DPSIR Framework

Handbook

JAMAICA

Driver-Pressure-State-Impact-Response (DPSIR) Framework for Jamaica

OVERVIEW

This handbook summarizes the Driver-Pressure-State-Impact-Response (DPSIR) Framework conducted for Jamaica, under the CSIDS-SOILCARE Phase 1 Project. It provides an overview of the methodology, assessments, and description of the three (3) intervention sites selected for Guyana. Importantly, the DPSIR results of each intervention site were highlighted along with the recommended interventions to address the land degradation issues. Through the various interventions, the project aims to restore 29,000 hectares of land and 26,000 hectares of landscapes under improved practices. Consequently, the project will target approximately 7000 hectares of land in Jamaica under component 4.

The recommended interventions will be further discussed with stakeholders to determine the most effective interventions for each selected site. Additional information on the DPSIR Framework for Jamaica and the other participating countries can be found in the DPSIR and the country-specific reports.

INTRODUCTION

The Partnership Initiative for Sustainable Land Management (PISLM) is implementing ***the Caribbean Small Island Developing States (SIDS) Multicountry Soil Management Initiative for Integrated Landscape Restoration and Sustainable Food Systems: Phase 1, referred to as the PISLM CSIDS-SOILCARE Phase 1 Project.*** *This project is being implemented in eight (8) participating countries, Antigua and Barbuda, Barbados, Belize, Grenada, Guyana, Haiti, Jamaica, and St. Lucia. The project's primary objective is to "strengthen Caribbean SIDS with the necessary tools for adopting policies, measures, and reforming legal and institutional frameworks to achieve Land Degradation Neutrality (LDN) and Climate Resilience".*

In this regard, five (5) components were established under the project to address and reverse land degradation in CSIDS. Furthermore, the Driver-Pressure-State-Impact-Response (DPSIR) Framework is one such intervention. This was coupled with the National Soil Surveys, Climate Risk Assessment, and Land Suitability Analysis conducted in participating countries. This handbook, however, will focus on the results of the DPSIR framework for Jamaica intervention sites as highlighted by the DPSIR report.

The DPSIR framework is considered valuable for assessing soil degradation in CSIDS given its cause-effect approach which can determine appropriate management responses (Francis, 2023).

Under the CSIDS- SOILCARE Phase 1 Project, one component will be addressed in Jamaica as follows:

Component 4: *Enhancement of Food Systems and Alternative Livelihoods through the promotion of innovations in agriculture and livestock production systems and mobilization of the Private Sector in Support of LDN Special Climate Change Fund (SCCF).* **This component would be executed at Holland Estate, Ginger Hill, and Lowe River.**

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METHODOLOGY

The research was conducted in four (4) stages as follows:

1. Comprehensive review of the Land Degradation Neutrality-Target Setting Process for Jamaica
2. Identification of hot spots affected by land degradation.
3. Participatory qualitative analysis was conducted within the locations identified as Intervention Sites.
4. Evaluation of the drivers, pressures, state, impacts, and possible responses (DPSIR) to land degradation of the Intervention sites.

NB. NB. A land capability survey and a visual soil analysis were conducted based on the Protocol for the Assessment of Sustainable Soil Management. However, the findings are captured briefly in this handbook but details can be found in the DPSIR report.

A GIS analysis was conducted for each location to ascertain the nature of the land use and vegetation health through the Normalized Difference Vegetation Index (NDVI).

SOILCARE INTERVENTION SITES

NO. 1: HOLLAND ESTATE

The Holland Estate intervention site was once a sugarcane plantation transformed for crop production and livestock farming. Approximately 250 farmers utilize the area. The estate is used for livelihood activities such as cattle ranching, crop production, fishing, and animal rearing. The primary natural resource for livelihoods is grazing of the lands.

The major land degradation challenges in Holland Estate include a decline in biodiversity, deterioration in water quality, and soil erosion. Furthermore, land degradation is primarily caused by using inorganic fertilizers, poor land management practices, and social and economic issues.

These impacts result in reduced income, lower yields, and increased production costs. A major area of concern is soil erosion as a result of, overgrazing of animals.

HOLLAND ESTATE
DPSIR FRAMEWORK

Table 1: Driver-Pressure-State-Impact-Response (DPSIR) Framework

Framework	Indicator
Driving Forces	Monocropping of sugarcane
	Cattle ranching: free grazing of cattle.
	Climate change
Pressures	Poor land use management practices.
	Transfer of agrichemical pollutants to air, water, and land
	Increase droughts and storm intensity
	Increase demand on water supply for crop growth on cultivated farm plots.

