GLOBAL SOIL PARTNERSHIP (GSP)
TECHNICAL WORKSHOP
MANAGING LIVING SOILS

Donald Joseph

STATUS AND CHALLENGES OF SOIL MANAGEMENT IN HAITI

Rome, Italy

Geographic location of the Republic of Haiti within the Caribbean region

Haiti covers 27,500 square kilometers and extends itself between 18.020 N and 20.090 N of latitude, and between 71.610 W and 74.480 W of longitude. It is politically and administratively divided into ten departments which each is subdivided into communes themselves individually further subdivided into communal sections

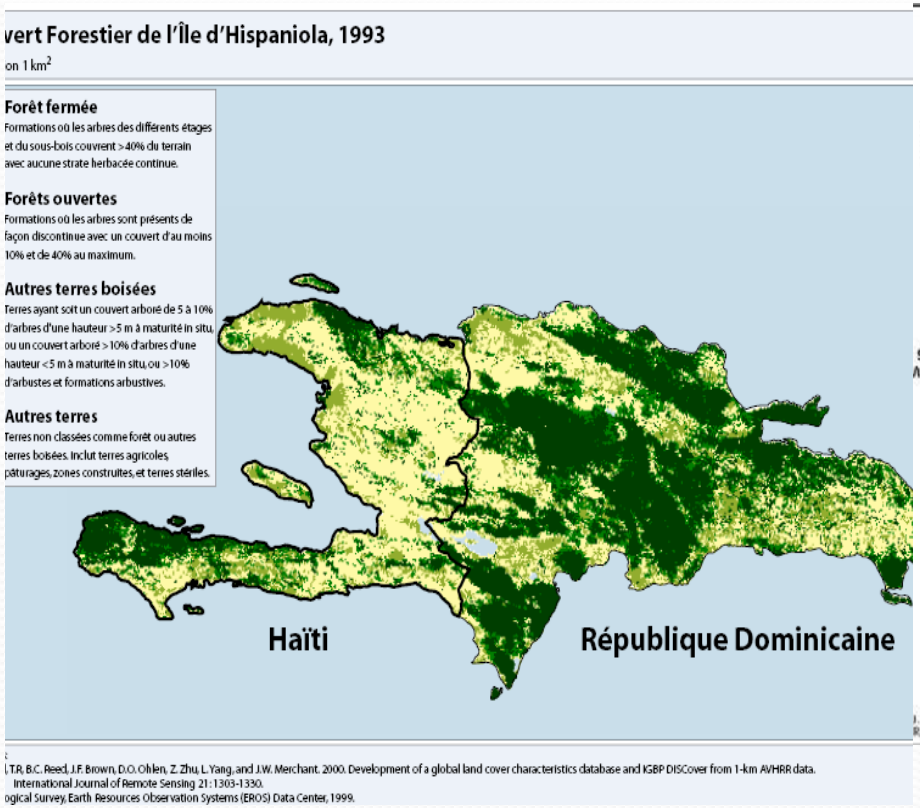
High dependence on agriculture

Agriculture is the leading economic activity employing 46% of the existing labor force, thus sustaining 70% of the population (CDERA, 2003) and contributing up to 27.58% of the GDP (MEF, 2005). Despite a downward drift in its contribution to the GDP from 47% to 24% over the 1970-1996

period, and to 27.58% in 2005, (Smucker et al, 2000; MEF, 2005), it still provides a third of the commodity exports. According to IHSI (2005), agricultural land covers 59% of total surface area with a rate of cultivation of 90%. On average, 80% of the rural households have access to 1.8 parcels of land, which they own in 80% of the cases; average size in ha is 0.99 ha (IHSI, 2005). A limiting factor for Haiti's agriculture is that it depends on the use of predominantly mountainous, rough terrain characterized by generally steep slopes (CDERA, 2003) ; 57% of the agricultural land is located on smooth to steep slopes, and is to a large extent (60%) exposed to medium to high erosion risks.

