Food and Agriculture Organization
of the United Nations

Annex 22

Assessment of GHG Emissions Reductions

For the GCF-FAO Project "Forest Landscape Restoration for Climate Benefits and Resilience (Fiji FLR)"

1. Project information

Following the planning established by Fiji and formally communicated via the five- and 20-Year Development Plan 2017-2036, the Climate Vulnerability Assessment in 2018, the National Adaptation Plan in 2018, the Third National Communication in 2020, the Nationally Determined Contributions in 2020, and Low Emission Development Strategy (2018-2050), this proposal will support and contribute to the paradigm shift from a linear approach to climate change (adaptation and mitigation), natural resources management (i.e. resources extraction) to a more circular and holistic one where sustainable planning and management of natural resources (i.e. land and ecosystems) considering the complex interdependencies of ecosystems (e.g. from cloud forests to coral reefs) and remove bottlenecks to both adaptation and mitigation. The project will also explore the possibilities for Fiji to enhance engagement with carbon trading markets to further diversify revenue streams for FLR and SFM interventions after the completion of the project, further contributing to the bankability of such interventions. During the engagement process (Annex 7), national stakeholders set the objective of this proposal to enhance with a climate adaptive approach from ridge to reef (R2R)[i] the overall resilience of Fiji's forest landscapes and communities by (I) addressing the policy and governance gaps currently preventive a paradigm shift and enhancing communities participation in land management planning; (II) removing drivers of ecosystems degradation and ensuring sustainable forest landscape management investments; and (III) contributing in creating the economic and financial incentives and tools for public and private investments in sustainable natural resources management. This will allow addressing the main barriers to climate resilience and sustainable natural resources management in Fiji while ensuring and enhancing carbon removals, low carbon, and sustainable development pathways, and allowing stakeholders (e.g., communities, private sector operators, institutions) to benefit from sustainable natural resources management without externalizing adverse impacts and their economic burden to downstream or the state.

1.1 Project Site

Project activities will be carried out in Fiji, a small island nation in the South Pacific Ocean that is spread over 332 islands, which form a broad range of ecosystems from reefs, mangroves, and coastal wetlands to a gradually elevating topography from fertile lowlands to grasslands, rocky hills, and volcanic mountains topped with unique forests. The islands of Viti Levu and Vanua Levu comprise 80 percent of Fiji's landmass. Forests cover 60 percent of the total land area of Fiji, represent a biodiversity hotspot, and provide critical ecosystem services for the climate resilience of the country, its people, and the main sectors of the economy (i.e., tourism and agriculture), including avoiding soil to compromise the health of paramount coastal ecosystems such as coral reefs, seagrass beds, and mangroves.

2. Mitigation Impact

2.1 The Nationally Determined Contribution Expert Tool (NEXT) tool

The Nationally Determined Contribution Expert Tool (NEXT) is a new generation of greenhouse gas (GHG) accounting tool developed by the Food and Agriculture Organization of the United Nations (FAO) to support annual environmental impact assessments for the Agriculture, Forestry, and Other Land Use sector (AFOLU). It provides a 30-year time series of yearly and cumulated estimates of carbon removal and greenhouse gas emission reductions from actions determined by Parties in their climate policies. NEXT was developed using the Intergovernmental Panel on Climate Change (IPCC) methodologies, and estimates can be made using either the IPCC 2006 guidelines or the IPCC 2019 refinement to the IPCC 2006, which are complemented with the IPCC 2013 Wetlands Supplement. The tool was designed to provide results that directly respond to the provisions of the Enhanced Transparency Framework and support the Nationally Determined Contributions (NDC) development as required by the modalities, procedures, and guidelines. NEXT provides a detailed temporal series of results and a comprehensive set of indicators, including the social value of carbon, enabling a thorough environmental and economic overview of climate actions in achieving mitigation targets. The tool helps countries to interpret, track, and scale up the ambition of their NDCs, which could ultimately inform the global stocktake of the Paris Agreement in a harmonized way. NEXT is a land-based accounting standard for national and subnational GHG reduction goals, measuring annual carbon stock changes per unit of land (in hectare), methane (CH_4) and nitrous oxide (N_2O) emissions, expressed in a tonne of carbon dioxide equivalent per year, tCO_2-eq /year. NEXT provides the annual and cumulated estimation of the potential changes in GHG emissions from a set of climate actions over 30 years reading grid (Schiettecatte et al., 2022 a,b[1]).

Thanks to the 30 years reading grid, NEXT can be used at multiple points in time of the climate mitigation commitments, including NDC, investments, and projects:

- Before the implementation of climate action to evaluate its potential changes on GHG emissions reductions
- During the implementation of a climate action to assess and report progress toward the mitigation goal and evaluate additional GHG emissions reductions to achieve the mitigation commitments,
- At the end of the climate action period, assess its achievement regarding GHG emissions reductions.

