Table 3. Nutrient status of 37 hydromorphic soils from the forest region of West Africa (southern Nigeria, Sierra Leone and Liberia).

Properties and range	Distribution, %	
	Surface soil	Subsurface soil
Exch. Ca, meq/100g		
0-0.50	41	59
0.51-2.00	35	22
2.01-4.00	5	5
4.01-8.00	11	8
> 8.00	8	5
Exch. Mg, meq/100g		
0-0.50	70	78
0.51-1.50	11	5
1.51-2.50	8	5
2.51-3.50	8	3
> 3.50	3	8
Exch. K, meq/100g		
0-0.05	24	65
0.06-0.15	35	22
0.15-0.25	30	14
0.25-0.35	11	0
Extractable P (Bray 1), ppm		
0-5	51	89
6-15	35	8
16-25	8	0
25-35	0	3
> 35	5	0

Source of Data: IITA Soil Information Bank, Njala University College and University of Illinois Soil Survey Report for Sierra Leone (1974); Ministry of Agriculture and USAID Soil Survey Report for Liberia (1977), Manor River Soil Survey Report, Liberia (1979).

also stressed. Utilization of these lands at traditional and improved levels of management for year-round crop production using wetland rice as the main season crop was proposed.

Further inventory of properties of 17 selected soils from the region are given in Table 4. Again, the predominant hydromorphic soils in this region are coarse and medium textured, but their chemical quality is slightly better than their counterpart in the high-rainfall region in terms of available Ca, Mg and K in the surface horizons. Available P status is invariably low although these soils have very low P fixation capacity.

Savanna zone (central and northern Nigeria). Hydromorphic soils in the savanna zone occur in a wide range of land forms such as inland depressions, river valleys and ancient and recent flood plains. The sedimentary plains of the Niger and Kaduna Rivers and their tributaries comprise a significant portion of potential rice land in central Nigeria, which is yet to be fully developed and utilized.

The inventory of hydromorphic soils in this region is exploratory due to lack of soil survey information. A preliminary inventory of soil properties of 10 selected sites in central Nigeria (excluding Vertisols) is given in Table 4. Hydromorphic soils at these locations show wide variability in texture, organic matter and soil reaction. Mineralogical studies showed that many hydromorphic soils in

Table 4. Properties of 27 hydromorphic soils from the savanna zone and the forest/savanna transition zone of Nigeria.

Properties	Surface soil		Subsurface soil	
	Range	Mean	Range	Mean
Forest/savanna transition zone (17 soils)				
pH (H_2O, 1:1)	4.7-6.4	5.6	5.0-6.5	5.8
Organic C, %	0.37-1.96	0.91	0.07-1.36	0.42
Clay, %	4-68	15	3-70	21
Silt, %	4-51	21	5-53	18
Sand, %	13-89	64	10-84	61
Exch. cations, meq/100g				
Ca	0.67-12.83	3.48	0.47-11.13	3.34
Mg	0.29-7.40	1.53	0.21-7.89	1.67
K	0.03-0.26	0.13	0.02-0.46	0.11
ECEC, meq/100g	1.51-23.60	5.99	1.06-21.26	6.14
Bray P1, ppm	2-14	5	0.2-4	2
Savanna zone (10 soils)				
pH (H_2O, 1:1)	4.2-6.1	5.3	4.6-7.4	5.7
Organic C, %	0.29-2.70	1.04	0.07-0.75	0.42
Clay, %	6-50	22	5-70	28
Silt, %	8-51	37	6-55	29
Sand. %	4-82	42	5-89	43
Exch. cations, meq/100g				
Ca	0.55-7.94	3.50	0.40-6.84	3.34
Mg	0.20-3.36	1.32	0.06-3.25	1.30
K	0.04-1.92	0.40	0.04-0.29	0.14
ECEC, meq/100g	1.73-11.31	6.26	0.99-10.61	6.13
Bray, P1, ppm	2-39	9	0.4-5	2

this region are montmorillonitic and, thus, of high clay activity. Hydromorphic soils with more favorable clayey and silty texture are found in some extensive areas in the river basins of central Nigeria. But, because of generally low nutrient status and seasonal flooding, effective water management and fertilization are required in order to develop such areas for rice production.

An estimate is being made of the distribution of hydromorphic soils of selected areas of West Africa using LANDSAT imageries and a few large-scale soil maps that are available. The selected study areas include the wetland tracts along rivers of West Africa and inland swamps, such as those in Liberia and Sierra Leone and the wet sedimentary belts of southern Nigeria. Vertisols and the vertic subgroups are widely scattered but not fully documented on a national and regional basis.

Socio-economic analysis

Labor utilization

Literature was reviewed on labor utilization in cassava, yam, maize and upland rice production. Additionally, from short regional crop production surveys—preliminary labor utilization data were derived for cocoyam and soybean production in Nigeria (Table 5).

In 1980, further progress was made in the collection of time series data for food crop prices in West African countries. In addition to food crop prices in Nigeria and Cameroon, market prices were obtained from Ghana, Ivory Coast and Togo.