Haiti is a country of watershed

Haiti has a forest cover ranges from 1.5-2%



T.R, B.C. Reed, J.F. Brown, D.O. Ohlen, Z. Zhu, L. Yang, and J.W. Merchant. 2000. Development of a global land cover characteristics database and IGBP DISCover from 1-km AVHRR data. International Journal of Remote Sensing 21:1303-1330.
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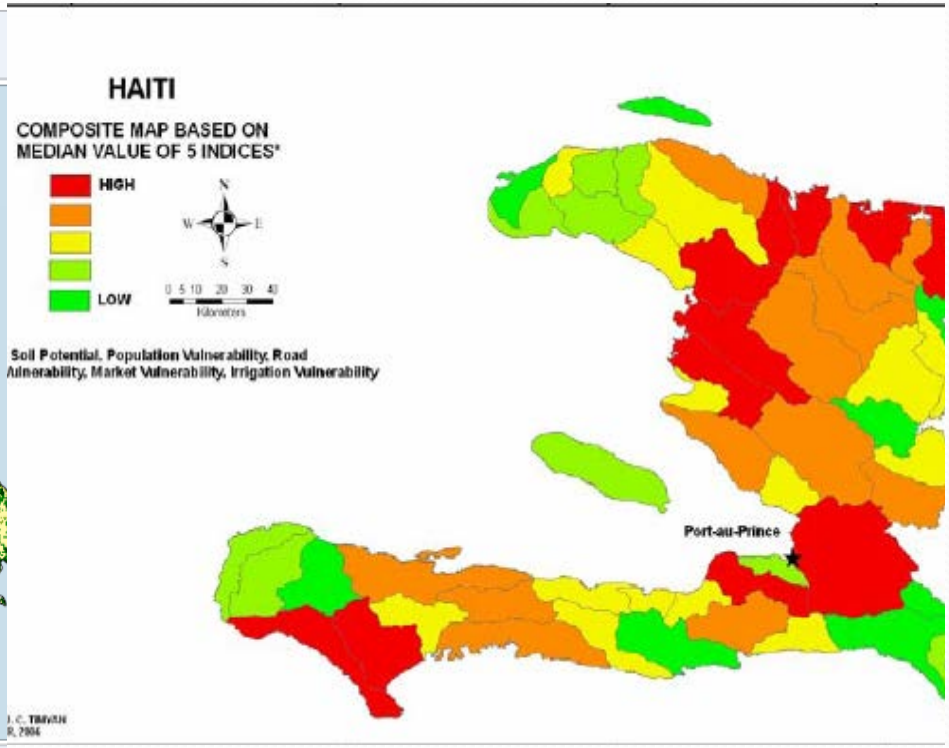
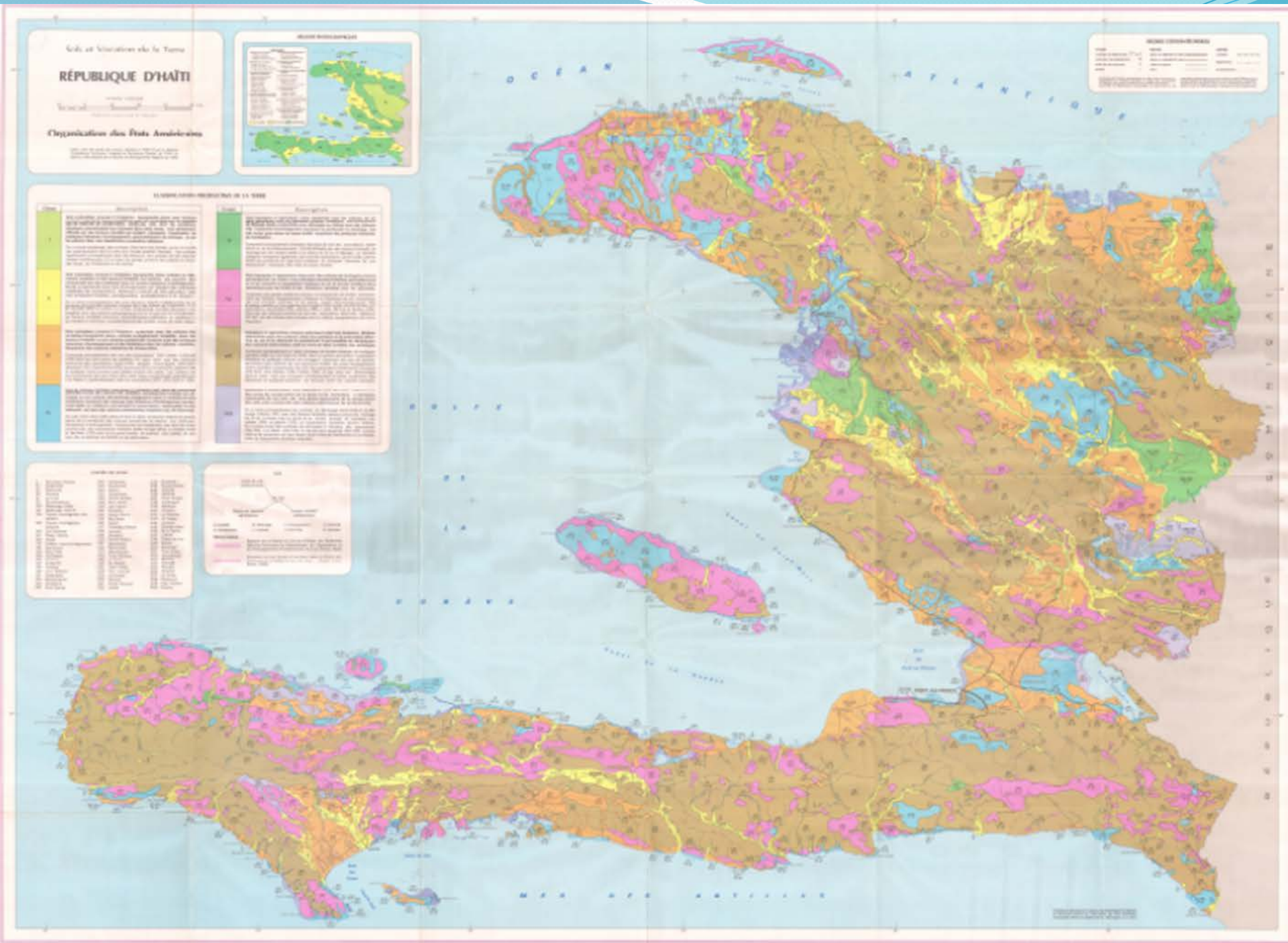
Watershed Priorities