The 30-year time series of results per gas, activity, and carbon pool allows us to understand the impact of past and current climate actions and shape the necessary actions and related international and national investments for countries to meet their climate targets.

2.2 Methodology for determining the baseline

NEXT allows users to assess the impact of climate actions against a hypothetical reference scenario. In NEXT's terminology, the climate action is defined as the target, while the hypothetical scenario is the reference. Climate action can be a policy, or low-carbon measures implemented within the country or region of interest.

In the context of low-carbon development, the reference scenario refers to scenarios based on the assumption that no mitigation policies or measures will be implemented beyond those already in force or planned to be adopted. The reference scenario is not a prediction of the future but rather a counterfactual projection based on information retained to indicate the level of emissions without any mitigation policy. The term "**reference scenario**" can be used interchangeably with **the baseline, BAU, or no policy scenarios**.

---

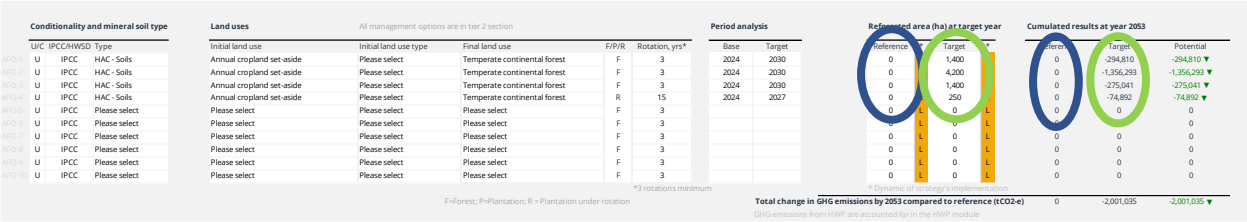
[1] Schiettecatte, L-S., Audebert, P., Umulisa, V., Dionisio, D., and Bernoux, M., 2022a The Nationally Determined Contribution Expert Tool (NEXT): A Comprehensive Greenhouse Gas Accounting Tool to Support Annual Environmental Impact Assessment Over a 30-Year Time Series in the Agriculture, Forestry and Other Land Use Sector. Front. Clim. 4:906142. doi: 10.3389/fclim.2022.906142

Schiettecatte, L-S., Audebert, P., Umulisa, V., Dionisio, D., and Bernoux, M., 2022b. Technical Guidance to the Nationally Determined Contribution Expert Tool, NEXT. Rome: FAO.

Once users have provided a set of basic information per activity, which is the area, the start and end of the climate action, and the land management practices, NEXT will estimate the annual and cumulated GHG fluxes and carbon stock changes from the transition of the initial land-use or management practices to the final land-use or management practices, including changes in GHG fluxes and carbon stocks that will keep occurring after the end of the climate action. These estimates are done for the target, the reference scenario, and, ultimately, the balance. The final results of NEXT are the potential changes in GHG emissions reductions per activity and per gas. This potential change in GHG emissions reductions, or balance, is defined as the difference between the gross fluxes from the target and those from the reference.

Concerning the data for establishing the baseline, which first regards the definition of the Forestry practices in the NEXT tool, the experts for sustainable forestry practices of the FAO design mission considered experience gained in the region. They confronted them with information provided by local experts. TIER 2 values were used to estimate carbon balances for reforestation and forest management activities.

Figure 1 Screenshot of the spreadsheet "Forest land" of the NEXT tool, which includes modules to assess any forestry-based activities such as (af/re)forestation. The blue ellipse represents the reference ("baseline") in which no land is reforested, and the green ellipse represents the situation after the implementation of the project activities, leading to a total of 7,000 ha of reforested land with a new carbon sink.



2.3 GHG Analysis utilizing NEXT

NEXT is built up of several modules allowing the evaluation of GHG emissions in the AFOLU sector. The present analysis used NEXT standardized to the IPCC 2006 methodologies, using the GWP of the 5th Assessment report, Myrhre et al., 2013.[2]Several modules, namely the afforestation module, the forest management module, the Crop and Grass module, and the harvested wood product (HWP) module, were used to account for the project's activities.

While the project will be implemented over seven years, NEXT will keep capturing the full impact of management and conservation strategies on biomass and soil organic carbon (SOC) stocks until the different carbon stocks, particularly soil and biomass, reach their respective equilibrium. For instance, in the case of the conversion from a set-aside land to a forest over an implementation period of 7 years, NEXT will estimate the SOC stock changes until years 7+20[3] when the last unit of set aside land is converted to forest, and consequently will have reached its SOC equilibrium. Thus, in NEXT, carbon stock changes (biomass, litter, deadwood, and soil) are estimated over the period plus the period needed for each carbon stock to reach its respective equilibrium. The changes in biomass carbon stock will be calculated over the 30-year time series. The total lifetime considered for the project is 20 years to capture SOC changes and equilibrium until 2045.

