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GCP/GUY/003/GRI
Terminal Report

FAO/GOVERNMENT COOPERATIVE PROGRAMME

MAINSTREAMING SUSTAINABLE LAND DEVELOPMENT AND MANAGEMENT IN THE COOPERATIVE REPUBLIC OF GUYANA

GUYANA

PROJECT FINDINGS AND RECOMMENDATIONS

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ROME, 2025

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Report prepared for
the Government of Guyana
by
the Food and Agriculture Organization of the United Nations

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 2025

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LIST OF ABBREVIATIONS

ANR	- Assisted Natural Regeneration
APA	- Amerindian Peoples' Association
BSc	- Bachelor of Science
CI	- Conservation International
COP	- Conference of the Parties
CORS	- Continuously Operating Reference Stations
CRIC	- Committee for the Review of the Implementation of the Convention
EFI	- European Forest Institute
EMBRAPA	- Agricultural Research Corporation of Brazil
EPA	- Environmental Protection Agency
EPAGRI	- Empresa de Pesquisa Agropecuária e Extensão Rural (Agricultural Research and Rural Extension Agency (Brazil))
ESRI	- Environmental Systems Research Institute
FIG	- International Federation of Surveyors
GCAF	- Gender-Responsive Climate-Smart Agriculture and Food Systems Project
GFC	- Guyana Forestry Commission
GGMC	- Guyana Geology and Mines Commission
GIS	- Geographical Information Systems
GLSC	- Guyana Lands and Surveys Commission
GNSS	- Global Navigation Satellite Systems
GSA	- Guyana School of Agriculture
GTI	- Guyana Technical Institute
IGIF	- Integrated Geospatial Information Framework
LCDS	- Low Carbon Development Strategy

LIDAR	- Light Detection and Ranging
LoA	- Letter of Agreement
M&E	- Monitoring and Evaluation
MMA/ADA	- Mahaica Mahaicony Abary – Agricultural Development Authority
MoU	- Memorandum of Understanding
NAREI	- National Agricultural Research and Extension Institute
NDIA	- National Drainage and Irrigation Authority
NGLMS	- Next Generation Lease Management System
NGO	- Non-governmental Organization
NICIL	- National Industrial and Commercial Investments Limited
NSDI	- National Spatial Data Infrastructure
PMU	- Project Management Unit
PSC	- Project Steering Committee
SDG	- Sustainable Development Goal
SDI	- Spatial Data Infrastructure
SEPAL	- System for Earth Observation Data Access, Processing and Analysis for Land Monitoring
SIRGAS	- Geodetic Reference System for the Americas
SLDM	- Sustainable Land Development and Management
SLM	- Sustainable Land Management
SOP	- Standard Operating Procedure
ToT	- Training of Trainers
TWG	- Technical Working Group
UAV	- Unmanned Aerial Vehicle
UNCCD	- United Nations Convention to Combat Desertification
UN-GGIM	- United Nations Committee of Experts on Global Geospatial Information Management

A. OVERVIEW

A.1 PROJECT PROFILE

Country	Guyana
Project Symbol	GCP/GUY/003/GRI
Project Title	Mainstreaming Sustainable Land Development and Management in the Cooperative Republic of Guyana
Resource Partner	Guyana REDD+ Investment Fund (GRIF)
Actual EOD	11 April 2018
Actual NTE	31 December 2025
Participating Organizations (e.g. Ministry of Agriculture, etc.)	Guyana Lands and Surveys Commission
Contribution to FAO's Strategic Framework <i>Indicate the title of each higher level result to which the project contributes</i>	
Sustainable Development Goals (SDGs)	12, 13 and 15
SDG Target(s)	12.a – Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production 13.2 – Integrate climate change measures into national policies, strategies and planning 15.2 – By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally 15.3 – By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
FAO Programme Priority Area(s)	Better Environment (BE) 1: Climate change mitigating and adapted agrifood systems. Better Environment (BE) 2: Bioeconomy for sustainable food and agriculture

	Better Environment (BE) 3: Biodiversity and ecosystem services for food and agriculture
Regional Priority Area/Initiative	Regional Initiative (RI) 3: Sustainable use of natural resources, adaptation to climate change and disaster risk management CPF 2016-2019
Country Programming Framework Output(s)	Government Priority 2: Sustainable management and utilization of natural resources (land, forest and fisheries), climate change and resilience of livelihoods to disasters Output 2.1 – National capacities strengthened for sustainable management and utilization of natural resources Output 2.2 – National governance frameworks that foster sustainable natural resource management strengthened Government Priority 3: Agriculture, forestry, fisheries, hinterland and rural development Output 3.2 – Capacity-building provided to improve crop, livestock forestry and fisheries production and productivity and their uptake facilitated as well as the promotion of integrated farming systems that contain components of crops, livestock and aquaculture
UNDAF Outcome(s)	Resilience to Climate Change/Shocks and Sustainable Natural Resource Management

A.2 FINANCIAL DATA in USD¹

Latest Approved Budget	USD 15 192 204
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¹ Data source: FPMIS/Data Warehouse.

A.3 EXECUTIVE SUMMARY

Guyana faces growing challenges of land degradation and unplanned development, driven by pressures from mining, agriculture, forestry and human settlements. These issues, combined with the increasing effects of climate variability, have undermined land productivity, environmental resilience and equitable access to land resources in the country. The project was designed to address these challenges by strengthening governance, institutions and technical systems to support sustainable and climate-resilient land use.

The overall objective was to integrate sustainable land development and management (SLDM) principles into Guyana's policy frameworks, institutions and practices. Specifically, the project sought to establish an enabling environment for SLDM, enhance institutional and human capacity for integrated land governance and test and promote sustainable practices at local levels.

The project was implemented by the Guyana Lands and Surveys Commission (GLSC), in partnership with the Food and Agriculture Organization of the United Nations (FAO) and with the broad involvement of national ministries, regional authorities, academic institutions, farmers, miners, surveyors and community members. Land sector professionals were trained in areas including land administration, remote sensing, geospatial analysis and cadastral management, while stakeholders participated in consultations, workshops and knowledge exchanges. At the community level, farmers and land users piloted sustainable practices such as assisted natural regeneration, biochar production and vetiver grass for erosion control and reclamation.

Key achievements included the development of a National Land Use Policy Paper and a national spatial data infrastructure (NSDI) action plan, the modernization of land administration through a digital lease management system and strengthening of GLSC's geospatial infrastructure via the expansion of the continuously operating reference stations (CORS) network, the creation of the Guyana GEOID2024 model and the digitization of cadastral records. A national light detection and ranging (LIDAR) survey, covering the majority of Guyana's urban areas and planned development, delivered the most comprehensive mapping data in over 50 years, and is now being applied in housing, agriculture, infrastructure planning and disaster risk management. Regionally, the project also enhanced Guyana's profile as a leader in land governance by hosting the 17th Session of the United Nations Convention to Combat Desertification (UNCCD) Committee for the Review of the Implementation of the Convention (CRIC). The project also enabled GLSC's full participation in a range of

United Nations frameworks, fora, conferences and conventions that are critical to sustainable land management (SLM) and governance.

Implementation was grounded in capacity-building and institutional strengthening, ensuring that investments were not only delivered but also embedded in long-term systems. Sustainability is being secured through strengthened national ownership, the integration of outputs into government and university curricula, improved technical capacity at GLSC and modernized service delivery systems that will continue to benefit stakeholders beyond the project's lifetime.

The project promoted inclusive participation, with targeted engagement of women and youth through training, field demonstrations and locally-led pilots.

In sum, the SLDM project directly addressed the urgent problem of land degradation and weak land governance in Guyana. By modernizing systems, building human and institutional capacity and piloting sustainable practices, the project delivered tangible results that will contribute to environmental sustainability, economic resilience and Guyana's achievement of the Sustainable Development Goals (SDGs).

The terminal evaluation of the project is planned for the fourth quarter of 2025 and will capture the impacts of the interventions, with the results published in a separate report.

B. RELEVANCE

The problem

Guyana's rapid economic expansion and the accelerated allocation of state land for agriculture, mining, logging, settlements and urban growth have intensified land degradation over the past 15 years. Unregulated small-scale mining, unsustainable agricultural practices and deforestation have led to an increase in soil erosion, water pollution, landslides and flash floods, undermining productivity and resilience. These pressures, which are compounded by climate variability, threaten biodiversity, ecosystem services, food security and community livelihoods.

Prior to the project, these trends had severely undermined Guyana's capacity to cope with climate variability. Erratic rainfall, rising temperatures and extreme weather events posed growing risks of flooding, water contamination, prolonged droughts and heightened vulnerability for land users and their livelihoods. Land degradation and deforestation were also diminishing biodiversity, depleting ecosystem services and negatively impacting food security, with the potential to exacerbate social and environmental conflicts. If left unaddressed, these processes risked compromising the country's ability to achieve its economic, social and

environmental goals, as well as its commitments to the Sustainable Development Goals (SDGs).

The response

The SLDM project was developed and implemented to create an enabling environment for sustainable, climate-resilient land development and management in Guyana. Its objectives were (i) to mainstream SLDM into policy, institutional and governance mechanisms to prevent degradation and restore degraded lands, (ii) to strengthen institutional and human capacity for participatory and integrated SLDM and (iii) to enhance local governance in three targeted regions. These objectives are aligned with the low carbon development strategy (LCDS) and were executed while maintaining effective project management, monitoring and evaluation.

The project was implemented through a collaborative approach involving GLSC, FAO and other national partners. Under the first outcome, GLSC enhanced policy development at national level under its mandate and strengthened institutional collaboration across land-related sectors, levels and agencies. It supported the development and mainstreaming of national strategies and frameworks on SLM in alignment with the LCDS, thereby benefiting the entire country.

The second outcome area focused on strengthening physical, technical and human capacities, primarily within GLSC. It encompassed all areas of SLDM including planning, land information system, geodesy, cadastre development, geospatial information systems and land governance for SLDM and reclamation, which were required to meet national and international commitments. In total, over 500 participants from within the land sector directly benefited from capacity-building. In conjunction with the improvements to GLSC's physical and infrastructural capacity, the citizens of Guyana have more reliable and accessible land services, improving property management and investment security.

The third outcome area focused on SLM in the targeted administrative regions (Regions 4, 7 and 10) and emphasized capacity strengthening and knowledge improvement. It enhanced regional insight and capacity on the status of land degradation, improved land management and piloted structured, internationally adopted methodologies for SLM. The interventions piloted directly benefited 98 farmers, while an estimated 12.8 ha of degraded land underwent land reclamation. Furthermore, conservation approaches were demonstrated to 30 miners (25 male and five female).

The SLDM project was implemented in close synergy with national and regional initiatives, ensuring alignment with Guyana's LCDS and promoting collaboration across key land management, agricultural and environmental sectors. The Soil Care Project and SLDM

worked collaboratively on activities under Outcome 3, focusing on SLM and rehabilitation. Through partnerships with national agencies, a number of complementary initiatives were supported. The National Agricultural Research and Extension Institute (NAREI) established model training units for biochar production, vermicomposting and multicropping in shade houses, enabling farmers to maintain year-round operations. The Guyana Geology and Mines Commission (GGMC) collaborated with the project to pilot reclamation interventions in mined-out areas, facilitating the planting of vetiver seedlings for land restoration. Similarly, the Guyana Forestry Commission (GFC) contributed technical expertise by identifying native forest species, raising seedlings and guiding enrichment planting efforts.

Educational collaboration was also strengthened through the Guyana Technical Institute (GTI), which benefited from SLDM's support in enhancing its land surveying programme. Regionally, the project collaborated with the Agricultural Research and Rural Extension Agency of Brazil (EPAGRI), facilitated by FAO Brazil, to provide technical insights on dragon fruit cultivation as a cash crop suitable for areas with low soil fertility. In addition, FAO's Subregional Office for the Caribbean supported the project by supplying high-resolution commercial satellite imagery from Planet Labs, covering over 290 square kilometres, to enhance geospatial analysis and monitoring. Coordination mechanisms were also established with GRIF-funded projects, including bimonthly meetings to share lessons learned, address challenges and align ongoing interventions. Together, these partnerships ensured a coherent, cross-sectoral approach to sustainable land development and environmental management in Guyana.

C. ACHIEVEMENT OF RESULTS

Outcome 1: SLDM mainstreamed in policy, institutional and governance mechanisms to prevent degradation and restore degraded lands

This outcome aimed to integrate SLDM into Guyana's national policy, institutional structures and governance mechanisms. Four key outputs were delivered under this outcome, contributing to strengthened legal frameworks, strategic planning, geospatial information systems and international obligations.

Output 1.1: Harmonized land policies developed and submitted for adoption and institutional capacities in place for mainstreaming responsible governance of tenure and SLDM

A high-level intersectoral mechanism was established to provide strategic oversight and policy guidance for the SLDM project, ensuring smooth implementation and the achievement

of all stated outcomes. This mechanism was embodied in the national project steering committee (PSC), which played an advisory role throughout project implementation. The PSC provided policy guidance to the project team, ensuring synergies with other ongoing governmental processes, reviewed project progress through annual and ad hoc meetings as needed, examined periodic reports and helped to identify solutions to major challenges and obstacles. Chaired by GLSC, with FAO as co-chair, the PSC included representatives from the project management office, key government agencies with land management responsibilities and civil society actors.

Under this intersectoral framework, the project successfully completed the drafting of the National Land Use Policy Paper in August 2021, which was handed over to the Government of Guyana to inform the revision of the National Land Use Plan (2013) and support development of the official National Land Use Policy. This policy paper provided a formal framework for integrating SLDM principles into national policy-making and spatial planning, strengthening governance of land resources and contributing to SDG 15.3 (on land degradation neutrality). In addition, the draft legal assessment report, which identified gaps, overlaps and inconsistencies in legislation, regulations and mandates, was completed. While no interagency agreements were established and coordinated, the clarification of roles and responsibilities of GLSC and other key agencies involved in land governance was advanced as part of this process. This improved understanding of institutional mandates and laid the foundation for improved coordination in land administration and SLM.

Direct beneficiaries under this work area included over 30 national policymakers and technical staff from GLSC, the Ministry of Legal Affairs and other relevant agencies, while indirect benefits extended to all land users nationally by promoting equitable and sustainable land allocation and use.