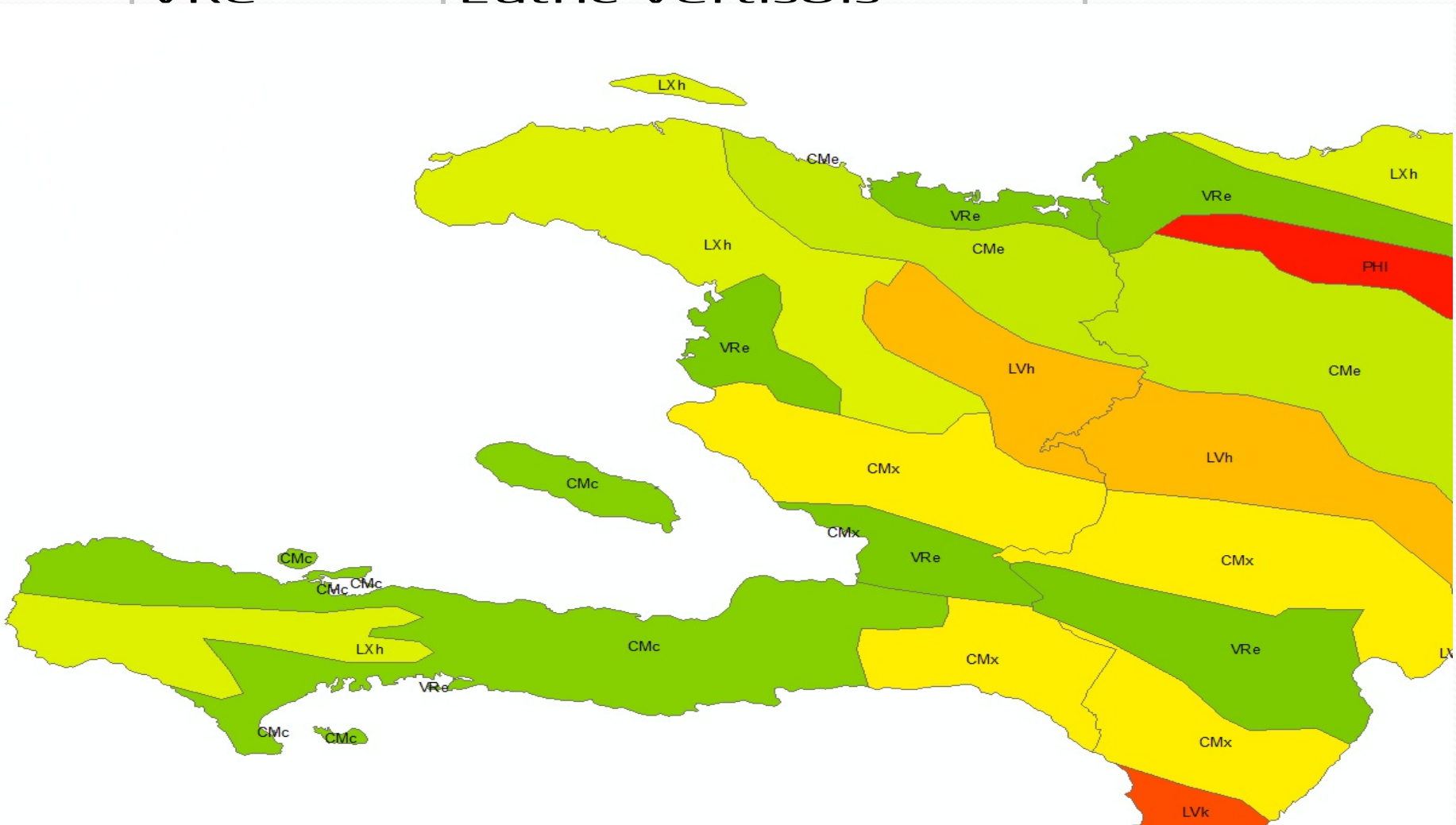
STATUS OF HAITIAN'S SOIL

Soil distribution in Haiti shows great variability, because of the Geomorphology and significant differences in rainfall. Calcareous soils from sedimentary rocks predominate, however, across the country and more than 80% of the territory, the rest being made up of materials of volcanic origin.

