

Land Suitability for Castor Cultivation



Mr. Niconor Reece
Project Engineer – Biofuels
Presented : Jamaica Castor Industry Association Workshop
May 30, 2017



Overview

- Ecology of Castor
- Climate and Soil Requirements
- Jamaica Climate and Geography
- Land suitability Assessment



Ecology of Castor

- Castor bean or oil nut *Ricinus communis* belongs to the family Euphorbiaceae and can be found growing wild in Jamaica.
- It originated in Africa and grows wild in East and North Africa, Yemen and the Middle East.
- The plant is now found widely in the tropical and subtropical regions.



Climate Requirements

- Elevation: The limiting factor is the elevation at which Grey Mould infestation occur. Good yields are seen at elevations at sea level (Bodles, St Catherine, (94ft) 29 meters), (Sam Motto, Manchester (2300ft) 700 meters, up to 1500m.
- Precipitation and Temperature: Castor favours a climatic conditions that provides it with a good supply of water in the early stages of growth.
 - Twenty to thirty two (20-32) inches or (500 to 1,000mm) of annual rain fall is recommended for the first four months of growth after planting.
 - Irrigation is necessary to achieve good yields for rainfall levels below 350 mm per annum
 - Castor grows well at average temperatures between 20-30 °C



Soil Requirements

- The highest yields of castor are realized on loam to sandy loam soils.
- The soil should have very good surface and subsurface drainage with adequate subsoil permeability for air and water to facilitate root growth.
- The soil should be flat or with a maximum slope of 12% ($\sim 7^\circ$).
- Soil pH for castor should be less than 8.5, a pH close to neutral is ideal (pH between 6.0-7) and electrical conductivity (EC) of less than 4.



Jamaica Climate and Geography

- Jamaica experiences two types of climate:
 - A tropical climate prevails in the higher elevations on the windward side of the mountains,
 - whereas a semiarid climate predominates on the leeward side.
- The country experiences rainfall throughout the year that is brought by the warm trade winds from the east and northeast.
- The peak of the rain fall is experienced between May and October each year. Average rainfall is 1,960 millimetres (77.2 in) per year.



Jamaica Climate and Geography

- Where there are higher elevations such as the John Crow Mountains and the Blue Mountains, rainfall may exceeds 5,080 millimetres (200 in) per year.
- The south-western half of the island that lies in the rain shadow of the mountains has a semiarid climate and receives fewer than 760 millimetres (29.9 in) of rainfall annually.
- Temperatures in Jamaica are fairly constant throughout the year, averaging 25 to 30 °C (77 to 86 °F) in the lowlands and 15 to 22 °C (59 to 71.6 °F) at higher elevations. Temperatures may dip to below 10 °C (50 °F) at the peaks of the Blue Mountains



Land Suitability Assessment

Overview of Methodology

- The Food and Agriculture Organization (FAO) (1976) Framework for Land Evaluation used to assess the fitness of a given type of land for a specific use.
- The crop suitability results from the decision trees were incorporated into a Geographic Information System (GIS) environment to obtain the spatial distribution of the various suitability classes throughout the country.
- By manipulating the spatial data, maps were prepared for each parish (Ford, 2011 Rural and Physical Planning Ministry of Commerce, Agriculture and Fisheries).
- The following parameters used were:
 - Texture
 - pH
 - Soil drainage
 - Slope class
 - Rainfall
 - Soil depth