The project also completed the NSDI Action Plan, developed under the Integrated Geospatial Information Framework (IGIF). Guided by the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and the World Bank, the plan established geospatial management practices to improve data-sharing, reduce redundancy and enable evidence-based decision-making across government. GLSC implemented a centralized spatial data infrastructure node hosting core datasets – including administrative boundaries, planning control units, gazetteers, rivers, roads, imagery and digitized cadastral data – accessible through an internal geographical information systems (GIS) web portal. The initiative strengthened disaster preparedness, land governance and sustainable development planning, while benefiting institutional users of spatial data nationwide. The accompanying

geospatial policy was submitted for Cabinet approval to support open data-sharing across agencies.

Overall, the high-level intersectoral coordination through the PSC, the completion of the National Land Use Policy Paper and the establishment of the NSDI Action Plan collectively enhanced national capacity for responsible land governance, improved institutional coordination and laid a strong foundation for SLDM in Guyana.

Output 1.2 Enhanced land governance through regulatory and financial systems, spatial data information management and enhanced institutional capacities

A five-year strategic and business plan, along with an annual business plan, were successfully developed and handed over to GLSC for approval and implementation, thereby achieving the planned target. The consultancy, which was conducted by PricewaterhouseCoopers and finalized in October 2021, provided a comprehensive analysis of GLSC's internal and external environment, refined its vision and established strategic goals supported by performance indicators, financial models and monitoring frameworks. It also incorporated best practices from other land agencies and introduced innovative products aimed at enhancing financial self-sustainability.

However, the adoption of the strategic and business plan has been limited, primarily as the business plan was more profit- than people-centred, but also due to the need for better alignment with evolving national development priorities. In order to strengthen operational capacity and bridge these gaps, GLSC re-operationalized the SLDM project, investing in specialized training and modern equipment for its technical divisions. These measures improved productivity in lease issuance and surveying capacity, contributing to the generation of revenue and the laying of foundations for financial sustainability, although full implementation of strategic reforms remains ongoing.

The Government's revised policy direction emphasizes the need to make land access easier and more affordable, and to promote greater distribution across all regions. In this context, GLSC will leverage its infrastructure, data and service portfolio to secure financial stability, while providing affordable, people-centred services, including surveying, land administration and mapping products, in support of national development goals.

Table 1: Summary of SLDM project interventions – Outcome 1

Description	Target	Achievements	Remarks
National Land Use Policy Paper	Completed and submitted	Completed and submitted	
Strategic and Business Plan for GLSC	Completed and submitted	Completed and submitted	Certain elements remain under implementation
National Spatial Data Infrastructure (NSDI) Action Plan	Completed and under implementation	Completed and under implementation	
Support to meet international obligations	Participation on at least 6 platforms	Participated on 9 platforms	

Outcome 2: Strengthened institutional and human capacity for participatory and integrated sustainable land development and management

This outcome area focused on strengthening physical, technical and human capacity development, mainly within GLSC. It encompassed all of the areas of SLDM – including planning, land information system, geodesy, cadastre development and land governance for SLDM and reclamation – required to meet national and international commitments. Additionally, it successfully increased capabilities in integrated geospatial information systems and land governance.

Output 2.1: Strengthened human capabilities for sustainable land development and management – needs assessment, consultations and institutional capacity development plans

Comprehensive capacity assessments of GLSC’s institutional, land administration, geodesy and NSDI capacity were successfully completed, and provided critical insights into existing strengths, gaps and opportunities for institutional enhancement. Strengthened capacity and increased awareness of SLM mechanisms was a major focus, with the project exceeding its target by utilizing nine key national and international platforms instead of the planned six.

Under the SLDM project, GLSC received significant support in fulfilling its international obligations, particularly through the facilitation provided by FAO, as the project’s implementing partner. Leveraging its global position, FAO enabled GLSC’s full participation in a range of United Nations frameworks, fora, conferences and conventions, which are critical to SLM and governance. Notably, Guyana hosted the 17th Session of the CRIC under the UNCCD in January 2019 in Georgetown. This historic event, the first CRIC meeting hosted in the English-speaking Caribbean, attracted 566 participants from 94 countries, representing all geographic regions of the world in addition to United Nations officers. The successful hosting of CRIC 17 elevated Guyana’s profile on the international stage, showcasing its leadership in global environmental negotiations and reinforcing its commitment to SLM. Furthermore, the

event provided GLSC's commissioner, the national focal point, with the opportunity to chair future CRIC meetings.

Additionally, a Guyanese delegation of 13 representatives participated in the 14th Conference of the Parties (COP 14) of the UNCCD in September 2019 in New Delhi, India. During the event, the Guyanese delegation actively engaged in reviewing global progress on combating desertification, land degradation and drought, while also contributing to high-level side events that highlighted the strides made by the country in mainstreaming SLD and management practices.

Beyond its UNCCD engagements, Guyana strengthened its presence in global initiatives regarding geospatial information management. In November 2018, the country took part in the first United Nations World Geospatial Information Congress in Deqing, China, an event designed to advance innovation and technological solutions for geospatial information in support of the 2030 Agenda for Sustainable Development. In August 2019, Guyana attended the 9th session of the UN-GGIM in New York, where the head of the country's delegation was nominated as co-chair of the committee. Two GLSC divisional heads contributed as members of expert working groups on strategic pathways, further cementing Guyana's leadership in geospatial governance.

Guyana's participation extended to the World Bank Land and Poverty Conference in March 2019 in Washington, D.C., where a joint FAO-GLSC presentation on the United Nations Integrated Geospatial Information Framework showcased the Guyanese experience in leveraging geospatial data for SLM. Complementary engagements included the International Federation of Surveyors (FIG) Working Week in April 2019 in Hanoi, Vietnam, where Guyana presented its IGIF action plan, and the United Nations Expert Consultation on the IGIF Implementation Guide in June 2019 in Malaysia.

With the exception of CRIC 17, which attracted 234 local and host country participants, there were 34 participants across other international engagements. Collectively, these enhanced institutional capacity, facilitated global networking and reinforced recognition of Guyana as a leader in SLM and geospatial information innovation. Participants also contributed directly to the achievement of SDG 13 (climate action), while strengthening the country's technical expertise and ability to implement evidence-based policies at the national level.

Output 2.1: Strengthened human capabilities for sustainable land development and management through training and experience sharing workshops, materials development and exchange visits

Land administration and management capacity-building

Capacity-building initiatives in land administration were designed to modernize Guyana's land governance framework, making it more transparent, efficient and aligned with national development priorities. The diploma in land administration provided comprehensive instruction in land law, cadastral modernization and SLM principles, while the diploma in land valuation enhanced expertise in property appraisal and assessment methodologies, which are critical for revenue generation and equitable land allocation.

Further specialized courses focused on parcel management and land registration workflows, improving the accuracy and speed of titling and transaction processes. Technical staff also received training in enterprise geodatabase implementation, supporting the development of integrated cadastral databases as a foundation for interoperable land information systems.

Staff were also trained in enterprise GIS administration, workflow design and system development. Regional offices such as Bartica and Port Kaituma tested the new systems, providing feedback and ensuring decentralized service delivery.

Geospatial infrastructure, geodetic framework and digital systems capacity-building

Training in geospatial technologies significantly strengthened GLSC's ability to manage spatial data efficiently and deliver digital land services nationwide. Core modules covered enterprise GIS design and administration, ArcGIS Enterprise configuration, database management, geoprocessing automation and the development of interactive web platforms for public access to land-related data.

Staff applied these skills directly through the configuration and deployment of enterprise GIS systems at headquarters and in regional offices such as Bartica and Port Kaituma. These initiatives created a robust digital infrastructure that reduced reliance on paper-based workflows, accelerated transaction processing and enhanced decentralized service delivery.

Crucially, the project's interventions extended beyond GLSC to the education sector. Equipment was provided and scholarships introduced for the diploma programme in land surveying at the GTI, while support was given for the establishment of a tertiary-level programme in surveys and spatial science at the University of Guyana. These investments will sustain the gains made by producing a new generation of professionals skilled in GIS, global navigation satellite systems (GNSS), photogrammetry and spatial analytics. Collectively, these measures have positioned GLSC and its partner institutions to deliver modern,

technology-driven land administration services aligned with international standards and the SDGs, particularly those relating to land rights, responsible resource management and institutional capacity.

Geodetic framework capacity-building

Specialized training focused on strengthening Guyana's geodetic infrastructure, such as formal sessions on the new coordinate reference system, GuyanaGEOID2024, survey practice under evolving geodetic standards, sea and land level monitoring around Georgetown and the proposed Bachelor of Science (BSc) programme in geospatial sciences. These sessions engaged both government and private sector surveyors, thereby enhancing the technical capacity of the wider geospatial community.

In the last quarter of 2025, more detailed training sessions were implemented, with a view to developing capacities to work with new standards, equipment and reference frames. These included:

- GNSS technologies for point positioning.
- Geodetic data and projections.
- Quality control of positioning solutions.
- Hydrographic surveying.
- Geoidal modelling and national vertical control.

These interventions will further consolidate Guyana's geodetic framework, ensuring the precision and reliability of spatial data required for land administration, infrastructure development and climate resilience initiatives.

Remote sensing, land monitoring and environmental data systems

In order to strengthen environmental monitoring and climate resilience, the project prioritized capacity-building in remote sensing and land monitoring. Training covered satellite image interpretation, land cover classification, change detection and the integration of these outputs into national monitoring systems. A significant addition was LIDAR training, which enhanced technical capacity for generating high-resolution elevation models and 3D terrain analysis. This capability supports precise topographic mapping, flood modelling, infrastructure planning and forest inventory assessments, which are critical for land use planning and climate adaptation strategies.

Workshops introduced advanced geospatial analytics and modelling tools, allowing staff to produce high-resolution datasets for international reporting obligations such as UNCCD and REDD+. These capabilities position Guyana to meet global environmental commitments while

supporting local priorities such as disaster risk reduction, agricultural planning and biodiversity conservation, in turn ensuring a contribution to SDGs 13 (Climate action) and 15 (Life on land).

In total, across Outcomes 1 and 2, more than 600 individuals (including some repeat participants) took part in the different capacity-building exercises. While the majority of participants were GLSC staff, representatives from a number of other key institutions were also engaged. These included GGMC, the Central Housing and Planning Authority, the Amerindian Peoples' Association (APA), National Industrial and Commercial Investments Limited (NICIL), the Land Valuation Division of the Ministry of Finance, Deeds Registry, GFC, and the Mahaica Mahaicony Abary – Agricultural Development Authority (MMA/ADA).

By investing in staff training, institutional development and strategic planning, the project significantly improved GLSC's operational effectiveness. Long-term investment in GTI, while small, was catalytic, as the institute provides the pipeline of suitably skilled personnel for GLSC to add to their ranks. Indeed, some graduates are already new staff within the GLSC system and are driving the increased capacity of the commission.

Guyanese citizens are benefiting from improved public service delivery and expanded employment opportunities in the land management sector. Nationally, a skilled workforce contributes to a modernized land governance framework, fostering long-term sustainability.

Output 2.3: Enhanced physical capacity (knowledge, systems, infrastructure, and processes) for sustainable land development and management

Geodetic framework and geospatial infrastructure

The project delivered a modern, internationally aligned geodetic infrastructure for Guyana, creating the backbone for accurate land administration, infrastructure development and environmental monitoring. A major milestone was the expansion and optimization of the CORS network. GLSC extended the original five stations, with six additional CORS and three passive stations, providing full coverage of the country's populated areas. The network was tied to the Geodetic Reference System for the Americas (SIRGAS) reference frame in the International Terrestrial Reference Frame 2014, epoch 2015.0, ensuring that surveys and maps in Guyana are consistent with international standards. Nine of the stations were classified as zero-order control, with others set as first-order, establishing a robust and reliable national reference system.

The project also introduced GuyanaGEOID2024, the first national geoid-ellipsoid separation model, enabling precise GNSS-based vertical positioning. The model revealed important differences of up to 1.4 metres from older global models, particularly in the interior. Analysis of sea level data assessed a rise in sea levels at a rate consistent with known regional

trends and allowed the identification of localized coastal subsidence rates of up to 7 mm per year. These advances provide a new level of precision for national surveys, engineering and climate resilience monitoring.

Cadastral digitization advanced in parallel, establishing processes for field capture, office validation and digital storage. Staff were trained to perform full digitization workflows and integrate new surveys directly into the digital system. More than half of Region 3 has already been digitized, creating the foundation for a nationwide digital cadastre. This is a decisive step towards a “paperless” environment, reducing errors, duplication and delays in land administration.

The new geodetic and cadastral systems directly support infrastructure development, agriculture, natural resource management and urban planning by delivering high-accuracy, real-time positioning data. Surveyors and engineers can now access authoritative control points and GNSS services, reducing project costs and timelines. These improvements contribute directly to national priorities, in particular SDG 15.3, which is related to land monitoring.

In order to ensure sustainability, the project also invested in capacity-building. Surveyors and technical staff received training on the new reference system, geoid model and emerging geodetic practices. The project also supported the development of a new BSc in surveys and spatial science at the University of Guyana, ensuring that future generations of professionals are trained in geodesy, GNSS, photogrammetry and spatial analytics. This institutional innovation secures the long-term continuity of geospatial services.

Digital systems and spatial data infrastructure

In parallel with geodetic modernization, the project transformed Guyana’s digital land administration systems, better positioning GLSC as the national custodian of integrated land and spatial data.

The centrepiece was the Next Generation Lease Management System (NGLMS), a unified digital platform that manages the entire lease life cycle – from expressions of interest and inspections through to application, issuance and renewals. This replaces fragmented, paper-based workflows with streamlined digital processes. Field inspections are now conducted on tablets, reports are auto-generated and digital records are updated in real time. A secure client-facing portal, currently under development, will soon allow citizens to apply for and track services online, marking a major shift towards citizen-centric service delivery.

The integration of cadastral data with administrative workflows ensures that land transactions are accurate, traceable and efficient. Business process re-engineering introduced

workflow automation, enabling managers to monitor pending and completed tasks, enforce timelines and assign responsibilities transparently.

The project delivered a centralized spatial data infrastructure (SDI) node using ArcGIS Enterprise, now hosting core datasets including administrative boundaries, planning control units, gazetteers, rivers, roads, imagery and the digitized parcel fabric. An internal GIS web portal and data viewer allow staff to seamlessly access, overlay and analyse these datasets directly within the NGLMS. This integrated platform eliminates duplication, ensures consistency across divisions and promotes interoperability with partner agencies. By consolidating critical spatial layers such as parcels, gazetteers and planning control units into a single authoritative environment, the SDI establishes a robust foundation for the NSDI.