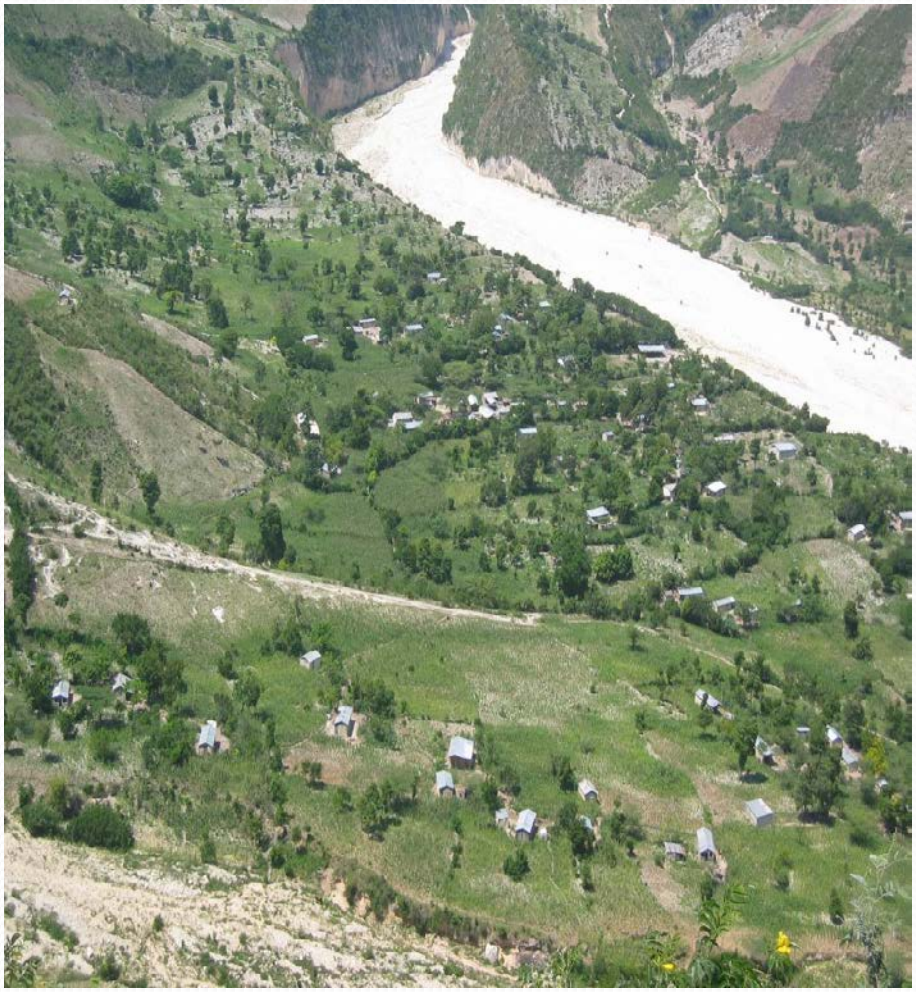
Erosion and runoff are complex phenomena. The magnitude of runoff and transport of soil particles depend on a multitude of factors and interactions: type of crop, tillage techniques, soil and bedrock ... The intensity of rainfall and the degree of slope and its length are among the most important.