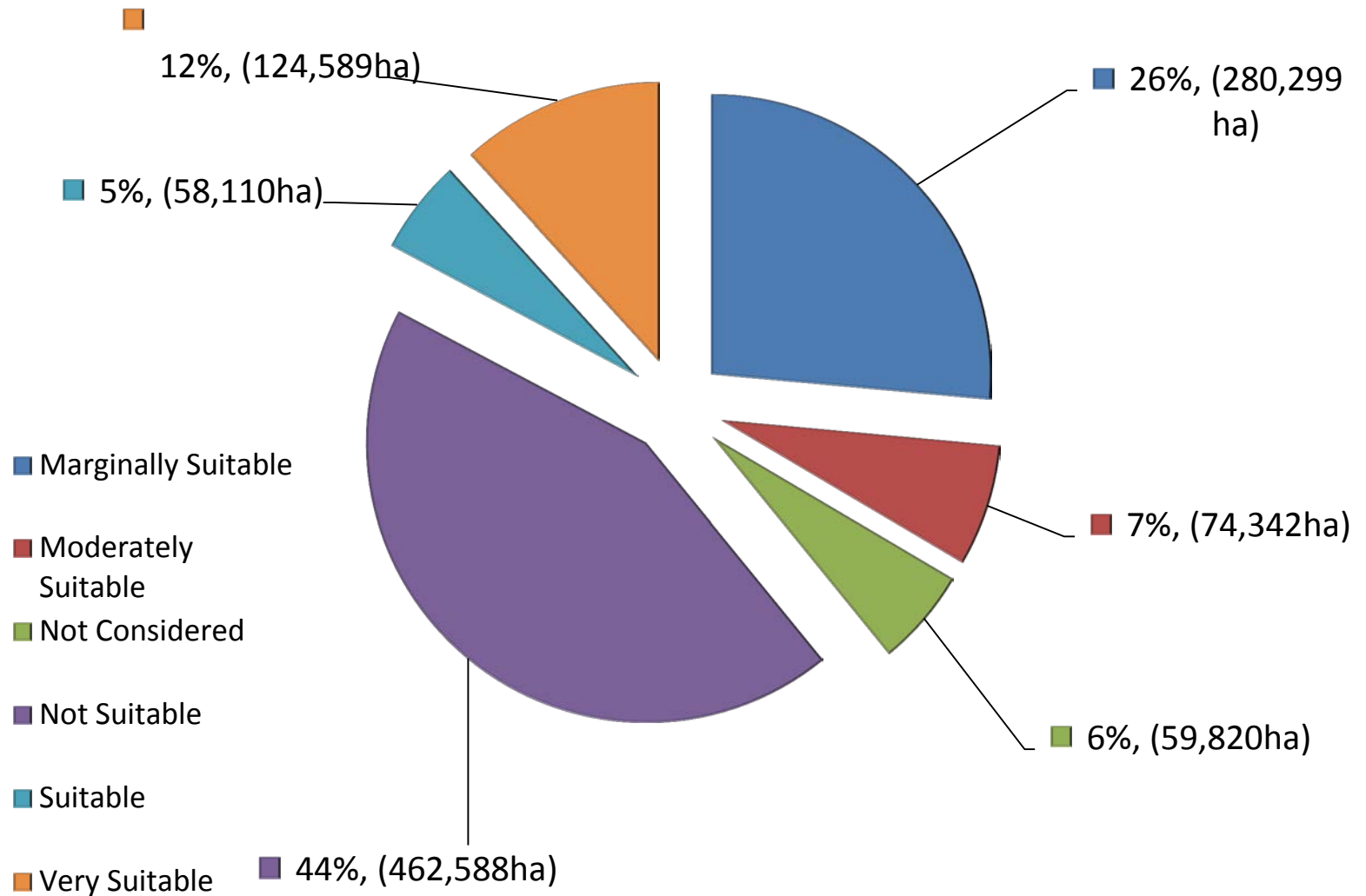
Land Suitability Assessment

Suitability	Rainfall	Temperature	pH	Soil Type/Drainage	Soil Depth	Slope Class	Soil Texture
Least	750 mm/yr.	$\leq 20^{\circ}\text{C}, \geq 37^{\circ}\text{C}$	5.5-6.0, 8.0-8.5	Heavy Soils			
Moderate	800mm/yr.		6.1-6.5, 7.5-7.9	Sandy soils. Extra fertilization will be needed due to low nutrient content of such soils		12° to 25°	
Most	1000mm/yr.	27°C	6.6-7.4	loam, sandy clay loam and silt loam	20-30 cm	$\leq 12^{\circ}$	Fine/ Medium

Castor can grow in stony land unsuitable for other crops
Heavy Soils-(clay, sandy clay, clay loam, silty clay loam, and silt)
Sandy Soils- (sand, loamy sand, and sandy loam)