Future plans include expanding the datasets to incorporate information from GGMC, GFC and other partner agencies, with selected layers to be made publicly accessible, thereby enhancing transparency, open data and evidence-based national development.

Complementing these reforms, a geodetic services web platform was launched in 2025. This online hub gives surveyors, engineers and academics direct access to GNSS data downloads, real-time CORS monitoring, coordinate conversion tools and survey control databases. In line with international best practice, the platform ensures that metadata, computational procedures and data reduction results are systematically managed, archived and disseminated.

The platform was formally approved by the Geodetic Unit and presented to national stakeholders, including government ministries, academia and the private sector. It has been widely welcomed as a transformative step that strengthens Guyana's geospatial infrastructure, aligning national geodetic operations with international standards and supporting future integration into the NSDI.

Institutional modernization extended beyond land administration into legal services. A new legal case management system was piloted to manage land disputes and petitions digitally, reducing paper reliance and improving record-keeping.

Base maps updated in Guyana using LIDAR

Between October 2022 and June 2024, GLSC) executed a landmark national LIDAR mapping initiative, covering 13 464 km² across eight administrative regions – 545 km² of urbanized areas – capturing nearly all of Guyana's urban building footprint, as well as 12 919 km² of rural areas across regions 4, 5, 6, 7, 8, 9 and 10.

By the end of implementation, all data capture and processing deliverables were achieved for Regions 4, 5, 6, 7, 8 and 9. Region 3 was partially completed, with 2 512 km² delivered out of a total of 2 970 km², leaving 458 km² outstanding. In Region 10, approximately 52 percent was completed, representing 2 140 km² of the contracted 4,120 km² in the Ituni/Ebini area. Despite these partial gaps, the overall coverage represents the most comprehensive high-resolution geospatial dataset ever developed for Guyana.

The outputs included high-resolution LIDAR datasets and processed products such as vector maps of infrastructure, water features and building footprints, as well as three-dimensional building models for urban areas. Ortho-photo and 3D urban model imagery was also delivered and validated, ensuring both accuracy and practical usability. These achievements mark the first significant update to Guyana's national base maps in over 50 years, aiding in transforming the country's geospatial foundation into a modern, data-driven system.

The completion of the LIDAR exercise will greatly enhance urban and rural planning, housing and infrastructure development, and the management of agricultural land, natural resources and conservation areas. The data will serve as a critical resource for agencies and sectors such as housing, agriculture, forestry, environment and hydrography, providing accurate inventories and elevation models essential for zoning, monitoring and sustainable land use. By modernizing the country's base maps, the project ensures that Guyana is better equipped to address contemporary development needs and climate resilience challenges.

Although the data capture and processing phases have been completed, the development of quality assurance and quality control standard operating procedures (SOPs) and on-the-job training for staff in managing, validating and applying LIDAR-derived datasets remain ongoing. These measures will consolidate long-term benefits and ensure that the data is effectively maintained and integrated into decision-making.

The LIDAR mapping exercise represents a milestone achievement for Guyana. By replacing outdated base maps with state-of-the-art geospatial datasets, GLSC has provided the nation with a reliable, accurate and modern foundation for planning, governance and sustainable development. The resulting products support SDG 15.3 (land degradation neutrality) and will support the Government, the private sector and communities alike, ensuring that spatial data becomes a central tool in shaping Guyana's future.

Improving technical and infrastructural capacity of GLSC

The upgrading of GLSC's regional offices was highlighted as critical to the commission's mandate of decentralizing their operation to ensure better and more convenient services in the regions. This was needed to better address the constantly growing demand for decentralized

land administration services, the challenges of permanence and greater effectiveness of GLSC operations. The project completed construction and rehabilitation works of GLSC regional offices in Mabaruma and Port Kaituma (Region 1), Black Bush Polder (Region 6) and Bartica (Region 7). Over 10 000 land users in these regions now have improved access to GLSC services, while the commission's regional staff also benefit from enhanced working conditions.

In tandem with infrastructure, extensive investments were made in vehicles, office spaces, furnishings and advanced technology in an attempt to modernize operations. Throughout the lifetime of the project, a wide range of equipment and software were procured to improve surveying capacity, data management and field mobility. These included GNSS receivers, total stations, smart stations, precise levels, compasses, soil testing equipment, projectors, digital cameras, laptop and desktop computers, high-capacity external hard drives, drones and networking infrastructure such as servers, routers and switches. Fleet upgrades – including double-cab pickups, boats with outboard engines and other vehicles – further boosted GLSC's ability to conduct outreach and fieldwork across remote areas.

Another significant technological upgrade was the acquisition of an enterprise GIS under the Land Administration Modernization Programme through the Environmental Systems Research Institute (ESRI). This four-year agreement provides GLSC with an advanced platform for processing geographic data, managing tenure information, storing and disseminating spatial datasets and integrating data products derived from the national LIDAR mapping exercise. The enterprise system, supported by licenses, server software and connectivity across regional offices, enables the production of updated topographic and thematic maps, 3D models and specialized geospatial products.

Together, these infrastructural and technical investments have transformed GLSC's institutional capacity. Citizens now benefit from more accessible, modernized and reliable land services across multiple regions, while the Commission itself is equipped with the technology, facilities and mobility required to respond effectively to a rapidly evolving development context. These improvements strengthen national land governance and enhance resource management.

Table 2: Summary of SLDM project interventions – Outcome 2

Description	Target	Achievements	Remarks
Improving land administration and GIS services	100% functional NGLMS within agreed parameters	100% functional NGLMS within agreed parameters	
Improving infrastructural capacity of GLSC (construction and renovation to expand services in regions 1, 6 and 7)	3 regional offices completed	3 regional offices completed	
Improving the technical capacity of GLSC (procurement)	100%	100%	
Strengthened human capacities in land governance, tenure and SLM	500 participants trained	613 participants trained	
Updating base maps in Guyana using LIDAR	100%	100%	
Improving Geodetic network and its CORS	Geodetic network improved and CORS re-operationalized	Geodetic network improved and CORS re-operationalized	This included six additional CORS and the construction of three passive stations

Outcome 3: Local governance strengthened in three regions for implementing SLM

This outcome area focused on SLM in the targeted administrative regions – specifically regions 4, 7 and 10 – emphasizing the strengthening and improvement in knowledge. The outcome enhanced regional insight and capacity in the status of land degradation, improved land management and provided a structured and internationally adopted methodology for prioritizing land restoration options.

Output 3.1: Strengthened capacity of actors in at least three regions to assess land resources status and trends

Under this component, significant progress was made towards strengthening local capacities and promoting SLM practices in Guyana. Awareness-raising efforts were conducted to ensure that national experts, local actors and communities in targeted regions understood land degradation processes and the available restoration options. This was achieved through consultations, field assessments, exposure visits and capacity-building activities, which featured the participation of government agencies, technical experts and community stakeholders.

The SLM diagnostic phase was completed in 2023, marking a major milestone. This phase included field visits to regions 4, 7 and 10 led by the SLM specialist, with participation from key agencies such as GFC, GGMC, GLSC and NAREI, along with the geospatial expert. The field findings, combined with geospatial data on land cover, land use and land degradation,

provided a strong knowledge base for developing recommendations for SLM intervention options. These assessments contributed to understanding of the land degradation process and identifying potential SLM interventions for piloting in the targeted regions.

Another key achievement was the formation of the SLM technical working group (TWG) in May 2023. This multistakeholder platform includes representatives from GLSC, the Ministry of Natural Resources and Environment, GGMC, GFC, the Hydrometeorological Department, the Ministry of Agriculture, the Department of Environment and Climate Change, the University of Guyana, NAREI, the National Drainage and Irrigation Authority (NDIA) and the Global Green Growth Institute (GGGI). The TWG plays a critical role in finalizing discussions on SLM technologies for pilot interventions, including determining suitable service providers, selecting implementation sites, defining beneficiary criteria and addressing challenges and opportunities. Four working sessions were completed, which paved the way for finalizing an implementation plan for on-the-ground interventions.

In terms of capacity-building, training was provided to SLM officers from GLSC on designing and maintaining a geospatial database, ensuring that technical staff are equipped to manage spatial data effectively. In addition, significant progress was made in monitoring and assessment capacities through the use of advanced IT tools. A series of training sessions were held on the System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL), a FAO-developed cloud-based satellite image processing platform. This training enhanced GLSC's capacity to monitor land degradation trends, generate accurate data for national reporting to the UNCCD and support land restoration planning. Practical skills were also developed in Google Earth Engine, Quantum GIS, Google Earth Pro and FileZilla Client, strengthening the technical foundation for environmental monitoring.

Output 3.2: Strengthened capacity for promoting territorial approaches for scaling up of proven SLM practices and rehabilitation measures

Pilots for SLM intervention in target regions

Local actors and community members across the three target regions successfully demonstrated increased awareness and understanding of land degradation processes, SLM practices and restoration options. By the end of the project, 100 percent of the identified beneficiaries were able to recognize key causes of land degradation and apply the appropriate SLM measures suited to their local contexts.

The project built the technical capacity of 168 local actors – including farmers, miners, extension officers and community leaders – in the selection, assessment and documentation of

SLM practices. Many individuals also benefited from multiple training course, as these capacity-building initiatives have strengthened local ownership, improved documentation of field-level results and contributed to the long-term sustainability and scaling-up of SLM practices in the participating regions.

For land users, the following was achieved:

- 40 farmers trained on biochar production and application to improve soil conditions.
- 40 farmers trained on the production and application of vermicompost to promote organic fertilizer to improve soil health.
- 40 farmers reached through exposure visits arranged by NAREI under the letter of agreement (LoA) to demonstrate the use of shade house, biochar and vermicompost as SLM interventions.
- 30 miners participated in the exposure visits to the mined-out area reclamation site to learn about the SLM interventions for restoration of degraded mined-out areas.
- 10 farmers trained on multicropping in shade house farming and use of drip irrigation.
- 18 farmers trained on dragon fruit cultivation techniques.
- 64 land users across regions 4, 7 and 10 participated in stakeholder consultations to identify priority SLM interventions, challenges and opportunities.

Extension officers/national experts trained and competent in SLM practices

- Seven SLM practices in targeted regions assessed and documented locally, peer-reviewed, shared through the World Overview of Conservation Approaches and Technologies (WOCAT) – United Nations Convention to Combat Desertification (UNCCCD) database and promoted for wider replication by service providers.
- As part of the capacity-building, a team of ten national experts from GFC, GGMC, GLSC, NAREI and the Ministry of Natural Resources and the Environment embarked on an exposure visit to Brazil in 2024 to gain valuable insights and learn from the country's successful practices in SLM, in particularly soil quality improvement practices, high-value crop cultivation and their marketing and reclamation practices for mined-out degraded land.
- Training of trainers was conducted, attracting 20 participants from GSA, NAREI and the University of Guyana, with the aim of building technical expertise in dragon fruit cultivation. The training focused on ecological requirements, best practices, pest and disease management, fertilizer use and post-harvest handling.

- A two-day training workshop was organized for technical officials from GFC, GGMC, GLSC, GSA and NAREI. The aim was to provide hands-on training on documentation of SLM technology according to the UNCCD guidelines. The training brought together 20 participants who participated in a day-long, in-house training session, which was followed by a field day for data collection and input to the WOCAT global database.

Inputs to beneficiaries under SLM intervention

The following section outlines the specific inputs distributed to farmers under the SLDM project.

- Vermicompost: Forty farmers were each provided with complete vermicompost kits comprising constructed pits, earthworms and manure to initiate composting activities. Additionally, two NAREI field stations were equipped with similar inputs to facilitate demonstration activities and provide technical backstopping to surrounding farming communities.
- Biochar kilns: Of the 40 farmers who received vermicompost pits, ten were also provided with biochar kilns – for use in groups – in order to promote the production of biochar as a soil amendment, thereby complementing ongoing SLM interventions. Two additional kilns were installed at NAREI research stations for research, trial purposes and continued technical support to farmers in the vicinity.
- Shade houses: A total of 12 wooden shade houses were fabricated and delivered – ten to individual farmers and two to NAREI research stations for research and development purposes. Each shade house was fitted with a complete drip irrigation system (approximately 180 feet of tubing), a 450-gallon water storage tank and a 0.5 horsepower irrigation pump. The structures were also supplied with two rolls of shade netting (40 mesh nets), 150 kg of organic compost, 12 gallons of tar for waterproofing and an assortment of seeds and seedlings for crop establishment and demonstration.
- Dragon fruit cultivation: Some 18 farmers were supported under the dragon fruit pilot initiative. Each beneficiary received 50 reinforced concrete trellises, 200 dragon fruit cuttings, one pruning shear, one pair of gloves, 100 m of irrigation pipe, 125 kg of organic compost, 25 kg of NPK fertilizer, and 45 kg of limestone. Similar sets of inputs were also provided to two NAREI research centres in an attempt to strengthen research, training and farmer demonstration capacities.

Pilots for SLM intervention in target regions

The SLM interventions aim to restore degraded lands, promote climate-smart agriculture and strengthen the resilience of farming communities. Seven key initiatives are being piloted, namely vetiver grass for erosion control, assisted natural regeneration (ANR) with enrichment plantation, brushwood check dams, biochar production, vermicomposting, shade house farming with drip irrigation and dragon fruit cultivation.

Overall, some notable achievements were recorded, including the successful propagation and transplanting of vetiver grass, ANR management and construction of brushwood check dams in the mined-out reclamation site, the fabrication and installation of biochar kilns and vermicompost bins, the establishment of shade houses with drip irrigation setup and the establishment of dragon fruit piloting plots. However, delays in implementation were faced due to logistical constraints, land tenure, the electoral period and adverse weather, in addition to site-level challenges, which occurred in particular in mined areas. The beneficiary selection under the LoA took longer than anticipated as many farmers did not have legal land holdings. There was a need for the farmers initially identified by NAREI to undergo a screening process by the GLSC in order to verify their legal status. This process entailed the replacement of a significant number of farmers, which, in turn, delayed NAREI's ability to begin interventions.