Sols et Végétation de la Terre
RÉPUBLIQUE D'HAÏTI
Organisation des États Américains
OCEAN ATLANTIQUE
MER DES ANTILLES

CMc	Calcaric Cambisols
CMe	Eutric Cambisols
CMx	Chromic Cambisols
LVh	Haplic Luvisols
LXh	Haplic Lixisols
LXh	Haplic Lixisols
VRe	Eutric Vertisols



The World Bank study on the management of natural resources in Haiti from 1990 estimates of soil losses for some watersheds ranging from 7.5 MT / ha. / Year to 750 MT / ha. / Year. The report also indicates that loss of the order of 12 to 150 MT / ha. / Year can be seen in many parts of the country



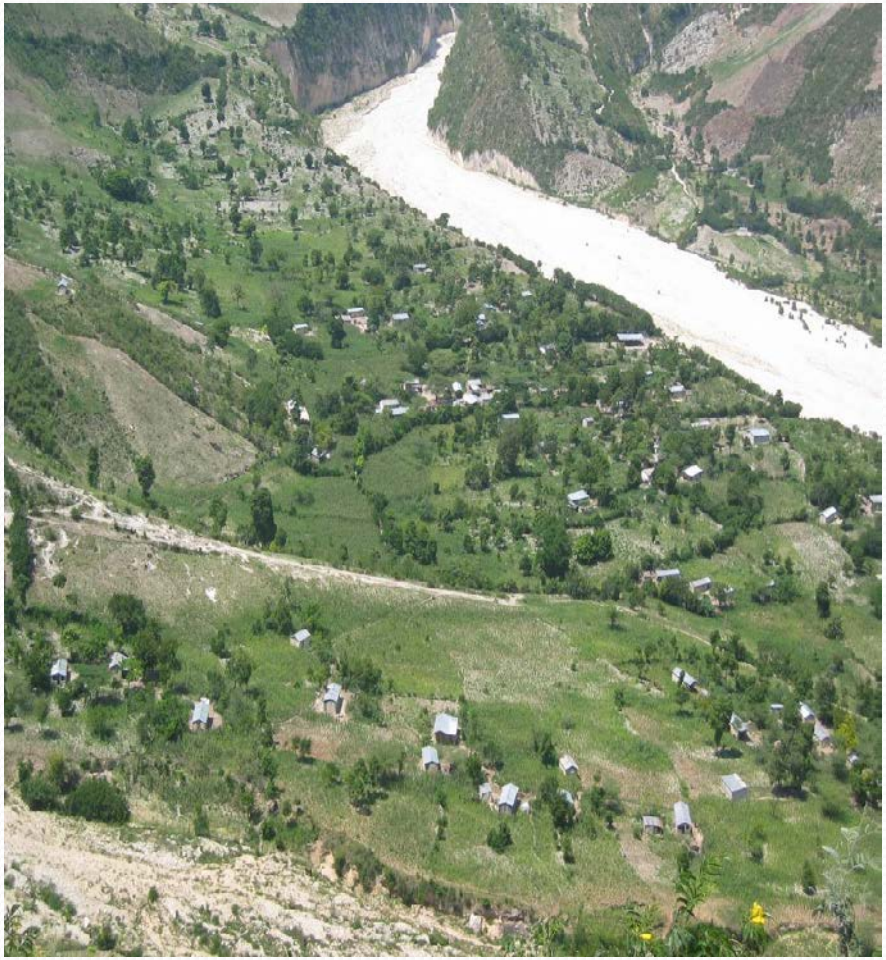
Causes and Consequences of Soil Degradation

_Deforestation, Demographic pressure ,

The decline in production per unit area pushing to increase acreage

Consequences: **Loss of productivity in rainfed, Lower productivity and profitability of investments in irrigated, Decrease in the quantities and quality of water for domestic and industrial use, Reduction in domestic energy production and increased cost,**

Consequences: **Increased risk of damage to infrastructure, Reduced potential for coastal**