2.4 Data used for the carbon accounting analysis

All components have a climate change mitigation impact. The corresponding activities are summed up in table 2.

[2] AR5 without climate-carbon feedback, i.e. 28 for CH_4 and 265 for N_2O.

[3] The IPCC guidance is assuming a default 20 years' time period for SOC to come to equilibrium. This is not the case for biomass which can reach equilibrium before or after according to the land use type, e.g. forest, agroforestry among other.

Table 1 Activities considered for the Carbon Accounting

		Activity description	Tools	Approach	Baseline & additionality	Common practice
Component 1	Activity 1.3.2.	10,000 ha of permanent forest estates established	NEXT worksheet FOREST LAND (forest management)	Forest Protection	The project will consider degraded forest lands currently under no lease agreement and establish agreements with the government, the private sector, and the communities owning the land to carry out sustainable forest management practices to rehabilitate the lands and develop permanent forest estates under new license agreements. This will also include the establishment of benefit sharing mechanism to encourage the participation of the communities in the accords and long-term sustainability, On the baseline scenario, it can be assumed that no further improvement to the degraded forest lands would have occurred. The land would have been converted under new lease agreements to other purposes in line with the short-term economic benefit expectations of the communities and the private sector making investments. To remain conservative, no further degradation of the forest was accounted in the baseline.	The iTaukei communities are responsible for deciding how to utilize their resources. Decisions are often taken on a short-term benefit-expectation basis and usually favor unsustainable agricultural expansion or deforestation to obtain logging premiums. If no economic benefit could have been received, it can be assumed that the degraded forest lands would have remained degraded without community intervention.
Component 2	activity 2.2.1	Community planting of 5,750 ha mixed species	NEXT worksheet CROP&GRASS (Cropland/Grassland)	Forest Restoration	This activity will engage all communities in implementing the CLMP and FLR Agreement. Landowners and smallholder farmers will be facilitated to work in groups and learn to develop their business plans to implement economically viable and financially beneficial FLR. Without project intervention, the communities lack the capacity and access to technology and finance to make investments that would not have occurred.	Logged-over forests are generally left utilized for agricultural purposes or left in a degraded state. Natural regeneration is often delayed if not converted for farming or other purposes, as few seed trees are present that cannot express their full potential for natural regeneration. The deforested areas stay, therefore, often in the state of set-aside grasslands.

		Natural regeneration of 5,000 ha degraded forests with communities	NEXT worksheet FOREST LAND (forest management)	Forest Restoration	These measures will consist of the natural regeneration of native species in areas where forests have partially disappeared and will be implemented by the benefitting communities. The measures depend on the existence of seed trees, and if necessary, native species will be introduced by direct seeding or planting saplings. Promoting the seed trees will be supported by removing invasive species, attracting seed dispersers, and regular weeding of the sites. Without project intervention, the area would have remained in a degraded state, with no further degradation to remain conservative. Without project intervention, communities lack the capacity and access to technology and finance to carry out investments.	
		Community restoration of waterways and Riparian zones totaling 5,000 ha	NEXT worksheet CROP&GRASS (Cropland/Grassland)	Forest Restoration	This activity will engage all communities in implementing the CLMP and FLR Agreement. Landowners and smallholder farmers will be facilitated to work in groups and learn to develop their business plans to implement economically viable and financially beneficial FLR. This activity involves planting mixtures of tree species to protect waterways and riverbanks in a high-priority watershed. It would work in synergy with the vetiver plantations promoted by the Ministry of Agriculture and Waterways. Depending on the management plans and stakeholder interest, vetiver could be added to the systems. Without project intervention, the communities lack the capacity and access to technology and finance to make investments that would not have occurred.	

