and meetings with provincial authorities from different departments including the Department of Planning and Investment and Department of Finance were organized to mainstream the principles, the economic and ecological benefits that can be derived from implementing the GGAP, and proposed roadmap for the GGAP's implementation in 2021-2030.

Recommendations and Replicability

The NGGAP largely focuses on three aspects, namely: reduced GHG emissions from all sectors, green production, and green lifestyle with sustainable consumption, but Lam Dong's GGAP takes it a step further by also including the preservation of natural resources and ecosystems services as well as increasing the income from main economic sectors. They also proposed new sets of indicators that capture (positive and negative) economic and ecological impacts.

The use of innovative tools like the LUMENS, GENRIVER, and LEAP provided science-based information, insights, and scenarios. These tools informed their planning and decision-making as to what impacts these interventions will have to their environment and economy. This foresight information helps in prioritizing actions that are most beneficial.

The replication of Compact and Source Up[1] will support local action to engage in participatory governance that can mobilize existing resourc-

1. Source Up – collaboration platform for supply chain sustainability changemakers

es, create long-term partnerships and attract investment from supply chain actors to implement Green Growth targets.

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List of Abbreviations

AF	-	Agroforestry
BL	-	Broadleaf
CF	-	Coniferous
CSB	-	Central state budget
CSO	-	Civil Society Organizations
DIFA	-	Degree of Integration of Focal Area
DPI	-	Domestic private investment
FDI	-	Foreign direct investment
GENRIVER	-	Generic River
GG	-	Green Growth
GGAP	-	Green Growth Action Plan
GRDP	-	Gross Regional Domestic Product
GHG	-	Greenhouse gases
LEAP	-	Long-range Energy Alternatives Planning
LUMENS	-	Land Use Planning for Multiple Environmental Services
MONRE	-	Ministry of Natural Resources and Environment
MACC	-	Marginal Abatement Cost Curve
MCP	-	Measure-Correlate-Predict
NGGAP	-	National Green Growth Action Plan
NDC	-	Nationally Determined Contributions
ODA	-	Official development aid
OECD	-	The Organisation for Economic Co-operation and Development
PSB	-	Provincial state budget
PPI	-	Protection – Production – Inclusion
PPP	-	Public and Private Partnership
REF	-	Reference Condition
SDG	-	Sustainable Development Goals
SI	-	Social investment
TECI	-	Total Edge Contrast Index
UNEP	-	United Nations Environment Programme
VGGAP	-	Vietnam Green Growth Action Plan

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