THE FAITH IN GOD
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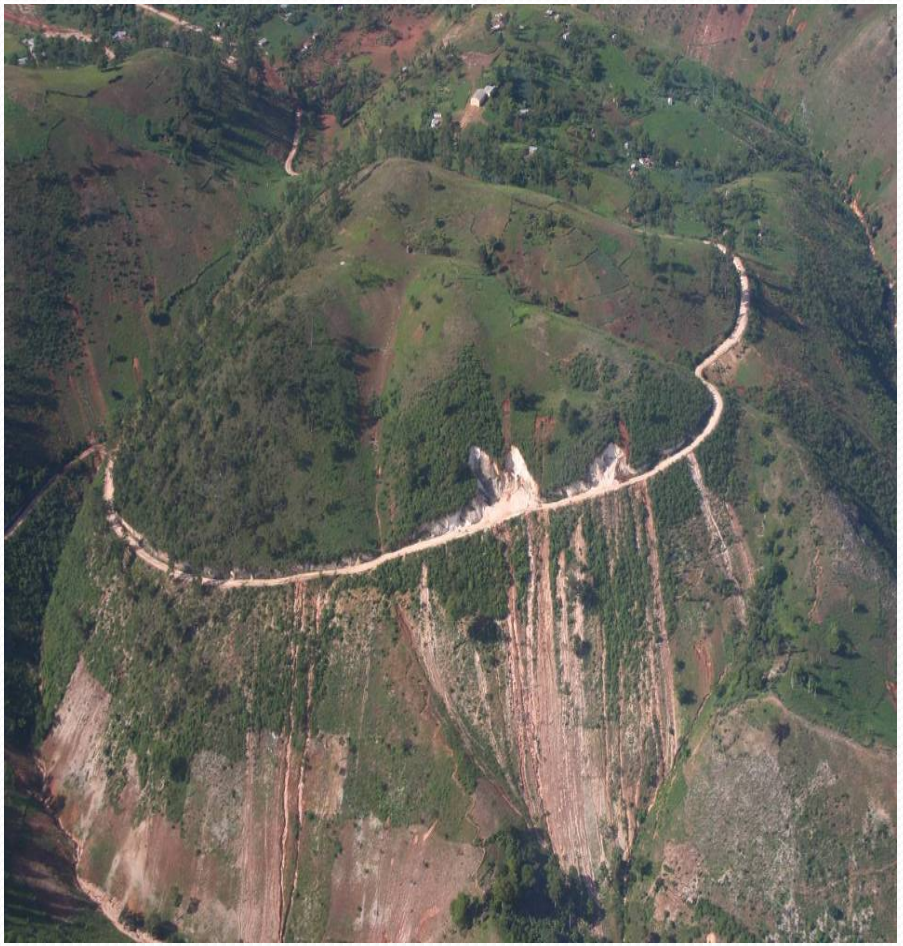

New approach of the Ministry of Agriculture for Soil and watershed management

The activities of populations at watershed have serious consequences on their internal dynamics. Indeed, government and others partners have undertaken programs to protect and reduce their vulnerability for over 50 years. However, they have not yielded the expected results. Because these projects have targeted only the conservation of Natural Resources without offering economic and social alternatives to local communities.

In addition, some of these projects are not applicable to the existing reality in the middle. It is essential now that the project soil and watershed management to ensure a decent income populations and continuously without losing sight of the objectives of sustainable management and flood management.

Therefore, the watershed management must be based on the potential related to each type of environment, taking into account the objectives. Thus, taking into account the vulnerability associated with the level of resource degradation, the vision of the state in the Watershed Management should aim to outline the following Reduce the vulnerability of both upstream and downstream basins through education and equipment

Protect the infrastructure of economic production

Protect property and lives

Sustainable use of natural resources

Provide social and economic alternatives to people

Promote an institutional and legal framework (framework law, review of other laws and regulations)

Rational application of these guidelines will contribute to a better management of disasters (floods, landslides and floods) and Land use and spatial planning, so that a genuine policy of rurality

Diagnosis Analysis of the Project

Stakeholders Analysis

Beneficiaries: Vulnerable families, schools, farmers and the ultimate end-users.

Decision makers: Central and local government, etc ;

Universities and Research Center and **International Institutions**: GEF, FAO, PNUD, BID, World Bank, JICA, USAID, NGO's, Private Sector, etc…

Project Activities Enhancement soil and Crop Productivity

- Data Base on National Distribution Fertilizers
- Data Base on Use and Application of Fertilizers
- Establishment Tissue Culture Lab

Activities already carried out in Soil Management and Crop productivity

Activities already carried out in Soil Management and Crop productivity

Activities Already Carried out in Crop productivity and Soil Management


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ES FORMULES D' ENGRAIS
:RIZ(ORYZA SATIVA L.)
VARIETE:TCS-10
N:MARNDR/DRFS/CRDA/FAMV
ODVA/AIEA/PSF