	Activity 2.2.2.	12,000 ha of HCVF established.	NEXT worksheet FOREST LAND (forest management)	Forest Conservation	The forest area is designated for logging practices. Given that it is a forest of HCVF, the government will agree with local communities to conserve it instead of assigning logging practices.	The iTaukei communities are responsible for deciding how to utilize their forest resources. Any formal activity, such as logging or forest conservation, undertaken on communally owned land requires the consent of the landowning community and needs to be approved by the iTLTB after consultation with the Ministry of Forestry (which makes its decisions based on the Fiji Forest Policy). Communities have been identified as lacking the necessary technical capacity to implement activities related to FLR and SFM and are often guided by short-term benefits, leading to unsustainable practices. The project will, therefore, coordinate between the government and the communities to assign a conservation status on the land and save, thus, precious resources considered HCVF and carbon sinks.
Component 3	Activity 3.3.1.	6,000 ha of logged-over forest naturally regenerated and under SFM.	NEXT worksheet FOREST LAND (forest management)	Forest Restoration	These measures will consist of the natural regeneration of native species in areas where forests have partially disappeared and will be implemented by the benefitting communities. The measures depend on the existence of seed trees, and if necessary, native species will be introduced by direct seeding or planting saplings. Promoting the seed trees will be supported by removing invasive species, attracting seed dispersers, and regular weeding of the sites. Without project intervention, the area would have remained in a degraded/set aside grassland state.	Logged-over forests are generally left utilized for agricultural purposes or left in a degraded state. Natural regeneration is often delayed if not converted for farming or other purposes, as few seed trees are present that cannot express their full potential for natural regeneration. The deforested areas stay, therefore, often in the state of set-aside grasslands.
		500 ha of forest reforested.	NEXT worksheet FOREST LAND (Afforestation/Reforestation)	Forest Restoration	Under the baseline scenario, no afforestation activities would occur in the project area. While the country is increasing its forest cover, the state, communities, and companies do not dispose of the necessary resources to cover the additional costs of climate-adaptive silviculture reforestation. In this regard, GCF funding will support the forestry investments to ensure investments that could otherwise not occur.	One of the priority activities of the low-carbon development strategy is planting 15 million trees by 2035. However, line agencies cannot implement investments and prepare enough seedlings to support afforestation. The forestry stakeholders do not know how to carry out climate-adaptive planting or manage and monitor planting sites. Therefore, the project is essential to overcome these barriers.

	Activity 3.3.2.	4,312 ha from left aside land (previously degraded forests) and areas supported with restoration via Technical Assistance and seedlings.	NEXT worksheet FOREST LAND (Afforestation/Reforestation)	Forest Restoration	The project will facilitate private companies and communities' restoration of degraded forests on plantation community land estates by providing technical assistance and seedlings of diverse species. Communities and private sector companies currently lack the resources or capacity to carry out climate-adaptive restoration processes, and the investment would not have taken place without intervention.	Stakeholders in Fiji currently lack the capacity, seedlings, and resources to restore left-aside degraded forests.
		800 hectares of community and privately owned short-rotation plantations	NEXT worksheet FOREST LAND (Afforestation/Reforestation)	Short Rotation Plantations	Decades of intensive farming and unsustainable forestry practices have compromised the quality of the land, leading to 110,000 ha of degrading agricultural shrubs, forests, and grassland. The project will support the private sector in planting trees in degrading agricultural, shrub, and grassland. This will allow communities to profit from their lands with a reduced investment need and allow soil to recover. In a BAU scenario, abandoned lands would maintain their degraded state. NEXT adopts a conservative approach, considering the carbon stocks of initial land are at equilibrium (no loss, no gain of soil and or biomass).	Land degradation rehabilitation is not currently being done in the country, given the lack of capacity and resources to implement the initial investments. Therefore, spreading knowledge of the activity's advantages and demonstrating the methodology's feasibility is necessary to promote land rehabilitation. As discussed with the company managers managing the country's most significant biomass for energy production, there is considerable potential for investments in SRP. However, initial investments anticipated by local stakeholders have not been carried out, so the biomass plant is currently significantly underperforming.
		24,375 ha of plantation from public corporations under SFM.	NEXT worksheet FOREST LAND (forest management)	Sustainable Forest Management	Current plantations focus mainly on the commercial aspects of the practices and do not consider the necessity of applying sustainable forest management approaches. The project will, therefore, support public enterprises in enhancing practices and ecosystem approaches.	Forest enterprises are currently not applying sustainable forest management approaches. The LEDS foresee an increase of the mean annual increment of plantations by 40% with improved management techniques, which appears feasible compared to similar regions. So far, however, the stakeholders lack the knowledge to do so.

	Activity 3.3.3	7,000 ha of agroforestry established.	NEXT worksheet CROP&GRASS (Cropland/Grassland)	Agroforestry	It can be assumed that without project intervention, investments in the degraded lands would not have occurred, as communities often lack knowledge and technical support on how to apply the concepts and are not provided with the needed inputs (climate-adapted seedlings, etc.) and finances to carry out initial investments. Furthermore, value chains are poorly developed, leading to a lack of demand for cultivated climate-smart products and lower investment incentives. The source mentions the need to promote the concept of agroforestry in Fijian communities as traditional agroforestry practices have slowly eroded. It highlights the importance of training and technical assistance to enable farmers to implement agroforestry systems effectively.	While there are some examples of agroforestry investments, scaling up practices has not been possible, mainly due to a lack of technical knowledge and inputs. Reportedly, there is sometimes a fundamental lack of knowledge about climate-adapted agroforestry. Agroforestry is sometimes confused with ordinary agriculture in a forestry setting (i.e., a “normal” agriculture field surrounded by forests).

