Research Note

POTENTIAL OF SOME SMALL IRRIGATION SYSTEMS IN HAITI[1]

There are 106 irrigation systems scattered throughout Haiti. Most of them are operating since colonial times.[2] They are generally small, except for the one operating in the Artibonite Valley. In 1975 the J.G. White Engineering Corporation identified small systems covering an aggregate area of 17,000 ha which could be possibly expanded and rehabilitated.[3] Most of them need repairs and maintenance. A study was conducted recently to evaluate the changes that could result from the rehabilitation of three of these systems: Dubreuil, Marigot and Thomazeau.[4] Issues addressed were the expected impacts in terms of yields, cropping patterns, animal production levels, and agricultural input changes that would result from the rehabilitation of the irrigation systems. Also, the appropriateness of current complementary inputs such as supervised credit, improved seeds, fertilizer and pesticides.

The Dubreuil Irrigation system, in southwest Haiti, covers some 1,000 ha; Marigot, in the southeast, 400 ha; and Thomazeau, northeast of Port-au-Prince, 600 ha.

As shown in table 1, Moisture Availability Index (MAI)[5] in Dubreuil approaches or falls below 0.50 in December through March. According to Hargreaves and Samani[6] a MAI value of 0.33 or less for 1 month during the crop growing season is considered to be a "danger signal." They further indicate that "if the average MAI value for the crop growing season is less than 0.50 then the use of fertilizer may not be economical." In Marigot, MAI values range from 0.01 in January to 1.43 in October. Values below the "danger signal", i.e., 0.33, occur in 4 months of the year; values below 0.50, in 7 months. The December-April and the June-July seasons would be too risky for crop production if irrigation is not provided. Were it not for irrigation, Marigot would not be an agricultural area of significance. In Thomazeau, MAI values range from 0.00 in

[1] Manuscript submitted to Editorial Board July 15, 1984.

[2] OAS, Integrated Technical Assistance Mission, 1972.

[3] The J.G. White Engineering Corporation. 1975. "Task A", Dubreuil Rehabilitation, Report to U.S.Aid.

[4] Lugo-López, M.A. and M. J. Taylor, 1983. Agricultural evaluation of the Dubreuil, Marigot and Thomazeau irrigation systems, Report to U.S.Aid.

[5] MAI is defined as the 75% probability of rainfall occurrence, i.e., PD, divided by potential evapotranspiration, ETP. The equation can be written as $MAI = \frac{PD}{ETP}$.

[6] Hargreaves, G.H. and Z.A. Samani, 1983. Rainfed Agriculture in Haiti (A Practical Manual), Intl. Irrig. Res. Center, Utah State Univ.

December, January and February to 0.61 in October. The mean annual MAI value is 0.41. In 9 months of the year, MAI values are below 0.33. In only 3 months of the year, mean MAI values are slightly above 0.50. Practically no crops can be grown in Thomazeau, without risks of total failure, without irrigation.

Most of the soils are Mollisols and Inceptisols that originate from alluvium. They are mostly loams, clay loams and clays. Expanding lattice minerals predominate in the clay fraction. They are generally friable, permeable and well-drained except for the compact clays with heavy subsoils (50% clay) of the bottom lands which are imperfectly drained. The following values were reported for the uppermost 56 cm of a dark clayey soil at Dubreuil[3].

TABLE 1.—*Moisture Availability Index (MAI) at Dubreuil, Marigot and Thomazeau*[1]

Month	Dubreuil	Marigot	Thomazeau
January	0.36	0.01	0.00
February	.45	.24	.00
March	.33	.43	.03
April	.82	.28	.24
May	1.36	.84	.57
June	.76	.38	.17
July	.63	.39	.09
August	.90	.70	.30
September	1.08	.77	.52
October	1.57	1.43	.61
November	.74	.59	.08
December	.18	.02	.00

[1] Data adapted from G. H. Hargreaves and Z. A. Samani, 1982. Rainfed Agriculture in Haiti (A Practical Manual), Intl. Irrig. Res. Center, Utah State Univ.

Property	*Value*
Bulk density, g/cm^3	1.1
Water held at ⅓ bar, %	52.0
Water held at 15 bar, %	32.0

The water held at tensions between ⅓ and 15 bar is considered to be available to plants. Therefore, this soil can hold enough moisture in the upper 56 cm where most roots develop. In total, down to 153 cm depth, it can hold 53 cm of soil-water that is available to plants. Soil pH values are between 7 and 8. Cation exchange capacity values are around 30 to 40 meq/100 g of soil in the upper 45 to 60 cm layers. This indicates a rather high inherent fertility. The organic matter content of the soils is high (probably 4% or more) and they appear to be well-supplied with P,

K and other nutrients. They are rich in Ca (more than 20 meq/100 g of soil). They respond to fertilizer N.

If the irrigation systems are rehabilitated and can supply water in the required amounts at critical periods for agricultural use, crop yields can be significantly increased with the use of appropriate modern farming systems. It is envisioned that changes from traditional to modern agricultural practices could be achieved in a 5 to 7 year period. Other significant impacts would be the increase in numbers of crops/year, the increased flexibility in cropping patterns and the reduction of risks. With a reliable irrigation system, farmers at Dubreuil should switch to high value, short growing cycle cash crops such as beans and tobacco. A relatively large reduction in the area planted to sorghum and sugarcane could be expected. With less sorghum and sugarcane there will be a

TABLE 2.—*Current and expected land use patterns after rehabilitation of the Dubreuil Irrigation System*[1]

Crop	Land use, ha	
	Current[1]	Expected
Corn	260	260
Beans	160	250
Tobacco	20	100
Sorghum	220	100
Sugarcane	80	20
Rice	20	20
Sweetpotatoes/cassava	150	160
Others	90	90

[1] M. A. Lugo-López and M. J. Taylor, Agricultural evaluation of the Dubreuil, Marigot and Thomazeau irrigation systems in Haiti (Report prepared for U.S. AID), September 11, 1983.

significant reduction in forage availability and no increases in livestock production (table 2).

At Marigot, plantains under irrigation could be grown profitably and marketed to nearby Jacmel and Port-au-Prince. Thomazeau offers a vast potential for increased vegetable production. It is relatively near to the large Port-au-Prince market, irrigation water is available in reasonable quantities and, if the soils are properly managed, high yields can be obtained. Furthermore, the dry climate, coupled with irrigation, is ideal for the production of high valued cash crops.

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