POTENTIAL USE OF Cs-137 AS SOIL TRACER IN HAITI

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Reference site

This radioisotopic study was carried out within the frame of the ARCAL RLA5051 Project: "*Using Environmental Radionuclides as Indicators of Land Degradation in Latin American, Caribbean and Antarctic Ecosystems*"Analytical experiment has been conducted no soil samples to confirm the sufficient and detectable level of the ^{137}Cs to be used as soil redistribution tracer for agro environmental purpose *Forets des Pins* (18 19'41.63" N and 7 47'12.16" W) a pine forest, located at the border of the Dominican Republic 1500 meters above sea level and the yearly rainfall is about 1000 mm calcareous material (red lateritic), featuring rugged embossed slopes greater than 15% originally exploited in 1945 by the "Societe Haitiano -Americaine de Developpement Agricole (SHADA) for plank s cleared end of the 1940's by the company and since then has not suffered any further anthropogenic disturbance

Figure 1. Sampling Site

Methods

Soil samples from two different stable sites were taken at different depths: (i) site 1 S1: 0-5 cm, 5-10 cm, 10-20 cm, 20-30 cm, 30-40 cm and 40-50 cm, and (ii) site 2 S2: 0-10 cm, 10-20 cm, 20-30 cm, 30-40 cm and 40-50 cm. After classical pre-treatment, soil samples collected by the local team (2 soil profiles; 5 increments per profile) were sent to the Soil and Water Management and Crop Nutrition Laboratory Seibersdorf. The γ-spectrometry analysis were performed using a high resolution HPGe coaxial detector (relative efficiency at 1.33 MeV, ^{60}Co = 115%).

Figure 2. Soil sampling session in Foret des Pins, Haiti

Results

Under the experimental condition, the Minimum Detectable Activity (MDA) for ^{137}Cs was 0.2 Bq kg^{-1} and the average error at 1 σ precision for 50 000 seconds counting times was 3% for the top soil samples. Table 1 shows the mass activity of radionuclides (i.e. ^{137}Cs, ^{40}K, ^{232}Th and ^{226}Ra) measured for each soil layer.

Table 1. Mass activity and depth distribution of selected radionuclides

Site 1		Site 2	
Soil Layer (cm)	Activity (Bq kg^{-1}) ^{137}Cs	Soil Layer (cm)	Activity (Bq kg^{-1}) ^{137}Cs
0-5	4.06 (0.13)	0-10	12.96 (0.18)
5-10	6.16 (0.14)	10-20	15.83 (0.20)
10-20	4.75 (0.12)	20-30	4.44 (0.14)
20-40	0.42 (0.08)	30-40	0.70 (0.12)
40-45	0.19 (0.10)	40-50	0.30 (0.11)

Discussions

Based on the mass activities measured in soil of the naturally occurring radionuclides (NOR), the external dose rate in the air at 1 m above ground level from external exposure to gamma rays was assessed using the procedures proposed by UNSCEAR[3]

Table 2. Radionuclide contribution to the external gamma dose rate in air

Radionuclides	Dose rate in air (nGy h^{-1}) Site 1	Site 2
^{226}Ra	48.95 ± 16.2	91.14 ± 19.0
^{232}Th	24.73 ± 4.7	33.87 ± 5.2
^{40}K	1.73 ± 0.27	2.49 ± 0.30
^{137}Cs	1.14 ± 0.11	3.32 ± 0.30
TOTAL	76.55 ± 1.28	130.82 ± 24.84

For ^{137}Cs, the external gamma dose rate was estimated using the RSP software[5]. In this case, a Monte Carlo code was developed to simulate the photon transport for the soil/air configuration, considering sources distributed in a slab of finite thickness.

Table 2 presents the external gamma dose rate contribution due to each radionuclide.

The total dose rate associated with the ^{226}Ra, ^{232}Th, ^{40}K and ^{137}Cs content in soil for site 1 is 76.55 ± 21.28 nGy h^{-1}, and for site 2 is 130.82 ± 24.84 nGy

CONCLUSION

Based on these preliminary results this study confirms that ^{137}Cs can be used as soil tracer for studying erosion and sedimentation processes in Haiti. External dose rates at the surface of the forested soils investigated are about 30% (Site 1) and 22.5% (Site 2) higher than the global average external exposure rate from terrestrial gamma radiation established at 58 nGy h^{-1} by UNSCEAR.