2.5 Boundaries/impact

GHGs considered for carbon accounting are essentially CO_2. None of the activities will have generated CH_4 and N_2O.

The GHG analysis does not include the lifecycle GHG impact of the materials (e.g., for the production of equipment using energy-efficient measures) applied. The impact of the different activities on climate change mitigation is explained in more detail in Chapter 3 and calculated in the NEXT file.

2.6 Monitoring Approach

The monitoring of the project's carbon accounting will be integrated into the national forest monitoring system. The MRV system related to carbon accounting will be based on IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (GPG-LULUCF). It will incorporate the following key elements: (i) Field data collection and remote sensing analysis to quantify forest carbon stocks and changes; (ii) Regular compilation and submission of GHG inventories and progress reports; (iii) Independent review and validation of reported data and methodologies.

The MRV system will collect the following data: (i) Forest area changes through satellite imagery analysis; (ii) Forest carbon stock changes via field plot measurements; (iii) Activity data on afforestation, reforestation, and forest management practices

Data will be managed through a centralized database system, with proper data backup and security protocols.

The MRV system will implement QA/QC procedures, including (i) Training programs for field staff on measurement protocols, (ii) Cross-checks of field data entries, (iii) Verification of remote sensing analysis through ground-truthing, (iv) Internal audits of data management processes; (iv) External peer review of methodologies and results

To **account for potential leakage emissions**, the MRV system will: (i) Monitor Forest cover changes in areas adjacent to project sites; (ii) Track displacement (e.g. agricultural expansion, or logging to non-project areas) of activities to non-project areas; (iii) Assess market effects on wood products and land use.

2.7 Assumptions associated with the activity data

The assumptions related to the carbon impact of the activities indicated in Table 2 are described further as follows.

Outcome 1: Strengthened regulatory framework for integrated landscape management aimed at climate change adaptation and mitigation

10,000 ha of permanent forest estates established

For the establishment of permanent forest estates on 10,000, it can be assumed as a conservative approach that would lead to a forest regrowth on 30% of the land. The increased carbon sink can be calculated with the gain-loss approach: with NEXT, the user can consider gains through biomass regrowth following improved forest management. In this regard, the carbon accounting considers that biomass regeneration would occur on 30% of the 10,000 ha due to the new climate adaptive silvicultural practices. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory (GoF, 2023) and inserted in the “tier 2” section of the tool, i.e., 2.63 tC/ha/yr and the same growth rate is used for the period less than 20 years and above 20 years (as IPCC is providing biomass growth rate for these two periods).

Outcome 2: Climate resilience of local communities through climate-adaptive forest management increased while contributing to mitigation and food security

Community planting of 5,750 ha mixed species

To demonstrate the diversified possibilities for land restoration, the project will apply 5,750 ha of mixed species to former degraded forest lands, which will be represented by grassland as a proxy. This choice is also a conservative approach to avoid overestimating the carbon balance, as by default (tier 1) the SOC of a grassland is the same than

a forest. The carbon accounting considers an adoption rate of 70%. Only biomass carbon stock changes will be estimated as a grassland's SOC is the same as a forest, using a default approach and carbon stocks (tier 1). The IPCC 2019 default biomass growth rate was utilized to provide a more updated estimation. As an average biomass growth rate and conservative estimation, the agroforestry approach is used within NEXT and informed in the "tier 2" section of the tool, i.e., 3.3.tC/ha/yr for above-ground biomass and 0.9 tC/ha/yr below-ground biomass over a 20 year period of biomass growth.

Natural regeneration of 5,000 ha degraded forests with communities.

After the initial planting of seedlings in the degraded forests to support restoration, the area will be assigned to natural regeneration. As a conservative estimate, it is assumed that this will lead to forest regeneration on 30% of the land. The increased carbon sink can be calculated with the gain-loss approach: With NEXT, the user can consider gains through biomass regrowth following improved forest management. In this regard, carbon accounting considers that 30% of the 5,000 ha biomass regeneration would occur due to the new climate adaptive silvicultural practices. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory (GoF, 2023) and inserted in the "tier 2" section of the tool, i.e., 2.63 tC/ha/yr, and the same growth rate is used for the period less than 20 years and above 40 years, as already explained above.