The SLM pilot interventions were designed to demonstrate practical, replicable solutions to combat land degradation, improve soil health and enhance livelihoods through sustainable agricultural practices. These pilots are part of a broader strategy to promote integrated land use planning and ecosystem restoration in mining-impacted and climate-vulnerable regions of Guyana.

Vetiver grass for erosion control and reclamation

Significant progress was made under the vetiver grass initiative, which was intended to stabilize degraded lands and control erosion in mining-affected areas. Vetiver seedlings collected in March 2025 underwent a three-month hardening process at NAREI and were ready for field transplanting by June. Approximately 9 000 polybags, each containing two to three seedlings (totalling close to 25 000 seedlings) were shipped to the Puruni reclamation site on 26 and 27 June. Transplanting began immediately under the supervision of FAO and GGMC. However, labour shortages, inadequate site monitoring and logistical setbacks meant that only around 50 percent of the work could be completed, even though the allocated budget for vetiver planting was fully utilized at this stage. As a result, the project needed to develop a revised plan to complete the remaining planting exercise, with additional measures for improving oversight and ensuring the survival of the seedlings. Consequently, the remaining vetiver grasses were

planted in August under the supervision of the project experts and using casual labour from outside of the mining sites. This pilot intervention demonstrated the potential of vetiver grass to accumulate the sediments, reduce the surface run-off and stabilize the eroded soil.

ANR

The ANR activity, which aimed to restore native vegetation through natural regeneration and enrichment planting, faced significant setbacks. Although the activity was initiated soon after the signing of the LoA, the enrichment plantation was delayed due to difficulties with the collection of forest seedlings.

As GGMC was unable to source the required seedlings through conventional nurseries, the decision was taken, in consultation with GFC, to collect them from the forest floor. A seven-strong technical team, comprising experts from GFC and GGMC, was formed to conduct the collection exercise in the forest. The team collected the seedlings from the forest floor and transplanted them into seed bags for hardening in a nursery prior to the field planting. A temporary nursery was established at the Puruni site. At the end of the collection exercise, which was held from 4 to 9 June, the team had successfully collected and transplanted 1 012 seedlings (Morabukea, Baromalli, Trysil, Soft Wallaba, Kabukalli, Simarupa and Kaditiri species) into polybags. GGMC assigned a dedicated person to maintain the temporary nursery and application of fertilizer to the seedlings. However, despite guidance and support provided by GFC professionals, it was observed that, within three weeks, approximately 70 percent of the seedlings had died during the hardening phase in the temporary nursery. The high mortality of seedlings was mainly due to fragile root systems, persistent heavy rainfall, transplant shock and inadequate acclimatization, compounded by poor drainage. Together, these factors reduced survival under nursery conditions.

As a corrective measure, GGMC and GFC agreed to review the species selection and nursery management approach and, at the time of writing, are exploring alternative strategies such as the procurement of more resilient species and the construction of an improved hardening facility. GFC has collected another batch of seedlings from the forest floor, which are currently undergoing the hardening process in the nursery. These seedlings will be transplanted in the field at the onset of the rainy season in December. The collected seedlings will be nurtured in their nursery for hardening before being transplanted to the reclamation site. However, the surviving seedlings that have already been transplanted are adapting well to the prevailing site conditions.

Biochar production and application

Biochar application is being piloted as a soil amendment to improve soil fertility, water retention and carbon sequestration on degraded lands. Under the LoA with NAREI, 12 biochar kilns were fabricated and delivered to demonstration sites, including NAREI's Kairuni and Ebini stations. Prior to their deployment, the kilns underwent design improvements to enhance airflow and ensure complete combustion for better-quality biochar production. NAREI identified a qualified trainer for biochar production, and initial training sessions have been scheduled. Farmers who received the kilns will also be provided with technical guidance to ensure proper application rates and to maximize the benefits. Once fully implemented, this practice is expected to reduce dependence upon chemical fertilizers and enhance both soil health and crop productivity.

Vermicomposting for organic fertilizer

Vermicomposting was introduced to promote organic fertilizer production at the community level. The specifications for vermicompost bins were revised by NAREI, and a total of 42 compost pits are under the final stage of construction and will be distributed to farmers and NAREI stations. NAREI facilitated the sourcing of critical inputs such as earthworms, manure and other organic feedstock, while farmers contributed through the initial stockpiling of materials.

Beneficiary farmers received technical support from NAREI for the proper set-up, maintenance, production and utilization of vermicompost. This intervention aimed to build local capacity for producing high-quality compost, reduce waste through the use of organic residues and improve soil structure and nutrient cycling. Training modules on vermicompost management were delivered alongside other capacity-building activities to promote sustainable, long-term adoption of the practice.

Shade house farming with drip irrigation

Shade house technology with integrated drip irrigation is currently being piloted to promote climate-smart agriculture and support multicropping practices in regions 4 and 10. Under the signed LoA, NAREI provided technical guidance to farmers on the management of multicropping systems within shade houses supplied by FAO through its procurement process.

During project implementation, FAO revised the original technical specifications of the shade houses – from prefabricated to wooden structures – due to budgetary limitations and recommendations from partners, including GLSC and NAREI. As a result, the procurement and construction process experienced delays beyond the initially anticipated timeline.

While 11 shade houses were initially planned, an additional unit was allocated to NAREI's Kairuni station to serve as a centralized demonstration and training facility. This decision is expected to enhance knowledge transfer and farmer outreach within the region. The design of the wooden shade houses (30×24 feet) incorporated features for optimal light management, ventilation and irrigation efficiency. In total, 12 shade houses with integrated drip irrigation systems were constructed and delivered.

This intervention is expected to promote year-round production, increase crop diversity and resilience to climate variability and improve yields, in particular for high-value crops. The technology also contributes to efficient water use, reduced pest pressure and improved quality of produce, supporting the broader objective of advancing climate-smart and sustainable agricultural practices in Guyana.

Brushwood check dams for water management

Brushwood check dams were identified as an effective measure to control water runoff and sediment movement at the Puruni reclamation site. Implementation was delayed due to unanticipated mining activities in and around the area. Newly created access roads and pits disrupted previously identified construction points, necessitating a reassessment of suitable sites. In August 2025, FAO's technical specialist revisited the site, conducted a detailed reassessment and adapted the dam design to the modified landscape.

Following the reassessment, five brushwood check dams were successfully constructed as planned. Despite the initial delays, this intervention remained a critical component of the reclamation strategy, aimed at restoring hydrological balance and preventing further land degradation in mined areas. The constructed dams have contributed to effective soil and water conservation, reduced erosion and stabilized gullies within the priority zones of the reclamation site.

Dragon fruit cultivation pilot

Dragon fruit cultivation was introduced in Guyana under the SLDM project as a direct outcome of an exposure visit to Brazil, followed by expert consultations that recognized its potential for the country. This represents the first initiative of its kind in Guyana, as dragon fruit had not been cultivated previously, making the project a pioneer in diversifying the nation's agricultural portfolio. Environmentally, dragon fruit is a hardy perennial crop that thrives on marginal and degraded lands, requires minimal chemical inputs and uses water efficiently, thereby supporting soil conservation, reducing erosion and enhancing resilience to climate change. Economically, it is a high-value crop with rapidly growing local, regional and

international demand. Importantly, farmers can begin harvesting fruits from the first year after establishment, with yields increasing significantly in the second and third years, and under good management practices, expected yields can reach 10-15 tonnes per ha by the third year. This ensures early and sustained economic returns, positioning dragon fruit as a viable agribusiness opportunity. The development of nurseries, trellising systems and potential agroprocessing ventures further extends benefits by creating employment opportunities and stimulating value addition. Socially, the initiative promotes youth and women's participation, strengthening community engagement in sustainable agriculture. Nutritionally, dragon fruit is a superfruit, rich in vitamins, antioxidants and fibre, contributing to healthier diets and enhanced food security. Overall, this pioneering intervention demonstrates how innovative crop introduction can simultaneously promote sustainable land management, economic resilience and community well-being in Guyana.

Following expert consultations, a specialist was engaged to lead the dragon fruit programme, deliver technical training and prepare a cultivation manual adapted to the Guyanese context. Twenty pilot sites were established, 18 of them on farmers' holdings and two at NAREI field stations, after GLSC had verified land tenure to enable sustainable investment. A locally designed trellis system was adopted, with 1 000 concrete trellises fabricated and delivered to beneficiaries. In parallel, 4 000 dragon fruit cuttings were procured from a local supplier. Each participating farmer received 50 trellises and 200 plants. The trellises were installed and planting completed across all farms and at the two NAREI research sites, which will support ongoing research and technology transfer beyond the lifetime of the SLDM project.

To further support the farming communities, the project successfully hosted a one-day training of trainers (ToT) on dragon fruit cultivation on 12 August 2025, at NAREI, followed by a one-day training for farmers on 14 August 2025 at NAREI's Kairuni station. The ToT brought together 32 participants, including technical officials from the Faculty of Agriculture and Forestry at the University of Guyana, the Guyana School of Agriculture (GSA), GLSC, NAREI and observers from GGGI and FAO Guyana. The farmer training engaged an additional 37 participants.

Across all interventions, continuous stakeholder engagement, robust monitoring and adaptive management approaches ensured timely delivery, quality implementation and long-term sustainability of results.

TWG/Interagency coordination

A TWG was officially established and became functional in May 2023. This multistakeholder platform brings together technical experts and decision-makers from a wide

range of relevant institutions, including GFC, GGGI, GGMC, GLSC, the Ministry of Natural Resources and Environment, the Hydrometeorological Department of the Ministry of Agriculture, the Department of Environment and Climate Change, NAREI, NDIA and the University of Guyana. The group played crucial roles in the following areas:

- Identifying opportunities and challenges to the SLDM project, specifically those related to potential SLM interventions in Guyana’s diverse ecological and socioeconomic contexts.
- Finalizing a set of appropriate SLM technologies to be piloted, ensuring that they were scientifically sound, locally relevant and capable of addressing pressing land degradation issues.
- Recommending and engaging suitable service providers with the technical capacity to implement these interventions effectively.
- Selecting pilot implementation sites that best represent the country’s land management challenges and opportunities, thereby maximizing the potential for learning and replication.
- Defining beneficiary criteria to ensure that interventions targeted the most relevant and vulnerable stakeholders, while also maximizing impact and inclusivity.

To sustain momentum and ensure effective coordination, bilateral meetings were conducted with a number of organizations, including Conservation International (CI), the Environmental Protection Agency (EPA), GFC, GTI, the University of Guyana and others. In addition, the TWG convened meetings on an ad hoc basis. These sessions served a number of purposes, namely progress reporting, addressing emerging challenges, fostering interagency collaboration and providing a platform for sharing lessons learned. Through this process, the group not only strengthened institutional coordination but also built a shared understanding and reinforced commitment to advancing SLM in Guyana.

On the farmers’ front, effective coordination was facilitated through the establishment of two dedicated WhatsApp groups – one focused on dragon fruit production (22 members) and the other on shade house, biochar and vermicompost interventions (45 members). Each group was supported by the relevant technical experts from FAO and NAREI. These platforms enabled farmers to share challenges and lessons learned via voice and text messages, while receiving timely technical guidance from experts on production practices such as pest management, fertilizer application and other key aspects of agricultural production. It is anticipated that these groups will remain active even after the closure of the SLDM project.

Development of national-level mapping for land cover and land use

Degradation indicators were previously assessed from imagery analysis for land use change in target regions 4 (Timehri to Yarowkabra), 7 (Puruni) and 10 (Intermediate Savannas). Land cover and land use products were finalized for the pilot regions selected.

National-level land cover and land use mapping was significantly advanced, as it built on the aforementioned regional degradation assessments. Final land cover and land use products were completed for these pilot areas, providing a strong analytical foundation for national-scale assessment. The broader national assessment was drafted and submitted to GLSC, who will finalize it after the closure of the project.

This work was supported through use of modern geospatial data infrastructures such as the SEPAL platform developed by FAO. SEPAL facilitated the integration of multitemporal satellite imagery and standardized processing algorithms aligned with global reporting frameworks. In addition, capacity-building sessions enabled GLSC and national stakeholders to strengthen their skills in data acquisition, classification and monitoring methodologies, enhancing the long-term sustainability of national land monitoring and reporting systems.

Table 3: Summary of SLDM project interventions – Outcome 3

Description	Target	Achievements	Remarks
Improving land administration and GIS services	100% functional NGLMS within agreed parameters	100% functional NGLMS within agreed parameters	
Improving infrastructural capacity of GLSC (construction and renovation to expand services in regions 1, 6 and 7)	3 regional offices completed	3 regional offices completed	
Improving the technical capacity of GLSC (procurement)	100%	100%	
Strengthened human capacities in land governance, tenure and SLM	500 participants trained	613 participants trained	
Updating base maps in Guyana using LIDAR	100%	100%	
Improved understanding of land status and trends in target regions	TWG fully functional	100%	
Pilots for intervention in regions 4, 7 and 10 areas with degraded lands from mining and deforestation	Piloting of 7 SLM practices in 3 regions fully implemented	Piloting of 7 SLM practices in 3 regions 98% implemented	Owing to the high mortality rate of transplanted forest seedlings in the nursery, the number of seedlings established in the enrichment plantation under the ANR activity fell short of the planned target
Development of national level mapping for land cover and land use	National-level mapping completed	National-level mapping drafted	Pilots were supported with regional mapping

Outcome 4: Project management structures and mechanisms including M&E framework strengthened

This outcome ensured effective project management and monitoring. It also supported work planning, progress reporting and budget allocations for efficient implementation and communication among partners and key stakeholders.

The project also engaged a sustainability specialist to lead the development and guide the implementation of the project's sustainability and exit strategy, ensuring that the benefits and outcomes of the SLDM project are effectively mainstreamed into GLSC and other national stakeholder organizations. The specialist's role focused on formulating practical recommendations and institutional measures to ensure the long-term integration, continuity and resilience of project-delivered systems, services and capacities beyond the project's completion.

Output 4.1: Project staff hired and management structures in place, for effective partnerships, stakeholder engagement, communications and procurement

The project established an effective management structure through close cooperation between GLSC and FAO, ensuring timely decision-making at both technical and policy levels. A dedicated Project Management Unit, supported by specialists in land administration, SLM, geospatial sciences, surveys, geodesy and LIDAR, successfully guided implementation. The majority of planned staff and specialists were functional throughout the project, which strengthened technical capacity and operational efficiency.