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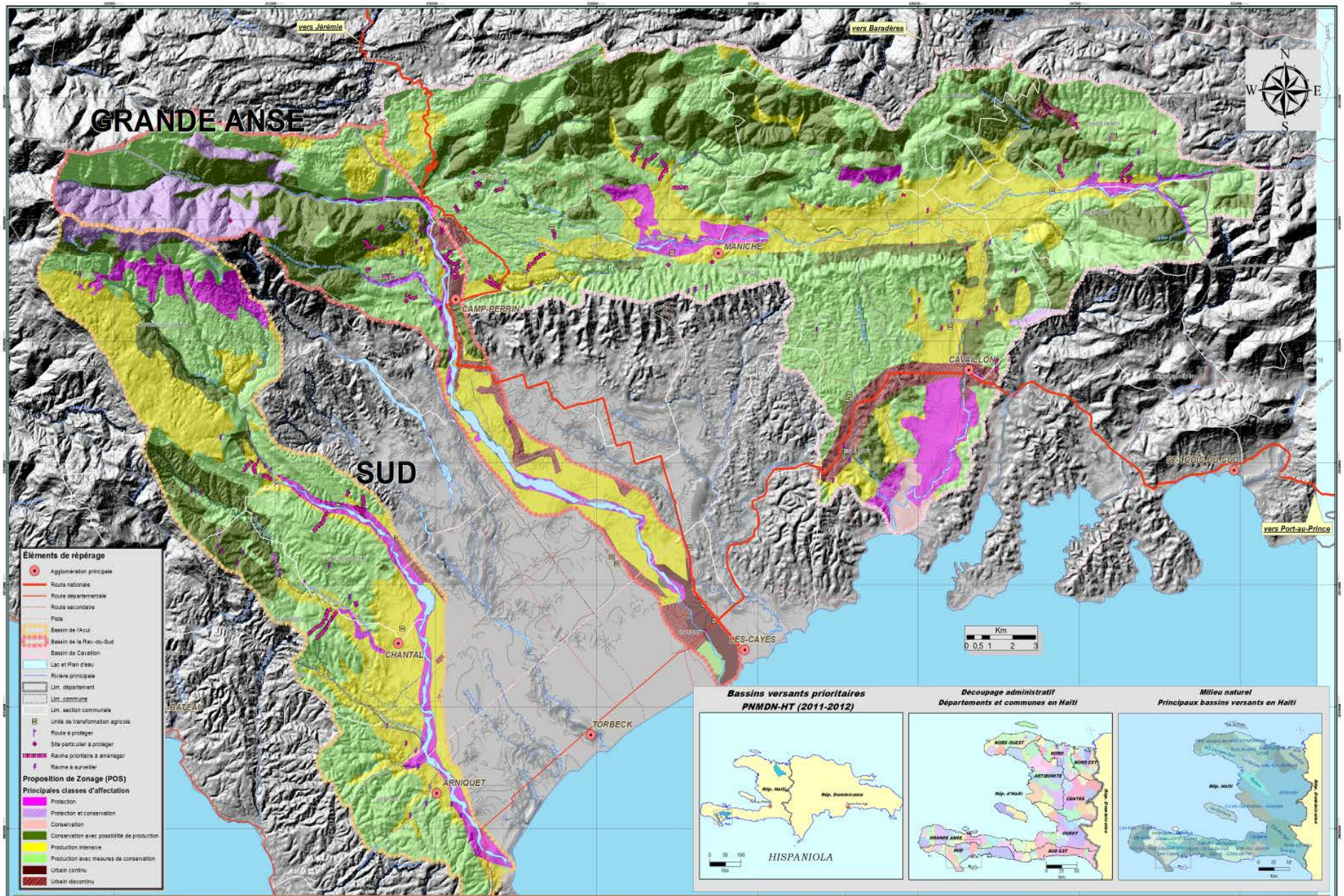

Projet National Mitigation des Désastres Naturels (PNMDN)
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InterAmerican Development Bank (IDB)

Ministère de l'agriculture, des ressources naturelles et du développement rural (MARNDR), HAITI

Oxfam Québec

CATIE

Échelle de production
1:50 000

Système de Référence
Projection Universelle Transverse de Mercator
UTM, Fuseau 18, Hémisphère Nord
WGS84

PLAN D'OCCUPATION DU SOL (POS 2012)
Protection, Équipement et Aménagement du Territoire
Unité hydrographique prioritaire du Sud (C-R-A), Rép. d'Haïti, 2012

PARTENARIAT

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Agt. du territoire - Environnement - Géomatique
Études-Conseil & Recherche-Action
UQAT 2012.
Université du Québec en Abitibi-Témiscamingue

SOURCE DE DONNÉES: Centre national de l'information géospatiale (CNIGS)
Min. de la Planification et de la Coopération externe (MPCE)

CONCLUSION

The conditions necessary to drive and sustain Soil management and intensification of production in Haiti are:

- Significant investments in equipment for farmers
- Provision of appropriate planting material
- Successful applied research
- A systematic market research
- Pest control structure and credible quality control
- A legal framework providing incentives for investments
-An offer of credit suitable for processing and marketing