Community restoration of waterways and Riparian zones totaling 5,000 ha

To demonstrate the different possibilities for community restoration, the project will apply 5,000 ha of tree species mixtures to protect waterways and riverbanks in a high-priority degraded watershed. Depending on the management plans and stakeholder interest, vetiver could be added to the systems. The carbon accounting considers an adoption rate of 70%. As degraded land is not an IPCC land use type, we used grassland as a proxy. This choice is also a conservative approach to avoid overestimating the carbon balance. Only biomass carbon stock changes will be estimated as a grassland's SOC, which is the same as a forest, using a default approach and carbon stocks (tier 1). The IPCC 2019 default biomass growth rate was utilized to provide a more updated estimation. As an average biomass growth rate and conservative estimation, the agroforestry approach is used within NEXT and informed in the "tier 2" section of the tool, i.e., 1.9.tC/ha/yr for above-ground biomass and 0.5 tC/ha/yr below-ground biomass. The biomass growth rate is estimated to be over 25 years, using the IPCC default values.

12,000 ha of HCVF established.

To establish 12,000 ha HCVF, it is assumed that without project intervention, logging would have occurred in the whole area. As a very conservative approach, it is believed that all the logs would have been converted to furniture, leading to an "export" of the carbon stock of the forests to Harvested Wood Products (HWP, i.e., furniture). The carbon loss avoided and consequently accounted for in the project corresponds to GHG emissions due to the degradation of HWP over the project's lifetime. The average carbon stock has been utilized from the national carbon stock assessment (GIZ, 2011) and inserted in the "tier 2" section of the tool, i.e., 53.2 tC/ha.

Outcome 3: Strengthened financial mechanisms, incentives, and opportunities for sustainability, food security and scaling up

6,000 ha of logged-over forest naturally regenerated and under SFM.

After the initial planting of seedlings in the degraded forests to enhance restoration, the area will be assigned to natural regeneration. As a conservative estimate, it is assumed that this will lead to forest regeneration on 30% of the land. The increased carbon sink can be calculated with the gain-loss approach: with NEXT, the user can consider gains through biomass regrowth following improved forest management. In this regard, the carbon accounting considers that biomass regeneration would occur on 30% of the 6,000 ha due to the new climate adaptive silvicultural practices. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory

(GoF, 2023) and inserted in the "tier 2" section of the tool, i.e., 2.63 tC/ha/yr, and the same growth rate is used for the period less than 20 years and above 40 years, as explained above.

500 ha of forest reforested

The project aims to enhance national afforestation efforts by planting climate-adapted local tree species through collaborative and more effective afforestation. With the project implementation, the afforestation activities would occur on at least 500 ha of currently set aside land. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory (GoF, 2023) and inserted in the "tier 2" section of the tool, i.e., 2.63 tC/ha/yr.

800 hectares of community and privately owned short-rotation plantations (SRP)

To demonstrate the possibilities for soil rehabilitation, the project will apply 800 ha of SRP on degraded agricultural land. As degraded land is not an IPCC land use type, we used annual cropland grassland as a proxy and conservative approach. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory (GoF, 2023) and inserted in the "tier 2" section of the tool, i.e., 2.63 tC/ha/yr and the same growth rate is used for the period less than 20 years and above 40 years.

4,312 ha from left aside degraded forests and areas supported with restoration via TA and seedlings.

Here, we assumed the reforestation of native species on a left-aside degraded forest. To keep a conservative approach to carbon stock changes, the left-aside degraded forest is represented by grassland, as the SOC is the same as that of a forest. The average biomass growth rate has been taken from the National Greenhouse Gas Inventory (GoF, 2023) and inserted in the "tier 2" section of the tool, i.e., 2.63 tC/ha/yr.

24,375 ha of plantation from public corporations under SFM

Due to the sustainable management of forest plantations, it can be assumed that this would lead to increased forest growth in 10% of the plantation area. The increased carbon sink can be calculated with the gain-loss approach: With NEXT, the user can consider gains through biomass regrowth following improved forest management. In this regard, the carbon accounting considers that biomass regeneration would occur on 10% of the 24,375 ha due to the new climate adaptive silvicultural practices. The average carbon stock of plantations from the carbon stock assessment (GIZ, 2011) is used and informs the "tier 2" section of the tool, i.e., 6 tC/ha/yr for forests less than 20 years old, and 2.4 tC/ha/yr for forest more than 20 year. We also assumed that Mahogany and Pine trees would represent 70 percent of the tree mixtures.

7,000 ha of agroforestry established

To demonstrate the possibilities for soil rehabilitation, the project will apply 3,000 ha of agroforestry to degraded agricultural land. The carbon accounting considers an adoption rate of 70%. As degraded land is not an IPCC land use type, we used annual cropland set-aside as a proxy. Tier 1 data from IPCC 2019 has been utilized to calculate the carbon sink increase through agroforestry, i.e. 3.3 tC/ha/yr for the above-ground biomass growth rate, 0.9 tC/ha/yr for the below-ground biomass growth rate over 20 years growth.