A comprehensive stakeholder engagement and communications strategy was developed and implemented, resulting in the consistent involvement of beneficiaries and communities, particularly in 2024 and 2025.

The project also executed approximately 92 percent of its procurement plans, ensuring timely delivery of critical goods and services to support technical activities. Strong partnerships with national institutions and technical experts were leveraged to maximize resource use and enhance the quality of outputs.

Output 4.2: Project M&E framework in place

The project successfully maintained a dedicated monitoring and evaluation (M&E) system to track progress against planned deliverables. This system supported routine monitoring, informed adaptive management and facilitated both the mid-term and ongoing final evaluation processes, ensuring transparency and accountability throughout implementation.

A resident M&E system was established within GLSC, integrating tools, processes and reporting templates into the Commission's operations. This strengthened GLSC's internal

capacity to monitor land governance initiatives beyond the life of the project, laying the foundation for long-term institutional sustainability in evidence-based decision-making.

At the decentralized level, pilot M&E systems will be initiated across three regions, testing methodologies for tracking land management practices, community engagement and local impacts. These pilots will provide valuable feedback for project implementation and also offer models that can be scaled up nationally to support regional land governance structures.

D. IMPLEMENTATION OF WORK PLAN AND BUDGET

Work plan and budget

The overall implementation of the project followed the approved work plans, with adaptive management applied in order to address unavoidable delays, including the late start to project activities, political transitions and the COVID-19 pandemic. Procurement execution reached approximately 96 percent, enabling the delivery of core technical packages – national LIDAR base mapping, lease management system upgrades, regional office rehabilitation and SLM pilots – within the revised schedule and budget.

At the start of 2024, the SLDM Project Management Unit (PMU) determined, through a critical path analysis, that an extension was necessary to complete complex technical outputs such as national base mapping with LIDAR, upgrading the land information system, constructing GLSC regional offices and piloting SLM interventions. Initially proposed as a no-cost extension until December 2024, this timeline was deemed too tight. As a result, following feedback from GGGI and GRIF, the end date was revised to December 2025 in order to allow adequate time for implementation, sustainability measures and close-out. An additional USD 399 464 was requested to cover administrative costs for the extended period, and the revised extension was formally approved by the GRIF Secretariat on 24 September 2024. The project underwent a number of budget revisions to account for the extension period as well, as the reallocation of funds.

The aforementioned extensions included updated, approved work plans and a revised logical framework, which revised or removed a small number of outputs, indicators and targets that were no longer deemed relevant. The revised timeline and budget allowed for full implementation of all technical work packages, as well as the implementation of a number of sustainability activities.

Technical support services

During the execution of the project, technical support services were mobilized from a number of FAO offices – headquarters, at regional level and the country office – in order to ensure the smooth implementation of activities under the SLDM project and related initiatives.

The FAO Guyana office provided direct support in coordinating requisitions, facilitating procurement and managing agreements with national counterparts such as GGMC, GLSC and others. Notably, GLSC was supported through requisitions covering the mapping of ground control points for airborne LiDAR imagery, the acquisition of CORS data and access to other essential survey equipment. These interventions ensured that the project received both technical backstopping and timely logistical support.

The FAO Regional Office for Latin America and the Caribbean contributed through staff secondments and the provision of specialized expertise to guide project execution and strengthen alignment with regional priorities. Inputs from experts in the regional office facilitated resource mobilization efforts, access to technical inputs (satellite imagery) linkages between the Guyana programme and regional strategies on land governance, SLM and geospatial applications.

The relevant units at FAO headquarters provided the largest share of technical support, in particular through the secondment of specialized staff. Technical experts from headquarters, in particular the lead technical officers, offered advisory services in domains such as geodesy, mapping, data management and resource mobilization. These inputs were often structured as temporary duty assignments and directly contributed to strengthening the institutional capacity of the SLDM project and related agencies.

Overall, the coordinated contributions of FAO headquarters, the Regional Office for Latin America and the Caribbean and FAO Guyana ensured that specialized knowledge, technical backstopping and operational guidance were delivered in a timely and cost-effective manner. This mix of global, regional and country-level support was instrumental in advancing project objectives, strengthening national institutions and ensuring accountability to donors and government partners.

Beneficiaries/Stakeholders

The planned scope of beneficiaries – comprising policymakers, GLSC staff, regional authorities, local communities and land users – remained consistent throughout the project. Under Outcome 3, there were 248 direct beneficiaries and stakeholders, including farmers, miners, national experts and land agency personnel. In the SLM pilot regions, the direct beneficiaries comprised 98 farmers and 30 miners. A number of on-the-ground interventions,

such as biochar production units, shade house installations and drip irrigation systems, remain in the early stages of implementation. Despite the late start, these localized activities have already begun to generate tangible livelihood benefits as they transition into full operation.

The SLDM project significantly strengthened human capacity in land governance, tenure and SLM by training over 600 participants (including some repeat beneficiaries) across key technical areas such as land administration, surveying, SLM practices, information systems (including land information systems), unmanned aerial vehicle (UAV) operations and LiDAR mapping. Beneficiaries included GLSC staff, as well as professionals from a broad range of agencies, including APA, GFC, GGMC, MMA-ADA, NICIL, Central Housing and Planning Authority, the Land Valuation Division of the Ministry of Finance and the Deeds Registry. Additionally, the project supported formal education through diploma programmes in land administration and management and land valuation at the University of Guyana and provided equipment and scholarships to the GTI for its diploma in land surveying, ensuring a sustainable pipeline of skilled professionals for the sector.

National-level beneficiaries significantly surpassed original projections, particularly institutional users of spatial data and land governance services. This was driven by the extensive dissemination and application of NSDI outputs, high-resolution LIDAR-based base mapping products and the expanded CORS network, which collectively enhanced geospatial data accessibility and decision-making capabilities across multiple sectors. Consequently, while immediate community-level impacts are still emerging, the project has already delivered substantial institutional benefits, strengthened land governance frameworks and is building a solid foundation for the long-term sustainability of SLM practices.

Resource partner contribution

The SLDM project was implemented between April 2018 and December 2025, with two extensions granted. The first extension, a 12-month no-cost extension from June 2023 to June 2024, came in response to delays in the early years of the project caused by the factors listed above. The latest approved budget is USD 15 192 204, which reflects GRIF's contribution. In addition, the project benefited from an in-kind contribution of USD 300 000 from FAO.

Coordination

The SLDM project was implemented in close coordination with the Government of Guyana, led by GLSC as the national executing agency. A formal PSC, co-chaired by GLSC and FAO, was established to provide strategic oversight, policy guidance and to ensure

alignment with national priorities. The PSC met regularly and included representatives from the Ministry of Natural Resources, the Ministry of Agriculture, EPA, GFC, GGMC, the Office of Climate Change and other government stakeholders. This arrangement created a high-level platform for multisector dialogue and coordination on land management issues.

In addition to government partners, the project maintained structured collaboration with academic institutions, notably the University of Guyana and GTI, as demonstrated by the arrangements to support the development of academic curricula, as explained above.

The project also engaged civil society and community-based stakeholders. Regional Development Councils, women and youth farmer groups and other interested groups were involved in pilot initiatives such as vetiver grass reclamation, biochar soil improvement and dragon fruit cultivation. While not formalized through Memoranda of Understanding (MoUs), these partnerships created community ownership of project interventions and strengthened local governance capacity.

At the international and intergovernmental levels, FAO leveraged its comparative advantage to integrate Guyana into global fora. The project enabled Guyana to successfully host the 17th Session of the UNCCD CRIC 17 in 2019, which attracted 566 participants from 94 countries. Through FAO's facilitation, Guyana also participated in the UNCCD COP 14, UN-GGIM sessions and the World Bank Land and Poverty Conference, thereby elevating the country's profile in land governance and geospatial management.

The project worked in synergy with other donor-funded programmes, including those financed by GRIF. For instance, alignment with the LCDS ensured consistency in climate-resilient land use planning. Coordination with CI, FIG and GGGI enriched technical exchanges and knowledge-sharing.

This coordinated approach brought a range of benefits, as outlined below.

- Policy impact: Alignment with national strategies ensured that the National Land Use Policy Paper and the NSDI Action Plan were officially recognized and ready for government adoption.
- Capacity-building impact: Collaboration with universities and technical institutes embedded new knowledge streams into curricula, creating sustainability of results.
- Visibility and credibility: Hosting CRIC 17 and active international engagement positioned Guyana as a regional leader in sustainable land governance.
- Community-level ownership: Engagement with farmers, youth and miners in pilot demonstrations enhanced awareness and adoption of sustainable land practices.

Risk management

Throughout the implementation of the mainstreaming SLDM project in Guyana, a range of technical, logistical, environmental and social risks were anticipated. Key risks included institutional silos that might limit collaboration and data-sharing, legal and policy amendments hindered by competing interests, stakeholder reluctance to engage in policy and legal reforms, active and persistent illegal mining, weak legislative enforcement and challenges in mobilizing local communities for SLM. To mitigate these risks, the SLDM project team and the broader GLSC adopted a proactive approach, facilitating transparent negotiations to harmonize cross-sectoral processes, engaging decision-makers to support legal reforms, conducting consultations with stakeholders and mining actors, raising awareness through training and public sensitization and creating local strategic teams to support SLM, as well as reclamation efforts. Additional mitigation measures included clear guidance from the PSC and adherence to United Nations and national procurement standards to ensure accountability, transparency and efficient use of resources.

Environmental and social risks were also addressed, recognizing that unsustainable mining, logging, sand extraction and agricultural practices contribute to land degradation. The project promoted environmentally-friendly practices to enhance productivity and reduce the negative impacts upon forests and other land resources. Stakeholder and community engagement was a priority to secure buy-in and facilitated the implementation of reclamation measures.

A structured risk management strategy was applied, including the establishment of a communication protocol between GLSC and the PMU to address unforeseen issues. Situations beyond GLSC's capacity were escalated to the PSC, which provided guidance and recommended actions. Regular reporting to the GRIF project management office and to the PSC ensured ongoing monitoring, timely mitigation and adaptive management to safeguard project objectives.

Visibility

The project implemented a comprehensive visibility and communication strategy that ensured wide recognition of its achievements at both national and international levels. Key results include:

- Publication of over 20 press releases and media features in top-tier media outlets, highlighting milestones such as CRIC 17, the LIDAR survey, technological advancement in land management and the introduction of dragon fruit cultivation.

- Development and dissemination of knowledge products including the National Land Use Policy Paper, NSDI action plan, business plans, training manuals, a draft geospatial policy and technical field notes serving as quick guides for practitioners and farmers.
- Technical training manuals on GIS, surveying, land valuation and technical field notes, which were subsequently shared with GLSC and other relevant partners. Additionally, curricula were developed for the courses offered under GTI and the University of Guyana in order to enhance both academic content and professional training.
- Organization and support for national visibility events, such as Mining Week, Green Walk and agriculture and land management fora.
- Celebration of international observances, including UNCCD, International Day of Forests, World Environment Day and World Food Day, where project achievements were showcased to broad audiences.
- Production of five high-quality video documentaries capturing project interventions and beneficiary stories, to be displayed at national and international fora and on the social media platforms of GLSC, FAO and United Nations Guyana.
- Facilitation of community-level visibility through field days, community meetings and demonstration visits, enabling farmer-to-farmer learning and increased uptake of practices.
- Organization of a project closing workshop 25 November 2025, which is to be attended by approximately 100 participants, where key project deliverables will be exhibited to major stakeholders and the general public. The event will highlight successful outcomes and discuss follow-up actions to sustain impact beyond the project's lifespan.
- Design and distribution of branded promotional and give-away items (umbrellas, handbags, water glasses and others) to increase project recall and community visibility.
- Publication of a project impact summary and comprehensive brochure capturing project achievements, success stories and human interest narratives, highlighting the perspectives of women, youth and farmers who benefited from the project.
- Events planning and media support for all new and renovated offices launched to highlight the new services and the advancement of facilities under the project.

These communication and visibility efforts highlighted the results of the SLDM project, thereby raising Guyana's profile as a regional and global leader in sustainable land governance, while also ensuring that knowledge products, field notes and digital media will continue to serve as practical resources beyond the lifetime of the project.

E. SUSTAINABILITY

A project sustainability and exit strategy was undertaken from February to May 2024. The purpose of this strategy was to outline how the benefits of the SLDM project will be integrated into the SOPs in Guyana. It detailed how the project's impacts should be transitioned to the GLSC and other stakeholders who have the necessary capacity and resources. A review of the operating context and issues leading to SLDM was undertaken. A political, economic, social, technological, legal and environmental analysis was undertaken and was complemented by an analysis of the digital transformation aspirations.

The SLDM project design identified a number of different issues that needed to be addressed. These were broadly categorized into Degradation issues, policy and governance issues, information, technology, and spatial governance issues and resource issues. Appropriate interventions and recommendations were subsequently proposed to address these issues and lead to the desired changes. Mainstreaming was viewed as crucial for ensuring the long-term success of service transformation, as it takes the benefits of the changes and makes them the new standard for organizations. The sustainability of project results is considered below.

a. Capacity development

Sustainability prospects are high due to extensive institutional and human capacity investments. Under the SLDM project, human resources development was significantly enhanced through tertiary diploma programmes, as well as on-the-job training undertaken in areas such as land administration, surveying, SLM, information systems (including land information systems), UAV and LIDAR mapping.

Capacity-building participants were primarily GLSC staff, but also included other land sector agencies such as APA, GFC, GGMC, MMA-ADA, NICIL, Central Housing and Planning Authority, the Land Valuation Division of the Ministry of Finance and the Deeds Registry.

By investing in staff training, institutional development and strategic planning, the project significantly improved GLSC's operational effectiveness. Long-term investments in GTI, while small, were catalytic since the institute provides the pipeline of suitably skilled personnel for GLSC to add to their ranks. In fact, some graduates are already new staff within the GLSC system and are driving the increased capacity of the Commission.

b. Gender equality

Gender considerations were integrated into training, stakeholder consultations and regional engagement to promote equal access to opportunities in land governance and SLM practices. While quantitative sex-disaggregated data was not systematically reported across all activities, the participatory approach ensured women's involvement in policy dialogues and local capacity-building initiatives, supporting long-term inclusivity in decision-making processes.

c. Environmental sustainability

The project's core outputs – including the National Land Use Policy, SDI, LIDAR-based national base maps and SLM pilots –strengthened environmental governance, improved land administration and enable informed decision-making. These outputs addressed systemic gaps in land use planning and resource management, ensuring better coordination across key sectors such as agriculture, forestry and mining.