Jamaica Land Suitability

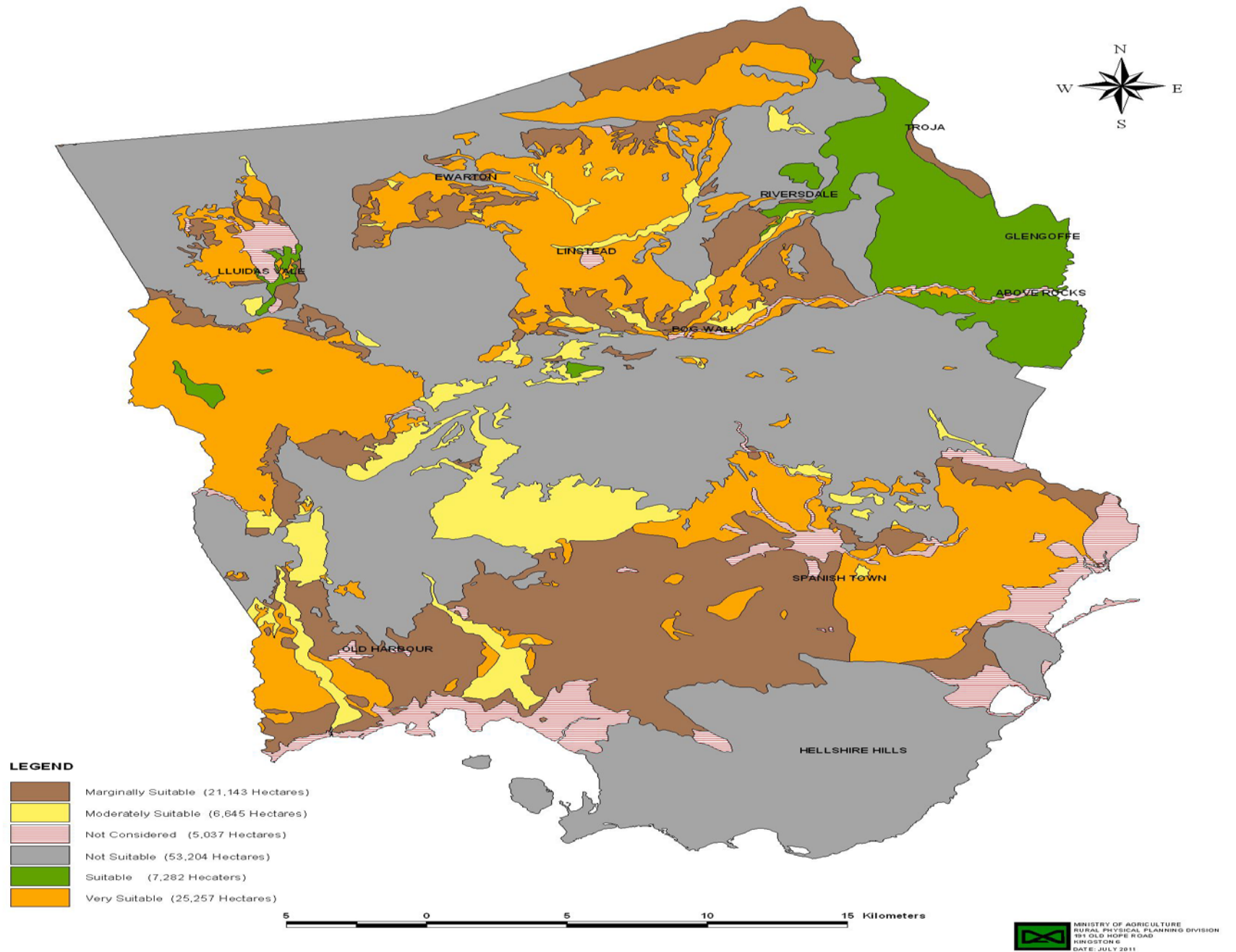


Land availability for castor cultivation







Parish	Total Land (ha)	Plantation Lands (ha)	Herbaceous crops, veg.(ha)	Total available land (ha)
Clarendon	71,423	22,219	15,634	33,570
St. Catherine	60,327	13,635	13,153	33,539
Portland	59,965	1,428	1,574	56,963
St. Thomas	59,224	8,804	3,801	46,619
St. Mary	51,515	2,279	4,719	44,517
St. Elizabeth	46,528	5,015	60,191	---
Westmoreland	36,038	15,664	19,952	422
Kgn & St. Andrew	29,332	77	1,361	27,894
St. Ann	29,192	660	27,551	981
Manchester	28,456	198	22,951	5,307
Hanover	24,103	1,267	6,533	16,303
St. James	20,736	2,481	7,839	10,416
Trelawny	19,561	5,879	9,986	3,696
Total	536,400	79,606	195,245	280,227