3. Greenhouse Gas Appraisal results

The carbon accounting of the forestry activities is presented in Figure 1 for the following years: (i) year 2028 at the Mid-Term Evaluation of the project; (ii) year 2031, i.e., at the end of the project implementation ; and (iii) year 2044, i.e., 20 years after the start of the project.

Figure 2: NEXT screenshot-overview of the results (cumulated and annual) in three different years.

NEXT indicators*

* Indicators from the strategies implemented in the present analysis

Cumulative emissions - Emissions expected by:	**2028**		**2031**		**2044**	
Reference scenario:	20,883	tCO2-eq	62,529	tCO2-eq	463,021	tCO2-eq
Target scenario:	-244,199	tCO2-eq	-949,081	tCO2-eq	-5,464,699	tCO2-eq
Mitigation potential:	-265,082 ▼	tCO2-eq	-1,011,610 ▼	tCO2-eq	-5,927,720 ▼	tCO2-eq
Carbon stock changes (balance):	-254,061 ▼	tCO2	-980,752 ▼	tCO2	-5,796,571 ▼	tCO2
tal emissions changes, excluded carbon stock (balance):	-11,021 ▼	tCO2-eq	-30,859 ▼	tCO2-eq	-131,149 ▼	tCO2-eq
Annual emissions - Emissions expected by:	**2028**		**2031**		**2044**	
Reference scenario:	9,047	tCO2-eq	16,245	tCO2-eq	40,949	tCO2-eq
Target scenario:	-134,638	tCO2-eq	-283,469	tCO2-eq	-348,373	tCO2-eq
Forest cover (balance, cumulative area):	29,135	ha	50,987	ha	50,987	ha

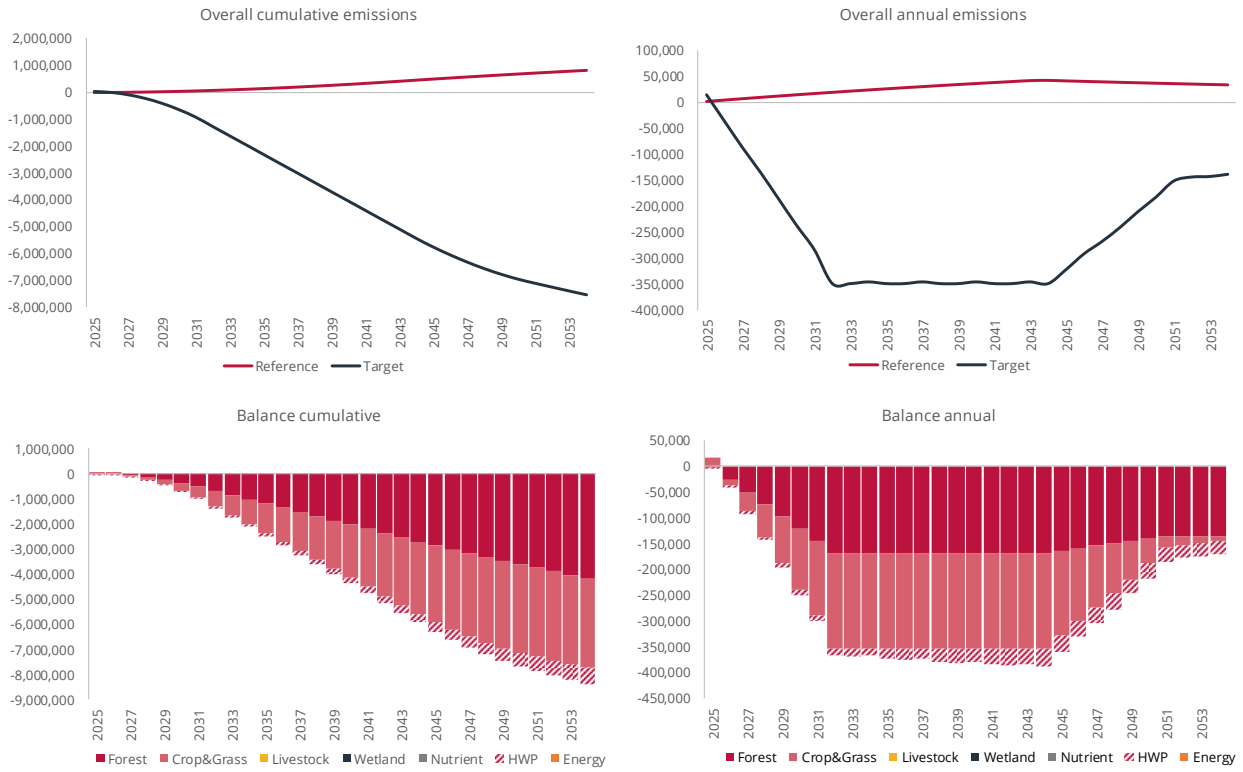


Table 3 summarizes the impact of the different implemented activities on climate change mitigation.