In parallel, field-level SLM interventions – including vetiver grass revegetation for erosion control, ANR to restore biodiversity and sustainable irrigation practices to optimize water use within shade house farming – were implemented to rehabilitate degraded lands, enhance ecosystem services and build resilience to climate change.

Collectively, these actions aided in the restoration of critical ecosystem functions, reduced land degradation and promoted sustainable livelihoods. By linking policy reforms with practical field interventions, the project created a comprehensive approach to SLM. This integrated strategy directly supported Guyana's LCDS and advanced national commitments to climate change mitigation and adaptation, biodiversity conservation and the SDGs, in particular SDGs 13 and 15. This combination of governance reforms and practical solutions ensured that the project delivered not only environmental benefits but also long-term social and economic gains, reinforcing the importance of integrated land management for sustainable development.

d. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

By improving tenure security systems, expanding public access to spatial data and supporting transparent land allocation, the project advances the Right to Food through better agricultural planning and the Decent Work agenda via capacity development in green economy sectors. Participatory planning with regional councils and communities strengthens rights awareness and equitable access to land resources.

e. Technological sustainability

The project embedded technological sustainability by implementing modern, scalable, and integrated systems that strengthen GLSC's core operations and ensure long-term functionality. Key upgrades such as the NGLMS, ArcGIS enterprise architecture and the expansion of the CORS network have served to institutionalize cutting-edge digital solutions in land administration and geospatial services. These systems provide a modular framework that facilitates future upgrades, reduces maintenance costs and ensures compatibility with evolving technologies. By moving away from legacy infrastructure to enterprise-grade solutions, the project has minimized technology obsolescence and positioned GLSC to adapt seamlessly to emerging innovations in geospatial data management and land governance.

Complementing these digital systems, the project invested in robust hardware, specialized software, and advanced field technology to support operational continuity. This has modernized surveying and data collection, ensuring precision and efficiency in environmental monitoring and land use planning. Furthermore, capacity-building through targeted training ensures that GLSC staff can operate and maintain these technologies effectively, reinforcing institutional self-reliance. Collectively, these measures guarantee that technological innovations remain functional, adaptable and sustainable beyond the project's lifespan, securing long-term benefits for land administration and SLM.

f. Economic sustainability

The project enhanced economic sustainability by modernizing land administration systems, improving tenure security and lowering transaction costs, which attract investment and foster business growth. It also boosted land productivity through sustainable practices, supporting diversification with high-quality geospatial data and building a skilled workforce for long-term economic resilience. Additionally, strengthened GLSC systems increase government revenue collection, ensuring reinvestment in sustainable land governance.

In addition to the sustainability factors outlined above, some interventions initiated under the SLDM project are being continued and financed through the European Forest Institute (EFI). Specifically, EFI has taken up the following three technical packages:

- Strengthening GLSC's technical capacity for database management and GIS development.
- Process documentation and optimization for the NGLMS.
- Design, development, deployment and operationalization of a national metadata portal for spatial data management in Guyana.

In addition, the SLM interventions piloted under the SLDM project will be scaled up through the Global Environment Facility-funded project “Strengthening Land Use Planning for Sustainable Land Management.” These complementary efforts will serve as a bridging mechanism, ensuring the continuity and consolidation of the SLDM’s achievements and laying the foundation for a comprehensive follow-up programme that advances sustainable land governance and management in Guyana.

The introduction of dragon fruit cultivation under the present project has demonstrated strong potential for scalability and long-term impact. The initiative has already been adopted by the FAO Gender-Responsive Climate-Smart Agriculture and Food Systems (GCAF) project, which will build upon the technology, training manuals and production techniques piloted through SLDM. By expanding investments and supporting wider farmer participation, the GCAF project will ensure continuity of the initiative while advancing value chain development and strengthening sustainability beyond the SLDM project.

Additionally, the Caribbean Small Developing States Multi-Country Soil Management Initiative for Integrated Landscape Restoration and Sustainable Food System: Phase 1 shares strong thematic overlap with Outcome 3 of the SLDM project. These encompass sustainable land and soil management, piloted restoration of degraded lands and capacity-building and institutional strengthening. Leveraging these synergies could enhance effectiveness of outcomes, avoid duplication of activities and efforts and enable scaling of best practices locally and regionally. Field interventions in common target areas may benefit through sharing proven restoration methods and monitoring results.

F. LESSONS LEARNED

LESSONS LEARNED – Elements of success

The effective partnership between GLSC and FAO was a central factor in the project’s success. Strong collaboration enabled the efficient allocation of resources, enhanced technical coordination and supported the timely achievement of key milestones.

Ongoing consultation with stakeholders and active collaboration with other relevant agencies were vital to securing broad-based support. This inclusive approach helped to align project activities with the needs of diverse beneficiaries, minimized duplication of efforts and strengthened the relevance of project outcomes. It also enabled the project to leverage the technical capacities and skillsets of government agencies such as NAREI and GGMC to lead on-the-ground implementation of certain SLM activities.

International knowledge exchange can drive innovative, context-specific solutions. The learning mission to Brazil's Agricultural Research Corporation (EMBRAPA) allowed the team to gain valuable insights and learn from Brazil's successful SLM practices, particularly soil quality improvement practices, high-value crop cultivation and marketing, including reclamation practices for mined-out degraded land. This exposure inspired the piloting of dragon fruit cultivation on degraded and low-capability lands, an initiative that has successfully fostered crop diversification and will enhance food system resilience and farmer incomes.

A comprehensive approach to capacity development is key to sustained improvement. Under the project, tertiary diploma programmes, as well as on-the-job training, were carried out in each technical area. Beneficiaries included all key land agencies, thereby improving the sector's operational effectiveness. Furthermore, a small but catalytic investment was provided to GTI, which provides the pipeline of suitably skilled personnel for GLSC to increase their human capacity.

LESSONS LEARNED – Impediments/constraints

The project experienced a number of personnel changes within the PMU, which impeded the normal flow of activities and delayed key processes. During the lifespan of the project, there were changes in the roles of chief technical adviser, operations officer, administrative and finance officer and communications specialist, which necessitated a learning period and caused a slow-down in these functions. The support of the FAO Guyana country office was critical in ensuring that delays were kept to a minimum.

The project faced a number of delays, mainly as a result of external factors. The majority of project activities were put on hold for almost a year as a result of the COVID-19 pandemic. Approximately six months were lost due to the late start of project activities, while further delays stemmed from Guyana's protracted electoral processes in 2020 and 2025 and their consequences. In view of these factors, along with other delays in implementation, extensions were granted on two occasions – a 12-month extension to June 2024 and an 18-month extension to December 2025 – in order to accommodate the delays recorded in the early part of the project and to allow for the completion of complex technical outputs such as national base mapping with LIDAR, upgrading the land information system, SLM piloting and the construction of GLSC regional offices.

The establishment of precise, measurable and mutually agreed deliverables within complex contracts and LoAs proved critical to ensuring clarity of expectations. This approach provided a clear framework for monitoring progress, facilitated accountability and reduced the likelihood of disagreements during project implementation.

While coordination was generally strong, some areas would benefit from improvement. In terms of the formalization of interagency agreements, although roles and responsibilities were clarified through the legal assessment, no binding interagency MoUs were signed, which limited institutional accountability for certain outputs.

Private sector engagement represented another constraint, as the project had limited coordination with private sector actors beyond technology providers. Stronger engagement could have supported the scaling-up of innovations (e.g. commercialization of dragon fruit and land service digitization).

Overall, coordination was a central factor in the success of the SLDM project. By fostering strong partnerships across government, academia, civil society and international fora, the project ensured that its outputs were not only technically sound but also embedded in national institutions and recognized globally.

G. FOLLOW-UP ACTIONS FOR GOVERNMENT ATTENTION

Align SDIs to create a NSDI baseline

While SDIs are in place, there is potential to improve interoperability, metadata standards and governance for a national SDI. Aligning SDIs to create a NSDI baseline would strengthen integration and collaboration among agencies. Follow-up actions could involve developing governance frameworks, standardizing metadata and data-sharing protocols and providing workshops and training for staff, supported by expertise in GIS architecture and funding for interoperability tools.

Support the retention of key development personnel and the institutionalization of their knowledge

There is an opportunity to strengthen staff retention and ensure that institutional knowledge is preserved. Supporting retention and knowledge institutionalization would involve documenting processes, creating internal knowledge repositories and providing mentoring opportunities. Follow-up actions may include offering professional development, competitive incentives and structured knowledge transfer programmes to sustain expertise within GLSC.

Support the maintenance of key geospatial infrastructure

There is potential to enhance the reliability and sustainability of geospatial infrastructure through structured maintenance and lifecycle management. Supporting infrastructure maintenance would involve developing proactive servicing schedules, building staff capacity,

and ensuring timely upgrades. Follow-up actions could include funding for maintenance contracts, staff training and life cycle planning for key systems and equipment.

There is an obligation under the Safety of Life at Sea convention to survey territorial waters for navigational charting purposes, and this activity will also support management of Guyana's offshore territory. A structured plan is required for this action in order to identify the responsibilities of national authorities, resource needs and to prioritize areas for coverage. In alignment with offshore surveys, coastal management must also be addressed through the development of legislation for littoral boundary definition, planning processes and environmental management of coastal development activities.

Formalize the ownership of the CORS infrastructure and Servers in GLSC and develop associated management strategies

The ownership and management of CORS infrastructure and servers could be clarified to ensure operational continuity. Formalizing responsibility and implementing management strategies would enhance reliability and accountability. Follow-up actions may include legal formalization of ownership, creation of governance policies, staff training for operations and budgeting for maintenance and upgrades.

There is a need for continuous development and monitoring of the geodetic infrastructure. Data from CORS stations should be included in a regular adjustment through SIRGAS, who have offered to include Guyana CORS in their adjustment. The densification of survey control through physical marks with 3D solutions with quality indicators is a requirement for the geospatial community to operate within the national coordinate system in some areas. These marks need to be maintained, with primary marks observed regularly to assess deformation, particularly in the vertical direction along coastal areas. This must be supported through the installation of permanent sea level monitoring stations.

Modernization of the national mapping strategy

The existing mapping strategy could benefit from updates to incorporate modern technologies and streamline workflows. Modernizing the national mapping strategy would improve data accuracy, operational efficiency and integration with other geospatial initiatives. Follow-up actions could include introducing digital mapping tools, remote sensing and GIS automation, staff training programmes and allocating resources for ongoing system updates.

Support the retention of key development personnel and the institutionalisation of their knowledge

There is an opportunity to strengthen staff retention and ensure that institutional knowledge is preserved. Supporting retention and knowledge institutionalization would involve documenting processes, creating internal knowledge repositories and providing mentoring opportunities. Follow-up actions may include offering professional development, competitive incentives and structured knowledge transfer programmes to sustain expertise within GLSC.

Develop a base map revision strategy

Existing base map data could be improved through more systematic updates and quality assurance processes. Developing a base map revision strategy would ensure that spatial data remained current and reliable for decision-making. Follow-up actions could involve scheduling regular updates, leveraging UAVs and satellite imagery, implementing quality control measures and training staff in data management practices.

Build the land registration and geospatial community of practice

Collaboration among land registration professionals could be enhanced to improve consistency and information-sharing. Building a land registration community of practice would foster collaboration, knowledge exchange and the adoption of best practices. Follow-up actions may include establishing digital platforms for interaction, organizing workshops and supporting peer-to-peer learning initiatives.

The geospatial ecosystem could benefit from stronger collaboration to drive innovation and transformation. Building a community of practice would encourage cross-agency engagement, shared problem-solving and continuous improvement. Follow-up actions may include establishing digital collaboration platforms, hosting regular stakeholder fora and providing facilitation support to maintain active participation.

Develop a change strategy across the stakeholder community of practice

There is an opportunity to strengthen coordination across stakeholders to support digital transformation and improved land management practices. Developing a change strategy would guide stakeholders through new processes and systems, foster collaboration and encourage the adoption of best practices. Additional support could include guidance from change management specialists, training programmes and engagement tools to ensure that stakeholders are well prepared for the transition.

Develop a core expertise strategy

Some areas of technical expertise could be strengthened to support long-term operational efficiency. Developing a core expertise strategy would identify essential skills, provide targeted training and encourage retention of key talent. Follow-up actions may include creating training programmes, offering professional certification opportunities and fostering partnerships with academic institutions to support ongoing skills development.

Reinforce drone capability

Drone capacity could be strengthened to improve efficiency in data collection and mapping. Reinforcing drone capability would involve acquiring advanced UAVs, training operators and ensuring compliance with relevant regulations. Follow-up actions may include procuring equipment, providing certification programmes and establishing maintenance plans to sustain operational readiness.

Sustaining organic soil amendments

The project promoted biochar and vermicompost as an organic amendment to the soils which provide complementary benefits when applied together and regularly. Sustainable soil management requires consistent inputs that enhance soil structure, fertility and biological health over time, especially for soils with low productivity. When biochar and vermicompost are applied regularly and in combination, these amendments reinforce each other's strengths.

Under the SLDM project, farmers were supported to initiate the production of biochar and vermicompost. However, there was limited time to monitor the production process and measure the outcomes of their application. In order to fully realize the benefits, a follow-up project is crucial – both to sustain farmer-led production and to ensure the regular use of these amendments to build long-term soil health, improve yields and promote climate-resilient farming systems.

Follow-up actions to sustain multicropping in shade houses

As part of the project, farmers were facilitated to adopt multicropping practices in shade houses, aiming to optimize land use, diversify production and increase income opportunities. However, due to the limited duration of the project, there was insufficient time to fully monitor and evaluate the outcomes of this intervention. Further assistance is needed to monitor and evaluate the outcomes of multicropping practices in shade houses, including crop yield performance, income generation and resource efficiency. Continued support will help to refine

the system, enhance adoption and ensure lasting productivity and livelihood gains among beneficiary farmers.

Securing long-term restoration through continued monitoring and support

In order to secure the sustainability of land reclamation and restoration efforts – including enrichment planting, vetiver grass stabilization and brushwood check dams – a structured follow-up mechanism should be established. This would allow continuous monitoring of vegetation survival, soil stabilization and ecological recovery to achieve lasting environmental impact.