HOLLAND ESTATE
DPSIR FRAMEWORK

Framework	Indicator
State	Reducing is biodiversity
	Decline in agricultural output and loss of land productivity
	Decline in water quality and quantity.
	Increased occurrence of sheet and gully erosion
Impacts	Household economic decline, poverty
	Increase demand on food imports and food insecurities
	Increase risk of exploitation

RECOMMENDED INTERVENTIONS FOR HOLLAND ESTATE

Table 2: Recommended interventions for Holland Estate

Agronomic measures	Organic matter/soil fertility; conservation agriculture, Residue management, organic mulching, compositing to improve fertility, setting up of compositing units.
Vegetative measures	Tree and shrub cover; agroforestry, hedges, and live fences.
Management measures	Change in management/intensity level; farm enterprise selection, vegetable production in greenhouses, rotational cropping,
	Rotational grazing, from open access to controlled access grazing.
Structural measures	Water harvesting/irrigation equipment; water intakes, tanks, and wells

NO. 2: GINGER HILL

This intervention site comprises a dispersed settlement of approximately 500 residents. The primary livelihood activities are subsistence farming, livestock rearing, and a few commercial or large-scale farms. Key livelihood challenges faced by the community include food insecurity. Cash crops and pineapples are cultivated during the rainy season, while various farming practices are employed in the dry season.

The land degradation issues are relative to land slippage, soil erosion, and a decline in overall soil health. The agricultural practices contribute to soil erosion, while the increased use of synthetic fertilizer and low crop output are evidence of land degradation.

GINGER HILL
DPSIR FRAMEWORK

Table 3: Driver-Pressure-State-Impact-Response (DPSIR) Framework

Framework	Indicator
Driving Forces	Monocropping of pineapple of steep slopes
	Small farm size: farms sizes are 1 - 3 ha
	Climate change
Pressures	Cleared forest for intensive monoculture of pineapple cultivation.
	Agricultural intensification
	Increase demand on water supply for crop growth
	Increased droughts and intensity of storms
	Transfer of agrichemical pollutants to air, water, and land

GINGER HILL
DPSIR FRAMEWORK

Framework	Indicator
State	Rill and gully erosion
	Decline in soil health
	Reduction is biodiversity
	Decline in land productivity
Impacts	Reduction in wildlife population and loss of ecosystem services
	Reduced incomes to farmers and increased vulnerability to poverty

RECOMMENDED INTERVENTIONS FOR GINGER HILL

Table 4: Recommended interventions for Ginger Hill

Agronomic measures	Vegetation cover; mixed cropping, intercropping, relay cropping.
Structural measures	Bunds, banks; earth and stone bunds along contours, Terraces, bamboo check dams.
Management measures	Change in management/intensity level; waste management; both artificial and natural methods for waste management, compositing to improve fertility, setting up of compositing units.

NO. 3: LOWE RIVER

The third intervention site is Lowe River, Trelawny, a dispersed settlement comprising approximately 4000 residents. The land is used primarily for farming, housing (farmstead), and to a lesser extent, commercial activities. Grazing of the land and extraction of water resources are the main natural resources used. Livelihood activities include the sale of yams and other cultivated food crops and livestock farming.

Land degradation challenges in this intervention site include land slippage, soil erosion and contamination, vegetation reduction, and a decline in overall soil health. Land clearance, cultivation of slopes, and overgrazing are the main causes of soil erosion, while vegetation reduction is mainly due to slash-and-burn agriculture. These land degradation issues cause reduced yields, diminished grazing areas, a decline in cultivation, and the formation of gullies.

LOWE RIVER
DPSIR FRAMEWORK

Table 5: Driver-Pressure-State-Impact-Response (DPSIR) Framework

Framework	Indicator
Driving Forces	Monocropping of yam of steep slopes
	Small farm size: farms sizes are 0.5 - 2 ha
	Climate change
Pressures	Cleared forest for intensive yam monoculture cultivation
	Agricultural intensification
	Increase demand on water supply for crop growth
	Increased droughts and intensity of storms
	Transfer of agrichemical pollutants to air, water, and land

LOWE RIVER
DPSIR FRAMEWORK

Framework	Indicator
State	Rill and gully erosion
	Soil biodiversity decline
	Deterioration of soil quality and loss of soil fertility, stability, and water storage capacity
Impacts	Habitat destruction and loss of ecosystem services
	Reduction in wildlife population

RECOMMENDED INTERVENTIONS FOR LOWE RIVER

Table 6: Recommended interventions for Lowe River

Agronomic measures	Vegetation cover; mixed cropping, intercropping, relay cropping, fertility management.
Management measures	Waste management; both artificial and natural methods for waste management.
	Change in management/intensity level; compositing to improve fertility, setting up of compositing units.
Structural measures	Bunds, banks; earth and stone bunds along contours, Terraces, bamboo check dams.

REFERENCE

Francis, R. (2024). DPSIR Framework Analysis

Francis, R. (2024). DPSIR Framework Analysis, St. Lucia

PISLM (2021). Caribbean Small Island Developing States (SIDS) Multicounty Soil Management Initiative for Integrated Landscape Restoration and Climate-Resilient Food Systems- Phase 1.