Aggregate land suitability for Castor

Parish	Suitable + Very Suitable (Ha)	Land in Plantation and Field (Ha)	Difference
St. Catherine	32,539	26,788	5,751
Clarendon	27,950	37,853	-----
St. Thomas	18,691	12,605	6,086
St. Elizabeth	17,258	65,206	-----
Portland	16,125	3,002	13,123
Hanover	14,363	7,800	6,563
Kgn & St. Andrew	12,712	1,438	11,274
Manchester	12,062	23,149	-----
Trelawny	8,738	15,865	-----
St. James	6,070	10,320	-----
St. Mary	5,181	6,998	-----
St. Ann	5,154	28,211	-----
Westmoreland	4,916	35,616	-----
Total	181,759	274,851	42,797

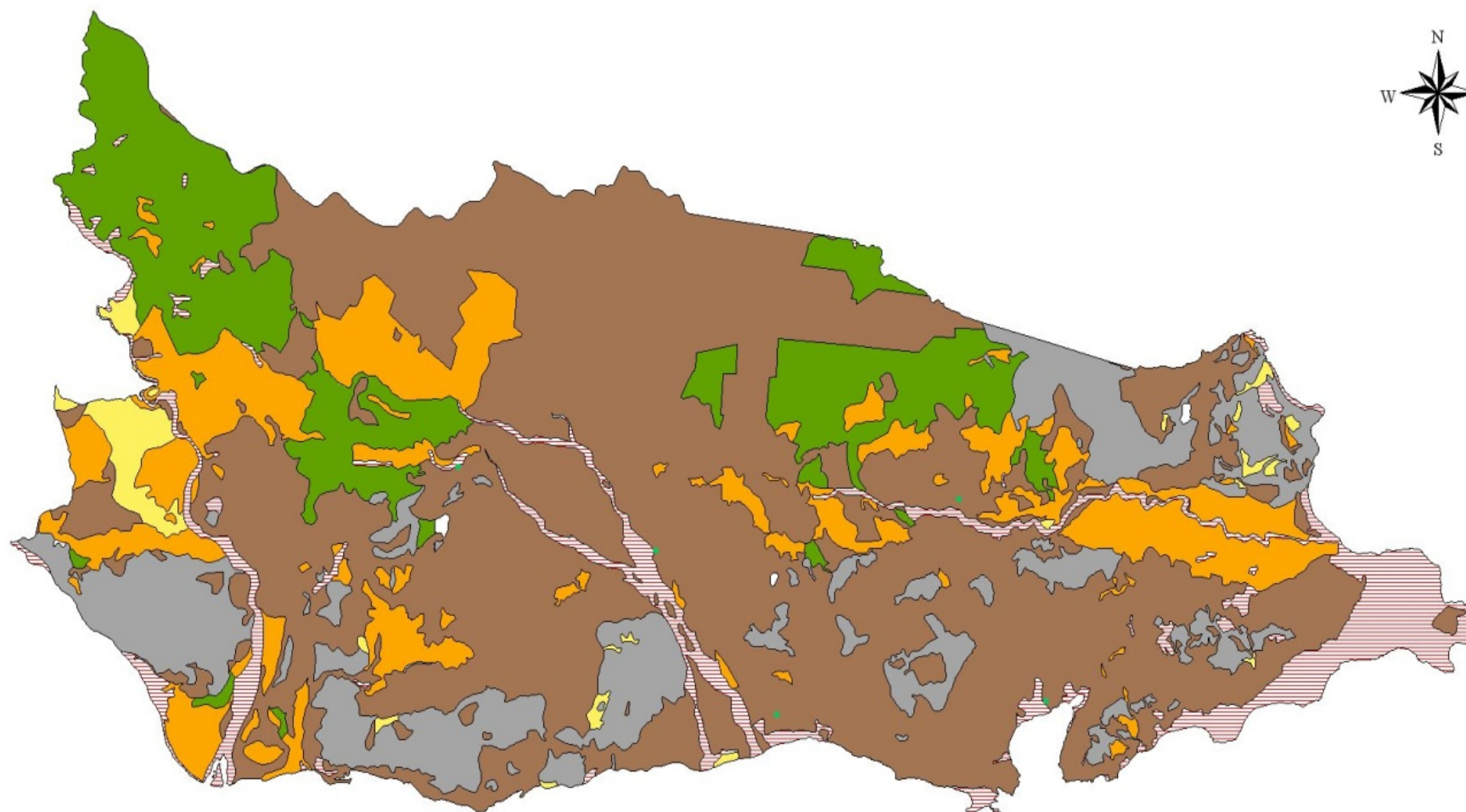


LEGEND

	Marginally Suitable (38,462 Hectares)
	Moderately Suitable (5,011 Hectares)
	Not Considered (6,629 Hectares)
	Not Suitable (40,970 Hectares)
	Suitable (11,490 Hectares)
	Very Suitable (16,460 Hectares)