Continue dragon fruit piloting and market development

A second-phase intervention is recommended to track the growth, yield and market performance of dragon fruit cultivation. This should include support for agronomic training, post-harvest management and market linkages, as well as the development of value-added products (e.g. juices, jams and dried fruit). Sustained follow-up will unlock the full economic and diversification potential of this high-value crop.

Follow-up phase recommendation

Given the modernization of land administration, the establishment of geospatial infrastructure and the positive results stemming from SLM pilots, the Government is encouraged to endorse a second phase of the SLDM project, focused on (i) consolidating national systems within GLSC, (ii) scaling up proven SLM interventions to additional regions and (iii) deepening NSDI integration for evidence-based, climate-resilient land governance. A successor phase – aligned with LCDS 2030 and the United Nations Sustainable Development Cooperation Framework – should leverage GRIF and other resource partners and complementary financing, anchored by government commitments towards operations and maintenance.

H. HUMAN INTEREST STORY

Transforming land administration in Guyana through capacity-building and continuous mentorship

Through the present project, GLSC has embarked on a transformative journey to modernize land administration and improve geospatial information management across the country. To achieve this, the commission partnered with FAO to deliver a comprehensive series

of training sessions focused on enhancing skills in cadastral data compilation, digitization and managing geospatial data, using a special cadastral portal to share information.

This initiative comes at a critical time, as Guyana's growing economy requires efficient land administration systems to ensure equitable access to land, support for sustainable development and the provision of accurate geospatial data to decision-makers.

Over the past year, staff from GLSC's information systems and land information management divisions have taken part in a number of training sessions. The curriculum was designed with the managers of the relevant divisions, in an effort to update the skills of the staff in the newer versions of the ArcGIS platform, including ArcGIS Pro, ArcGIS Portal, as well as in the server installed on-site and ArcGIS Online, equipping participants with cutting-edge tools and methodologies to improve the accuracy, efficiency and accessibility of land-related data.

the training events covered cadastral data compilation and digitization, geospatial information management, data-sharing, parcel fabric and data capture using mobile applications. Participants gained valuable skills in managing old land records digitally, maintaining data accuracy and using geospatial information to guide planning and decision-making.

The training also incorporated practical examples to ensure that participants gained hands-on experience. For instance, staff learned to upload parcel shapefiles to the ArcGIS platform and edit parcel data effectively. They practiced digitizing buildings such as schools and churches in Georgetown, Guyana and adding attribute information and images to create richer datasets. In addition, participants developed dashboards using health centre data to represent statistics with charts, pie graphs and symbols, thereby helping to enhance data clarity and usability.

These examples not only demonstrate the potential of the tools but also serve to equip staff with skills that they can immediately apply in their roles. The success of this training is part of the GLSC's broader modernization efforts. Building on this foundation, the commission established a continuous learning programme to keep staff abreast of emerging technologies and trends.

"This training has been really helpful," explains T.A., a GIS analyst at GLSC. "Before, I didn't have much experience with the ArcGIS platform, but now I'm confident and comfortable, especially in managing data and creating useful maps. It has made my work easier and more effective, and I'm excited to use what I've learned in future projects."



Photo 1 GLSC staff undergoing land administration capacity-building (©GLSC)

Appendix 1
LOGFRAME MATRIX– ACHIEVEMENT OF INDICATORS

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
Impact² Sustainable Land Development and Management mainstreamed into national policies and programmes for the sustainable management and utilization of natural resources (land, soil, water, climate and genetic resources) for the benefit of present and future generations in Guyana and in support of Guyana's Low Carbon and Green State Development Strategies	Preparatory work completed for a harmonized land policy and regulatory framework for SLDM and GLSC, providing improved support for land administration, planning and SLM. SLM and reclamation of degraded lands, through enhanced capacity, contributing to improved livelihoods, resilient populations and climate mitigation in target regions.	Fragmented policy and legislation Weakly coordinated divisions and information on land GLSC has limited capacity to fulfil its mandate. Degraded land and natural resources are affecting livelihoods and ecosystems and future development opportunities.	SLDM principles are mainstreamed into national policies and programmes, with 90% of GLSC staff and key sectoral counterparts trained and using modernized tools, geospatial and integrated information frameworks to support sustainable land administration, governance, management and restoration.	Achieved		
Outcome 1 Sustainable land development and management mainstreamed in policy, institutional and	Land use policy paper drafted to enhance the enabling environment for SLDM	Uncoordinated land policy and legislation across sectors	Policy paper drafted and submitted for adoption	Achieved		

² The impact level should always reflect the higher programmatic outcome to which the project contributes. For example, at the country level, this is expressed as the CPF outcome to which the project contributes and can also reflect other elements of impact that are defined at a higher programmatic level (UNDAF/national goal/FAO Strategic Framework).

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
governance mechanisms to prevent degradation and restore degraded lands	Number of interagency cooperation agreements	Information and data fragmented across sectors/institutions, out-of-date on some aspects and limited on SLM impacts	Harmonized regulations and/or laws in place to promote SLDM as a basis for enhanced climate resilience and food security	Achieved		
	Number of regulations and/or laws adjusted, where necessary, to meet the needs of the enabling environment	Lack of incentives for responsible investments	Legal review completed	Achieved		
	Business sustainability plan for GLSC completed	Unsustainable financial model	GLSC business sustainability plan in place.	Achieved		
			Interagency roles and responsibilities established and coordinated through at least two agreements	Not achieved	While no interagency agreements were established and coordinated, the clarification of roles and responsibilities of GLSC and other key agencies involved in land governance was advanced as part of the land policy use process,	

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
					improving the understanding of institutional mandates.	
Output 1.1 Harmonized land policies developed and submitted for adoption and institutional capacities in place for mainstreaming responsible governance of tenure and SLDM	High-level intersectoral mechanism/taskforce established	0	One high-level intersectoral committee established	Achieved		
	Guyana land use policy paper completed		Land use policy paper developed	Achieved		
	Open-data policy strategy for SLDM developed		Open-data policy strategy for SLDM developed	Achieved		
Output 1.2 Enhanced land governance through regulatory and financial systems, spatial data information management and enhanced institutional capacities.	Multistakeholder platform and events for awareness-raising on SLDM policy and governance	Weak governance of tenure, VGGT little known or applied	At least two multistakeholder events conducted on Guyana land use and policy paper	Achieved		
	Develop business plan (including revenue collection, services payment, human resources allocations, roles and responsibilities, etc.)	Land investments/ development leading to degradation and inequity Land cadastre and registers incomplete and records in hard copy Land information systems fragmented	GLSC long-term business plan, including financial sustainability strategy, drafted and adopted for implementation	Achieved		
Outcome 2 Strengthened institutional and human capacity for participatory and integrated sustainable land	Number of information systems and knowledge products developed for SLDM at the regional and national level	Weak capacities and limited data for supporting improved land tenure and sustainable	Open-data, national integrated land information system including (i) a spatial administration model and (ii) an updated cadastre (NDSI) in place	Achieved		

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
development and management	Number of GLSC staff and stakeholders at the national and regional level trained and otherwise capacitated for SLDM	management, compromising the capacity to cope with land pressures and climate change Lack of M&E tools for SLDM	Capacities built in GLSC and partner institutions in the development and use of integrated information systems, methods and indicators for improved land administration, governance of tenure, land planning, assessment and monitoring with stakeholders	Achieved		
	A set of revised procedures for land administration, land use planning and governance of tenure etc. in place, as a result of aligned and coordinated processes and infrastructure development		SLDM being promoted and scaled up through practitioners/experts sharing climate-resilient SLM practices and results through global WOCAT-UNCCD database and national events	Achieved		
Output 2.1 Strengthened human capabilities for sustainable land development and management, needs assessment, consultations and institutional capacity development plans	Capacity development plan for GLSC and strategies for mainstreaming SLDM based on identified needs	Poor awareness and limited information on tenure and rights No incentives or coherent support for SLDM and restoration	Roles and responsibilities of GLSC and key agencies clarified and strengthened	Achieved		
	Number of GLSC and partners' staff aware of land policy, governance of tenure, land rights and related issues	Fragmented capacities on land assessment, land degradation and SLM across sectors	Raised awareness on SLDM mechanisms using platforms such as CRIC (hosted by Guyana)	Achieved		
	Number of public awareness events and materials shared. Access to data and information on SLDM facilitated		At least one national and three regional land degradation, land management and land use assessments conducted by	Mainly achieved	Three regional assessments were completed. The national	GLSC have indicated that they will finalize the

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
			multisector team and data collected, analysed and available		assessment was completed in draft form and submitted to GLSC.	assessment after the project's closure.
	Number of agencies/staff aware of land degradation, land administration/ governance and SLM interactions and synergy effective and operational between SLDM and land degradation neutrality target-setting processes		Raised awareness on interactions between land degradation, land administration/governance and SLM (survey)	Achieved		
			An integrated multistakeholder platform facilitating effective consultation towards integrated land planning and governance for SLDM and restoration	Achieved		
			SLDM reports and restoration of areas through interventions	Achieved		
			Plan developed and implemented for improving geodetic reference framework and digitizing the cadastre	Achieved		
Output 2.2 Strengthened human capabilities for sustainable land development and management through training and experience-sharing workshops,	Number of GLSC and partners' staff trained on promoting land policy, governance of tenure, land rights and related issues.	0	500 individuals (from both GLSC and partner agencies) provided with on-the-job training on land administration, assessment and monitoring tools, data collection, analysis and sharing etc.	Achieved		Continued monitoring and reporting will be conducted post-project

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
materials development and exchange visits						by GGMC and NAREI.
Output 2.3 Enhanced physical capacity (knowledge, systems, infrastructure and proicesses) for sustainable land development and management	Improved integrated NSDI	Land data and information fragmented across sectors, separate registers and databases (raster and vectorized information), impeding access by stakeholders and use for land planning, administration and management Ineffective land planning and poorly informed decisions Lack of a culture of information-sharing or open data policy, hindering intersectoral and private-public sector cooperation	Improved integrated NSDI for SLDM through the completion of the NSDI road map and action plan and through UN-GGIM	Achieved		
Outcome 3 Local governance strengthened in three regions for implementing	Institutional capacity in targeted regions improved in land governance, planning,	Weak and uncoordinated capacities across sectors for addressing land degradation and	Improved capacities of regional institutions in land governance, land planning, land management and restoration on the ground	Achieved		

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
sustainable land management	management and restoration	climate change, resulting in costly, time-consuming and excessive bureaucratic processes that affect the efficiency and effectiveness of land management				
	Decentralized services provided at the local level in targeted regions to ensure SLM and climate resilience		Monitoring system in place for scaling up SLM in target landscapes	Achieved		
	Number of communities and local leaders sensitized and encouraged to adopt SLM practices		Communities and local leaders are sensitized	Achieved		NAREI and GGMC will continue to regulate and scale up the SLM activities. The established model units will serve as platforms for knowledge transfer, effective monitoring, and sharing of results with land users to facilitate wider

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
						adoption and scaling up of the practices
Output 3.1 Strengthened capacity of actors in at least three regions to assess land resources status and trends	Number of local actors capacitated on land degradation and SLM options	Weak knowledge of degradation and SLM in regions	Local actors and communities in at least three regions demonstrate awareness of degradation processes and SLM and restoration processes	Achieved		
	Number of SLM and reclamation technologies and approaches documented and shared	Inadequate involvement of local and decentralized actors in decision-making on SLDM that leads to a stockpile of decisions to be made at the central level Lack of extension materials on SLM and restoration practices	Capacity of local actors built in selecting, assessing and documenting SLM	Achieved		
Output 3.2 Strengthened capacity for promoting territorial approaches for scaling-up of proven SLM practices and rehabilitation measures	Strengthened extension services through 12 training and piloting events	No support for local actors in adopting SLM and restoration	Extension officers/land users trained and competent in SLM practices	Achieved		
	Number of communities involved and area (ha) under restoration	Sector-driven interventions and lack of priority-setting among stakeholders	11.8 ha mined-out area reclamation site. 11 farmer communities from Amelia's Ward, Bamia, Hauraruni, Kairuni, Kuru Kururu, Long Creek, Loo Creek, Moblissa, Nottinghamshire, West Watooka and Yarrowkabra.	Achieved		

Results Chain	Indicators				If not achieved, explain why	If applicable/ follow-up action to be taken
	Indicators	Baseline	End target (<i>expected value at project completion</i>)	Achieved		
Outcome 4 Project management structures and mechanisms including M&E framework strengthened	Percentage of project indicators achieved through establishment of PMU and staff in place	0	At least 65% of project targets achieved in a timely and cost-effective manner	Achieved		
	M&E framework applied in alignment with SLDM		Guidance provided by PSC as needed	Achieved		
Output 4.1 Project staff hired and management structures in place for effective partnerships, stakeholder engagement, communications and procurement	Percentage of project staff in place and specialists hired	0	60% of project staff and specialists functional for the project's lifetime	Achieved		
	Number of stakeholder engagement and communication strategies/plans		Stakeholder engagement and communication strategy/plan developed	Achieved		
	Percentage of procurement plans and contracts drafted		100%	Achieved		
Output 4.2 Project M&E framework in place	Number and type of M&E framework established to monitor SLDM activities during and beyond the project lifetime	0	SLDM project monitoring systems on progress of deliverables, mid-term and final evaluation of project impacts	Achieved		
	Number of trained institutional stakeholders to conduct M&E		Resident system of M&E established within GLSC	Achieved		
	Number of M&E databases and types of data capture		Pilot M&E systems at the local level in at least three regions	Achieved		

Appendix 2

DOCUMENTS PRODUCED DURING THE PROJECT

Technical reports

Jazaj, S. 2018. *NSDI Diagnostic Tool: Report*. 9 pp.

Coote, A.M. 2018. *NSDI CSDT Completed Questionnaire*. 39 pp.

Coote, A.M. 2018. *NSDI Diagnostic Tool: Indicator Scoresheet*. 3 pp.

GLSC. 2019. *National Spatial Data Infrastructure Action Plan*. 94 pp.

Coote, A.M. 2019. *Mapping Geospatial Use Cases to Government Policy Drivers (Geospatial Alignment)*. 50 pp.

Coote, A.M. 2019. *NSDI Ministerial Overview*. 3 pp.

Coote, A.M. 2019. *National Spatial Data Infrastructure – Final Report*. 16 pp.