Table 2 Overview of the calculated cumulated GHG emission reductions per activity over the project's lifetime in $ktCO_{2eq}$, i.e., year 2044

Action	Target (ha)	Target (kt CO2eq)	Reference Activity(s)

Forest Protection	10,000	-491,810	Activity:1.3.2
Forest Conservation	12,000	-453,638	Activity:2.2.2
Forest Restoration	26,562	-2,539,594	Activities: 2.2.1 & 3.3.1
Sustainable Forest Management	24,375	-909,878	Activity: 3.3.2
Agroforestry	7,000	-1,530,185	Activity: 3.3.3
Short Rotation Plantations	800	-3,462	Activity: 3.3.2
Total	**80,737**	**-5,928,567**	

A. The Low Emission Development Strategy and the Forestry Sector

To reach climate neutrality by 2050, Fiji developed the Low Emissions Development Strategy (LEDS), which includes four different scenarios with different ambitions. Fiji's LEDS is designed to be flexible and adaptive, allowing for periodic updates and adjustments based on new data, technological advancements, and financial resources. This approach ensures that Fiji continuously enhances its climate actions and aligns with the latest scientific and policy developments. The only scenario that leads to climate neutrality by 2050 is, however, the "Very High Ambition scenario," which involves adopting significantly more ambitious policies and technologies and securing additional financing to achieve substantial emission reductions across all sectors. The "Very High Ambition scenario" aims for most sectors to achieve net-zero or even negative emissions by 2050. In order to accomplish this, the forestry sector also has to increase its carbon sink from the estimated -0.058 million tCO_2 in 2020 to -1.4 million tCO_2-eq in 2050.

The GHG emission reduction from the project's forestry activities is expected to increase carbon removals and avoid carbon loss of the Fijian Forest by -6 million tCO_2-eq over the project's lifetime of 20 years. The implementation of the project would correspond to a reduction of -0.7 million tCO_2-eq by the year 2030. The project's impact will last: In fact, in 2045 alone, the project is expected to contribute to -361 kt tCO_2-eq, approx. 26% of the aforementioned additional -1.4 million tCO_2-eq additional carbon sink in the “very high ambition scenario” of the LEDs.

B. Conclusion

It is estimated that approximately -6 million tCO_2-eq will be avoided and or removed over 20 Years of the project through climate adaptive forest landscape. Considering all project investment costs, the price per tCO_2-eq avoided is approximately USD 8.3. The cost is well below other crosscutting projects related to forestry/ sustainable landscape management approved by the GCF, e.g. in Benin (US$ 19.6[4]), LAO PDR (US$ 17.7[5]) and others.

[4] https://www.greenclimate.fund/project/fp187
[5] https://www.greenclimate.fund/project/fp200

4. References

Intergovernmental Panel on Climate Change (IPCC). 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Agriculture, Forestry, and Other Land Use.

IPCC. 2013. 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands. Hiraishi, T., Krug, T., Tanabe, K., Srivastava, N., Baasansuren, J., Fukuda, M. & Troxler, T.G. (eds). Published by IPCC, Switzerland.

IPCC. 2019. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyearozhenko, Y., Shermanau, P. and Federici, S. (eds). Published by: IPCC, Switzerland.

Government of Fiji, 2023. National Inventory Report (NIR) of Fiji.

GIZ, 2011. Fiji National Forest Carbon Stock Assessment Version 1.

Myhre, G., Shindell, D., Bréon, F.-M., Collins, W., Fuglestvedt, J., Huang, J., Koch, D., Lamarque, J.-F., Lee, D., Mendoza, B., Nakajima, T., Robock, A., Stephens, G., Takemura T. & Zhang, H. 2013. Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Schiettecatte et al., 2022a. The Nationally Determined Contribution Expert Tool (NEXT): a comprehensive greenhouse gas accounting tool to support annual environmental Impact assessment over a 30-year time series in the Agriculture, Forestry, and Other land use sectors. *Frontiers in climate* https://www.frontiersin.org/articles/10.3389/fclim.2022.906142/full

Schiettecatte et al., 2022b. Technical guidance of the Nationally Determined Contribution Expert Tool (NEXT). https://www.fao.org/documents/card/fr/c/cc0568en/

[i] "Ridge to Reef refers to integrated approaches to freshwater and coastal area management emphasizing the inter-connections between the natural and social systems from the mountain 'ridges' of volcanic islands, through coastal watersheds and habitats, and across coastal lagoons to the fringing 'reef' environments associated with most PSIDS." For more information see: What is Ridge to Reef? | SPC-R2R (pacific-r2r.org)