5 0 5 10 15 20 Km

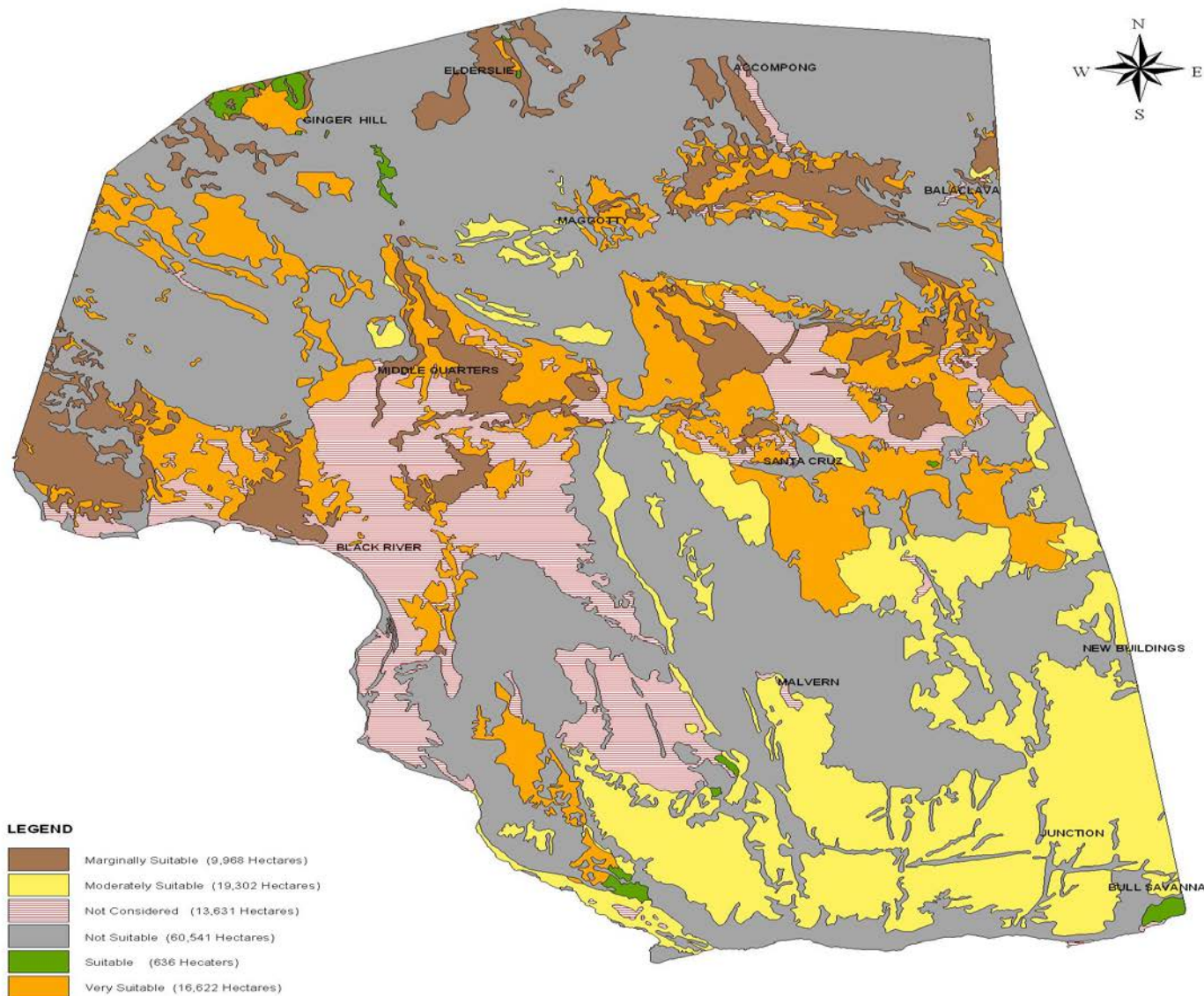




LEGEND

	Marginally Suitable (39,403 Hectares)		Not Suitable (9,228 Hectares)
	Moderately Suitable (1,130 Hectares)		Suitable (9,195 Hectares)
	Not Considered (4,718 Hectares)		Very Suitable (9,496 Hectares)