Coote, A.M. 2019. *National Spatial Data Infrastructure Socio-economic Analysis*. 51 pp.

Coote, A.M. and Jazaj, S. 2019. *Spatial Data Infrastructure (SDI) Diagnostic Tool – National Report*. 44 pp.

PricewaterhouseCoopers. 2020. *Final Current State Assessment Report*. 185 pp.

Da Passano, M.G. 2020. *Land Use Policy Report*. 9 pp.

Thomas, J.K. 2020. *Overview of legislation relevant to the land sector in Guyana*. 13 pp.

Sanjines, M. 2020. *Land Administration Assessment and Recommendations Report – Final*. 40 pp.

PricewaterhouseCoopers. 2021. *Development of a five-year strategic and business plan and an annual business plan for the Guyana Lands and Surveys Commission*. 48 pp.

PricewaterhouseCoopers. 2021. *Strategic Priorities and Strategic Plan 2021–2026*. 82 pp.

Da Passano, M.G. 2021. *Land Use Policy Paper*. 32 pp.

FAO. 2022. *Land Degradation Assessment for the definition of priority areas for Ecosystem Restoration using SDG 15.3.1 indicator and remote sensing*. 11 pp.

- FAO.** 2022. *Results of SDG Indicator 15.3.1 for the analysis of Land Degradation using the SEPAL platform.* 16 pp.
- Bosio, M.** 2022. *Sustainable Land Management in Guyana: A Remote Sensing and SDG-Based Methodology Tools for the identification of ecosystem restoration initiatives.* 12 pp.
- GLSC.** 2023. *Draft National Policy on Geospatial Information.*
- Miller, K.** 2023. *Densification of control within GGD2015.* 8 pp.
- Miller, K.** 2023. *Education in Land Surveying and Geospatial Science.* 42 pp.
- Miller, K.** 2023. *Geoidal Modelling.* 27 pp.
- Miller, K.** 2023. *Guidelines for Survey Operations in Point Positioning.* 24 pp.
- Miller, K.** 2023. *Guyana Coordinate Reference System.* 24 pp.
- Miller, K.** 2023. *Guyana CORS/VRS Network.* 14 pp.
- Miller, K.** 2023. *National Hydrography in Guyana status and recommendations.* 15 pp.
- Miller, K.** 2023. *Role of the Geodesy Unit in GLSC.* 9 pp.
- Miller, K.** 2023. *Spatial Data Delivery.* 8 pp.
- Miller, K.** 2023. *Software to perform Geodetic computations across Guyana using Guyana Geodetic Datum of 2015 (GGD2015), Guyana Map Grid (GMG), Guyana Geoidal Model (GuyanaGEOID).* 9 pp.
- Ordnance Survey International.** 2023. *OS Consultancy Report.* 32 pp.
- Ordnance Survey International.** 2023. *Office-Field-Office Process maps.*
- Rotmans, A. and Trotman, J.** 2023. *Sustainable Land Use Considerations for Guyana's Transitional Forelands of White Sands & Loams: Perspectives and pathways for responsible development in Agriculture & Mining from the Intermediate Savannas to the Yarowkabra Area.* 29 pp.
- Rotmans, A. and Bosio, M.** 2023. *SLDM National Working Group Rationale.* 3 pp.
- Miller, K.** 2024. *GuyanaGEOID 2024.* 14 pp.
- Winkelmann, A. and Miller, K.** 2024. *Assessment of CORS data continuity.* 15 pp.
- Winkelmann, A. and Miller, K.** 2024. *Sea levels and vertical datums in Georgetown in relation to land surveying, hydrographic surveying and sea level change.* 17 pp.
- Miller, K. and Abudu, I.** 2024. *Assessment of the EGM2008 geoidal model for Guyana.* 10 pp.
- Winkelmann, A.** 2024. *Surveys/Mapping Final Report.* 126 pp.

- Winkelmann, A.** 2024. *Levelling for Vertical Ground Control*. 39 pp.
- Winkelmann, A.** and Miller, K. 2024. *GNSS surveys – ground control network*. 33 pp.
- Winkelmann, A.** *Basic Field Surveying Procedures*. 19 pp.
- Warnest, M.** 2024. *LIDAR Mapping Specialist – Mission Report: Programme Update 2024*.
- Medici Land Governance.** 2024. *Guyana LIDAR Survey Final Project Report*. 65 pp
- University of Twente.** 2024. *FAO-GLSC Technical Report v 2024-03-25*. 25 pp.
- University of Twente.** 2024. *Guyana Unique Parcel Identifier – GUPI*. 7 pp.
- University of Twente.** 2024. *NextGen – Data Model*. 83 pp.
- University of Twente.** 2024. *Reference Architecture: NextGen – Land Information*. 15 pp.
- University of Twente.** 2024. *Supplant – Data Model*. 44 pp.
- Sanjines, M.** 2024. *Land Administration Consultancy Final Report*. 42 pp.
- Arafat, F.** 2024. *Proceedings of the validation workshop of the multistakeholder working group to finalize the SLM interventions for piloting*. 15 pp.
- Miller, K.** 2025. *GuyanaGEOID2025*. 28 pp
- Miller, K.** 2025. *Modernisation of vertical control in Guyana*. 8 pp.
- Miller, K.** 2025. *Attempt to modernise some international boundary marks for Guyana*. 8 pp.
- Miller, K.** 2025. *Hydrography revisited*. 9 pp.
- Miller, K.** *GTI Surveying programme*. 6 pp.
- Essa, A.J.** 2025. *Resource Mobilization Strategy*, 25 pp.
- FAO Guyana.** *Dragon Fruit Cultivation Manual in Guyana*. 78 pp.

Appendix 3

PROJECT STAFF

Function	Dates of Service	
	Starting Date	Concluding Date
Senior geospatial analysis consultant	15 September 2018	31 January 2019
National land administration and NSDI consultant	22 September 2018	30 October 2018
Communication specialist	1 April 2019	31 March 2020
Driver	1 April 2019	23 May 2024
Driver	1 April 2019	31 December 2022
National operations specialist	18 April 2019	16 September 2022
M&E specialist	2 May 2019	30 June 2025
Procurement assistant	13 May 2019	30 March 2025
International operations officer	10 July 2019	30 August 2020
International land policy consultant	20 September 2019	21 August 2021
National legal and land policy consultant	23 September 2019	20 April 2020
Senior land administration specialist	1 November 2019	1 December 2019
International legal consultant	8 January 2020	6 August 2020
Land administration specialist	13 June 2020	31 May 2025
Communication specialist	31 August 2020	30 June 2021
Land management consultant	5 June 2021	7 July 2021
Communication specialist	9 July 2021	31 December 2025
SLM specialist	21 March 2022	31 May 2024
Administrative assistant	2 May 2022	30 June 2023
SLM specialist	13 July 2022	7 June 2023
LIDAR mapping specialist	22 August 2022	31 January 2024
Driver	14 March 2023	30 September 2024
Project manager	11 April 2023	31 December 2023
Finance and administrative specialist	7 August 2023	9 June 2024
National database analyst	4 September 2023	30 June 2024
Sustainable land management specialist	8 September 2023	16 October 2025
National software solutions developer	18 September 2023	14 July 2025
Geodesy specialist/Survey	26 September 2023	30 April 2024
ICT/Network specialist (Data management systems)	26 September 2023	22 December 2023
Surveyor/Mapping specialist	4 October 2023	17 November 2023
Surveyor/Mapping specialist	1 February 2024	15 June 2024
National operations specialist	1 February 2024	30 April 2024

Function	Dates of Service	
	Starting Date	Concluding Date
Project sustainability specialist	15 February 2024	24 May 2024
ICT/Network specialist (Data management systems)	19 February 2024	30 June 2024
Finance and administrative specialist	2 October 2024	1 October 2025
Project manager/Senior project specialist	6 November 2024	31 December 2025
National database analyst	13 January 2025	31 December 2025
National sustainable land management specialist	20 January 2025	30 November 25
Driver	17 February 2025	
Dragon fruit specialist	2 June 2025	9 September 2025
GIS/Spatial developer	10 July 2025	17 October 2025
National software solutions developer/ Programmer	12 September 2025	31 December 2025
Geodetic specialist	26 September 2025	16 October 20225
Geospatial mapping specialist	20 October 2025	31 December 2025

Appendix 4

TRAINING AND STUDY TOURS

Title of training/study tour	Place	Date	Number of participants
Land Administration Diploma (first iteration)	University of Guyana	February 2018 – June 2019	28
Geospatial and CORS Study Attachment	United Kingdom	12-23 November 2018	6
UN-GGIM	United States of America	29 July – 4 August 2018	4
UN-GGIM	Deqing, China	26-29 September 2018	2
Latin America Geospatial Forum (LAGF) 2018	Mexico	6-8 November 2018	2
United Nations World Geospatial Information Congress	China	19-23 November 2018	6
Fourth United Nations Expert Consultation and Meeting on the Implementation Guide on Integrated Geospatial Information Framework	Malaysia	18-21 June 2019	2
20th Annual World Bank Conference on Land and Poverty	United States of America	25-29 March 2019	4
CRIC 17	Guyana	28-30 January 2019	98
UNCCD COP 14	India	2-13 September 2019	13
FIG Workshop	Viet Nam	22-26 April 2019	3
NSDI Europe Study Tour	Italy, the Netherlands, Serbia, United Kingdom	29 June – 14 July 2019	9
UN-GGIM 9th Workshop	United States of America	4-11 August 2019	3
Land Valuation Diploma programme	Guyana	February 2021 – June 2022	28
Land Administration Diploma (second iteration)	Guyana	March 2022 – September 2023	18
SEPAL	Online	24 January – 3 March 2022	42
Sentinel Multispectral Imagery Training	GLSC, Guyana	10 December 2022	9
LIDAR technology training	GLSC, Guyana	2023	25
LIDAR		15-31 May and	25

Title of training/study tour	Place	Date	Number of participants
		21-22 September 2023	
Land Administration and GIS capacity-building • Implementation of an enterprise geodatabase • Basics of ArcGIS Pro • ArcGIS Enterprise, Portal and interaction with ArcGIS Pro. • Working with Enterprise Geodatabase in ArcGIS Pro and QGIS • ArcGIS Enterprise portal, creation of content and basic dashboards • Creation and configuration of Parcel Fabric • Introduction to LADM	GLSC, Guyana	2023	18
Land Administration and GIS capacity-building, data-cleaning tools: • Joins and spatial queries • Topology rules • Parcel Fabric • COGO (coordinate geometry), Split and Merge in Parcel Fabric • Hands-on with Land Information and Mapping (LIM) data	GLSC, Guyana	March – May 2024	17
ArcGIS Online	GLSC, Guyana	June – July 2024	12
Practical Workshop in Surveying	GLSC, Guyana	June 2024	26
Environmental Systems Research Institute Incorporated (ESRI), 2024 ESRI User Conference		2024	3
SLM Study Tour	Brazil	July 2024	10
Leica Geosystems – Second Session Training	GLSC, Guyana	26-30 August 2024	50
Workshop on Sea and Land Levels	GLSC, Guyana	18 April 2024	25
Precise Surveying Training	GLSC, Guyana	2024	15
Real World Training	Colombia	November 2024	1
SIRGAS Symposium	Colombia	November 2024	1
ArcGIS Online: Parcel Fabric		Nov – December 2024	18
LIDAR	Online		
Land Surveying Diploma (Stipend)	GTI, Guyana	January – December 2024	13
11th UN-GGIM: Americas session and 7th High-Level Forum		October 2024.	

Title of training/study tour	Place	Date	Number of participants
LIDAR Reclassification and Display Techniques Training	GLSC, Guyana	2025	17
Land Surveying Diploma (Stipend)	GTI, Guyana	January – December 2025	7
Dragon fruit – training of trainers		12 August 2025	20
Dragon fruit – farmers’ training		14 August 2025	18
SLM farmer training		August - November 2025	40
WOCAT workshop		11 November 2025	20
Closing workshop		25 November 2025	85

Appendix 5

MAJOR ITEMS OF EQUIPMENT PROVIDED

Quantity	Item	Cost (USD)
18	GNSS Receiver, Leica VIVA GS18 (with in-house training)	372 240
179	Desktop computer	328 219
13	Network Equipment (network production, replication and 2U rack-mounted servers, network switches)	309 410
8	CORSNet hardware and software	198 380
7 years	ESRI GIS software	165 000
8	P 1" R500 Automated Total Station (with in-house training), Leica Viva TS 16	147 520
4	Vehicle, Toyota Land Cruiser Pickup 6 Seater, 4.2 litre	125 465
42	Laptop computer, Dell/HP	105 791
2	Vehicle, Toyota Land Cruiser 8-SEATER, V8	101 305
2	Surveying Smart Station configuration Leica Nova TS60, Leica Viva GS16	98 540
4	Vehicle, Toyota Land Cruiser Pickup-Double Cab, 2.4 cc	91 634
6	Plotter	76 796
2	Vehicle, Toyota Hilux Double Cab 2393 cc	75 237
1	Vehicle, Toyota Land Cruiser 79, Double Cab, 2755 cc	51 647
11	Printer	51 433
25	Land surveying equipment	43 736
	Office furnishings for three GLSC regional offices	37 000
3	DJI drones, Phantom	34 250
	Office furnishings for GLSC head office	34 000
1	Robotic total station and 3D laser scanner (with in-house training)	33 070
2	Manual total (topographic), Leica Flexline TSO7 7" R1000EGL	29 790
2 each	Aluminium boats and outboard engines	27 492
2	Precise levels (land surveying) and accessories	26 408
3	Vehicle, ATV, Honda TRX520, FMG2020	23 504
8	Pivot Platform software updates, Trimble	21 056
2	Vehicle, ATV, Honda TRX520, FM6 2025	20 076

3	Network switch	19 722
6	Toughbook computer	18 532
2	15 KvA UPS	18 170
1	Data centre network switch	17 095
10	CORSNet UPS	16 625
10	CORSNet router	11 823
16	Liquid prismatic compass, Pyser-SGI Francis Barker M-73	11 780
1	Firewall, Fortinet	8 740
2	Operating software upgrade for CORS servers	8 308
3	Video camera	6 842
2	High-capacity external hard drives	5 914
1	Smart television, Spectrum	4 282
1	Adobe Acrobat document cloud	1 838