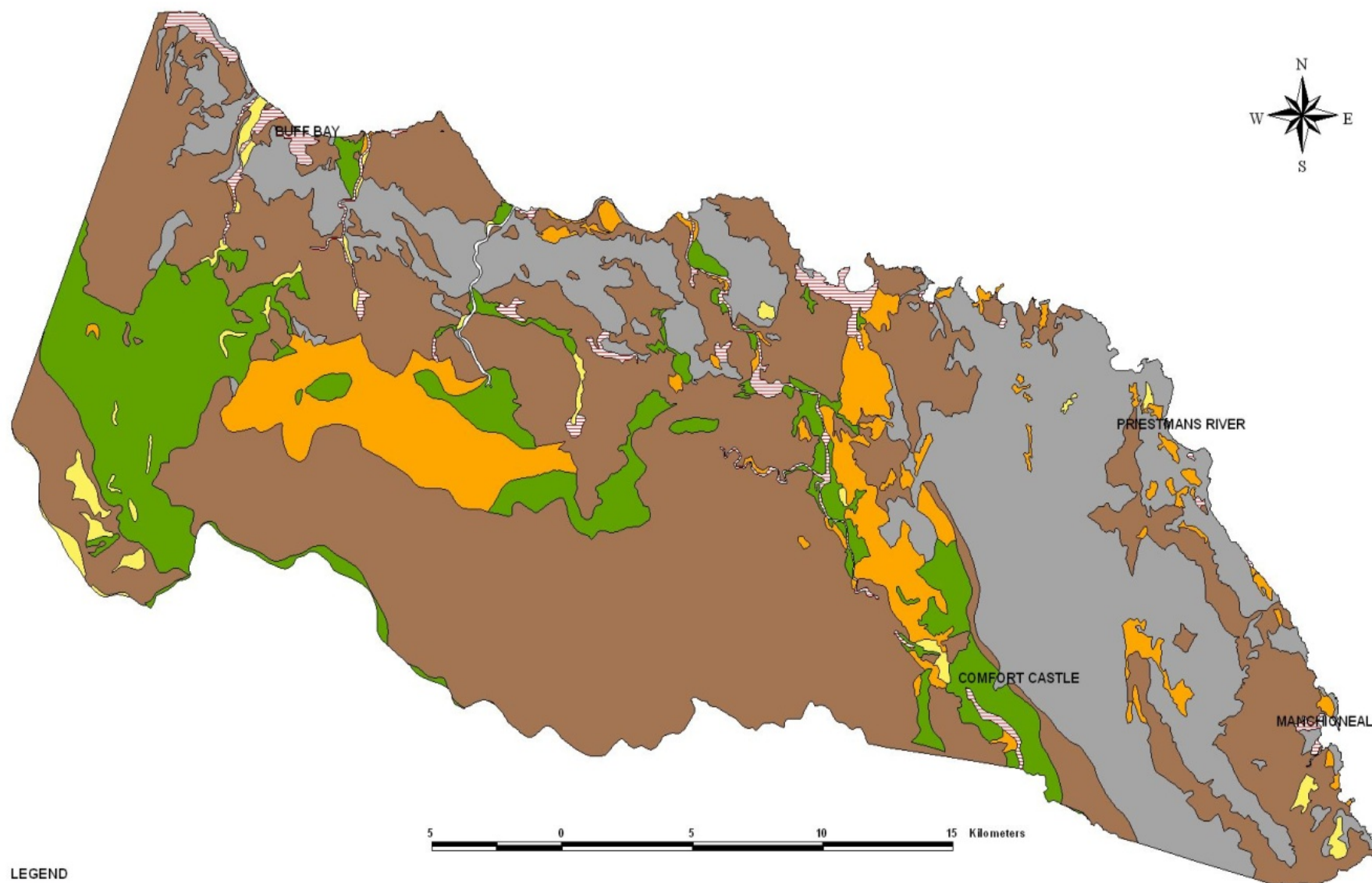




5 0 5 10 15 Kilometers



MINISTRY OF AGRICULTURE
RURAL PHYSICAL PLANNING DIVISION
191 OLD ROPE ROAD
HAGSTONE
BAYE, JULY 2011

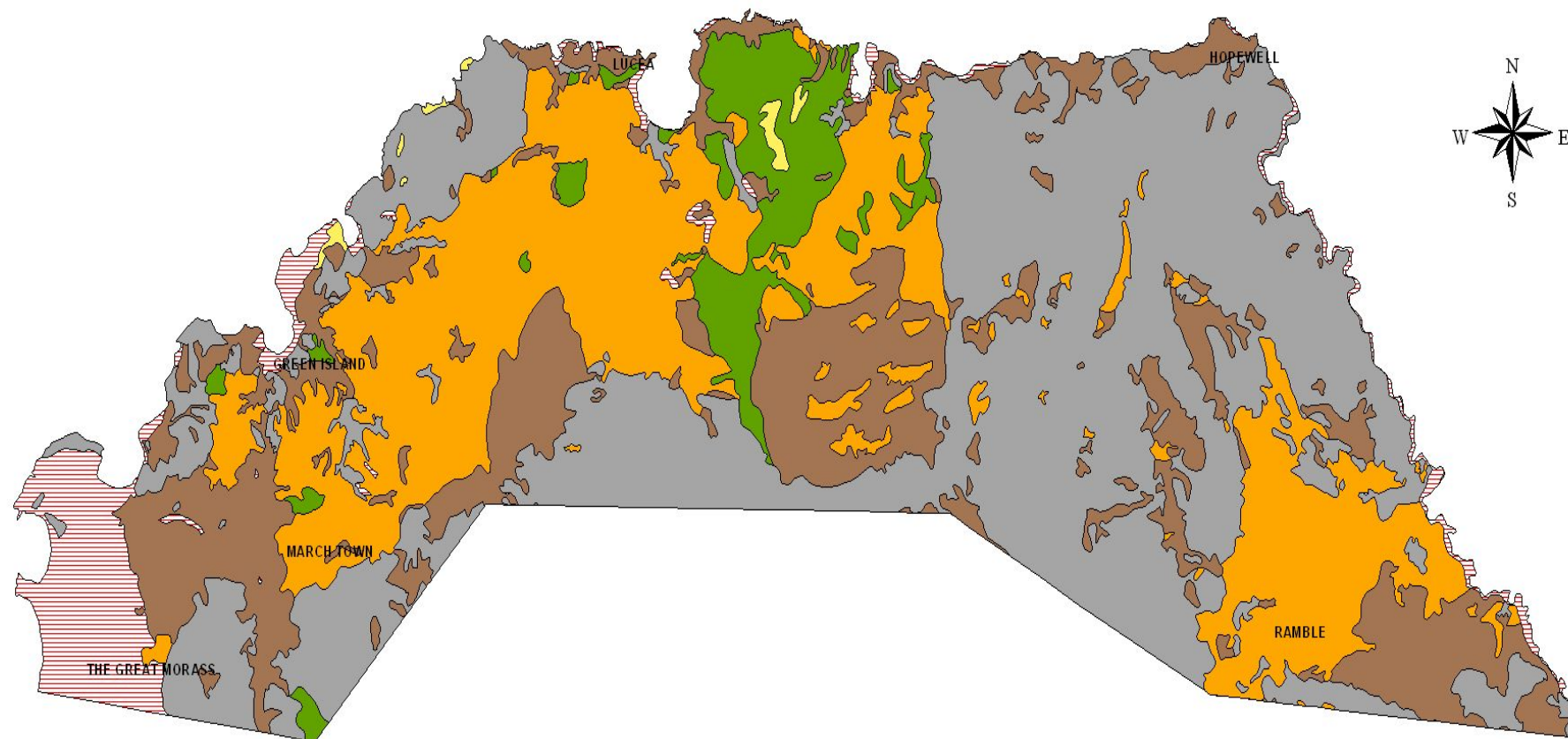


LEGEND

	Marginally Suitable (42,870 Hectares)		Not Suitable (19,832 Hectares)
	Moderately Suitable (970 Hectares)		Suitable (9,558 Hectares)
	Not Considered (1,366 Hectares)		Very Suitable (6,567 Hectares)



MINISTRY OF AGRICULTURE
RURAL PHYSICAL PLANNING DIVISION
191 OLD HOPE ROAD
KINGSTON 6
DATE: JULY 2011

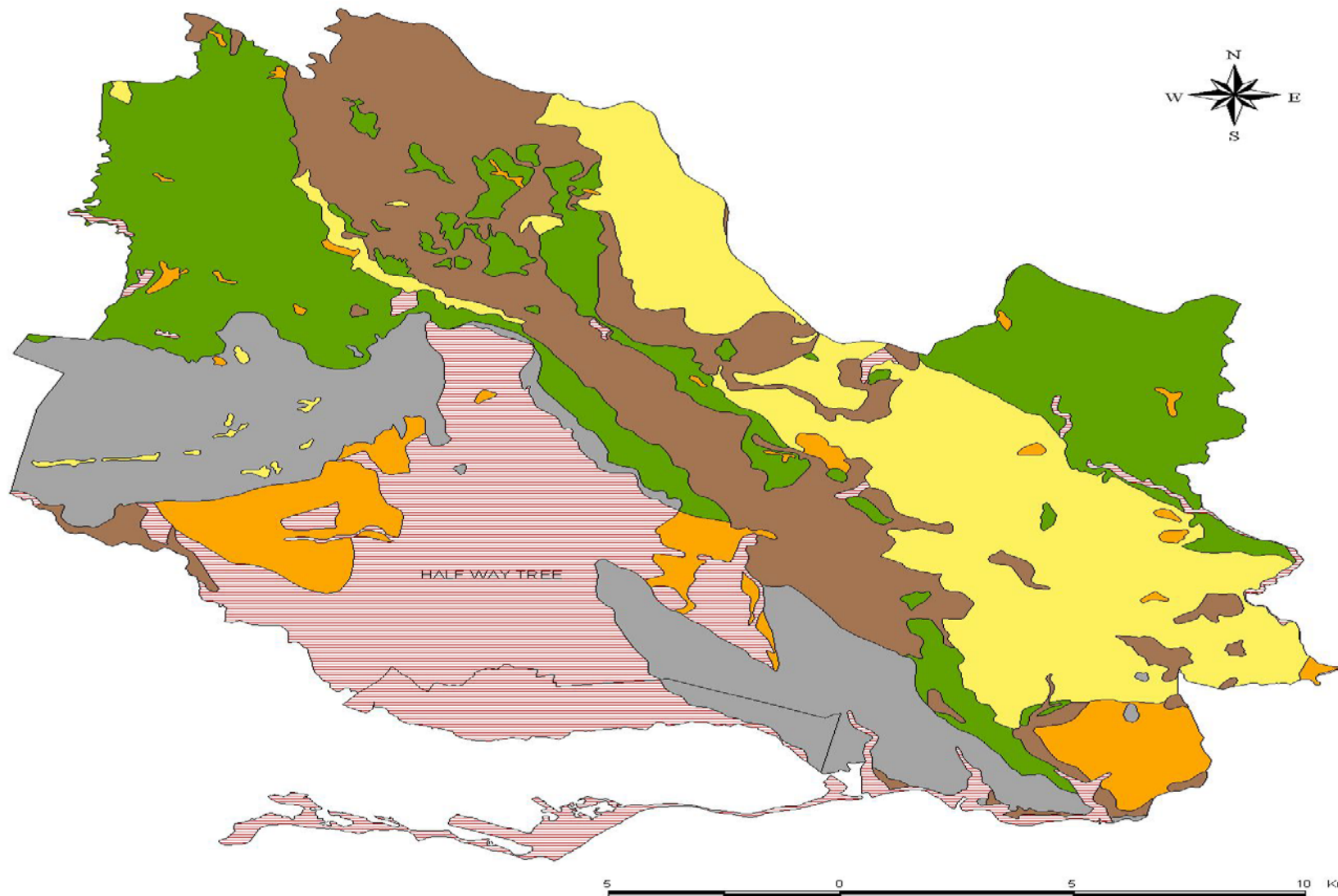


LEGEND

	Marginally Suitable (9,598 Hectares)		Not Suitable (18,476 Hectares)
	Moderately Suitable (147 Hectares)		Suitable (2,414 Hectares)
	Not Considered (2,365 Hectares)		Very Suitable (11,949 Hectares)



MINISTRY OF AGRICULTURE
RURAL PHYSICAL PLANNING DIVISION
191 OLD HOPE ROAD
KINGSTON 6
DATE: JULY 2011



LEGEND

	Marginally Suitable (8,120 Hectares)		Not Suitable (7,575 Hectares)
	Moderately Suitable (8,500 Hectares)		Suitable (9,870 Hectares)
	Not Considered (10,587 Hectares)		Very Suitable (2,842 Hectares)





Summary

- The results indicate that Jamaica has potential for Castor Bean production.
 - Total land area of varying suitability for castor bean cultivation is 280,277 hectares.
 - Approximately 42,797 hectares are deemed “suitable” and “very suitable” for castor cultivation.
 - Top seven Parishes:
 - St. Catherine
 - Clarendon
 - St. Thomas
 - St. Elizabeth
 - Portland
 - Hanover
 - Kingston and St Andrew



Thank you

Questions

?