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REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE — NATIONAL AGRICULTURAL LABORATORIES

KENYA SOIL SURVEY PROJECT

REPORT OF A SITE EVALUATION OF CAT CLAY HAZARDS

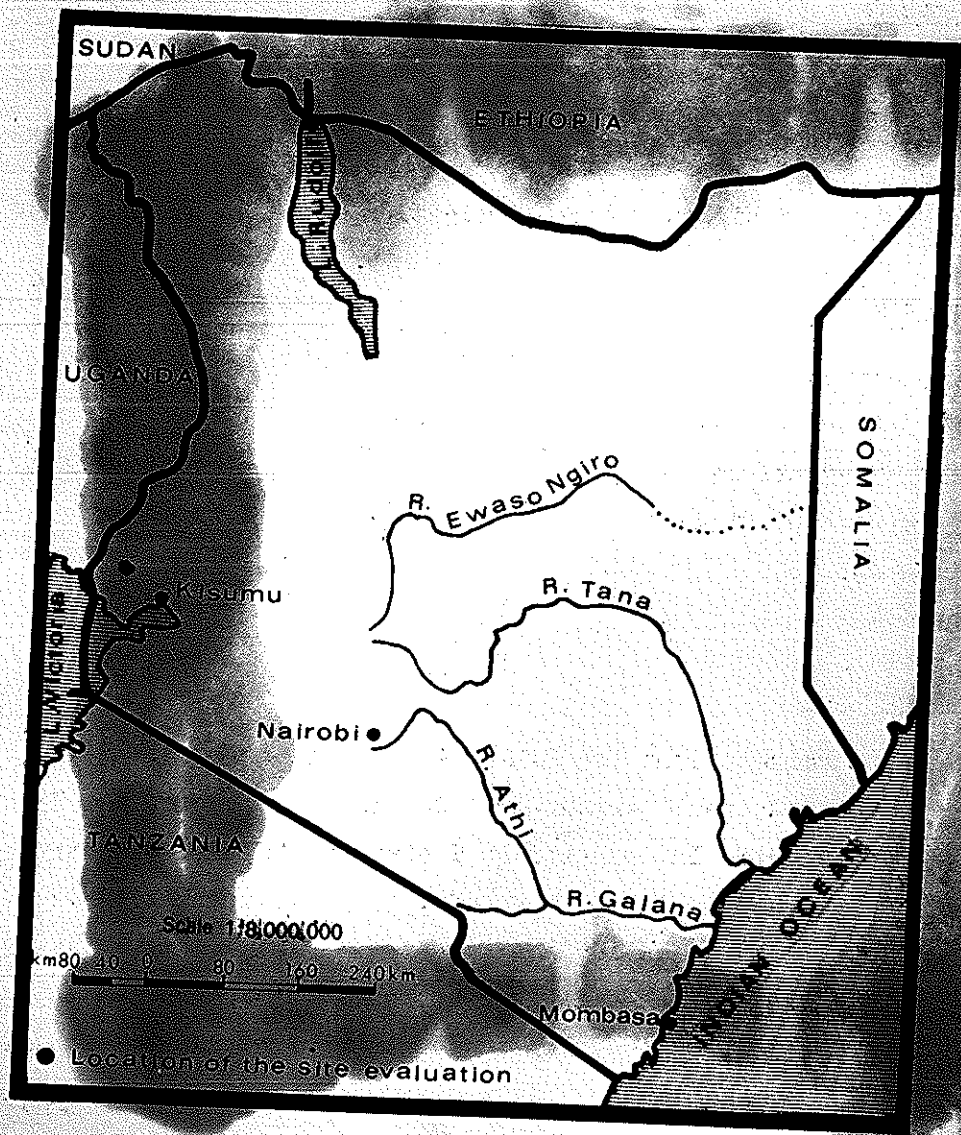
IN THE YALA SWAMP, WESTERN KENYA

By R.F. van de Weg and W.G. Sombroek

SITE EVALUATION

No: 1

Date: JUNE, 1972.



Kenya Soil Survey Project

Nairobi, 18/12/72

Site Evaluation No: 1

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REPORT OF A SITE EVALUATION ON CAT CLAY HAZARDS

IN THE YALA SWAMP, WESTERN KENYA

By R.F. van de Weg and W.G. Sombroek

June 1972.

ITINERARY

The trip was made by Landrover.

9th May 1972: Nairobi -- Kisumu

10th May 1972: Kisumu - Yala swamp - Kisumu.

11th May " : Kisumu - Ahero Irrigation Research Station - Nairobi.

CONTENTS

Introduction

Background information

Field observations

Interpretation of data

Follow-up.

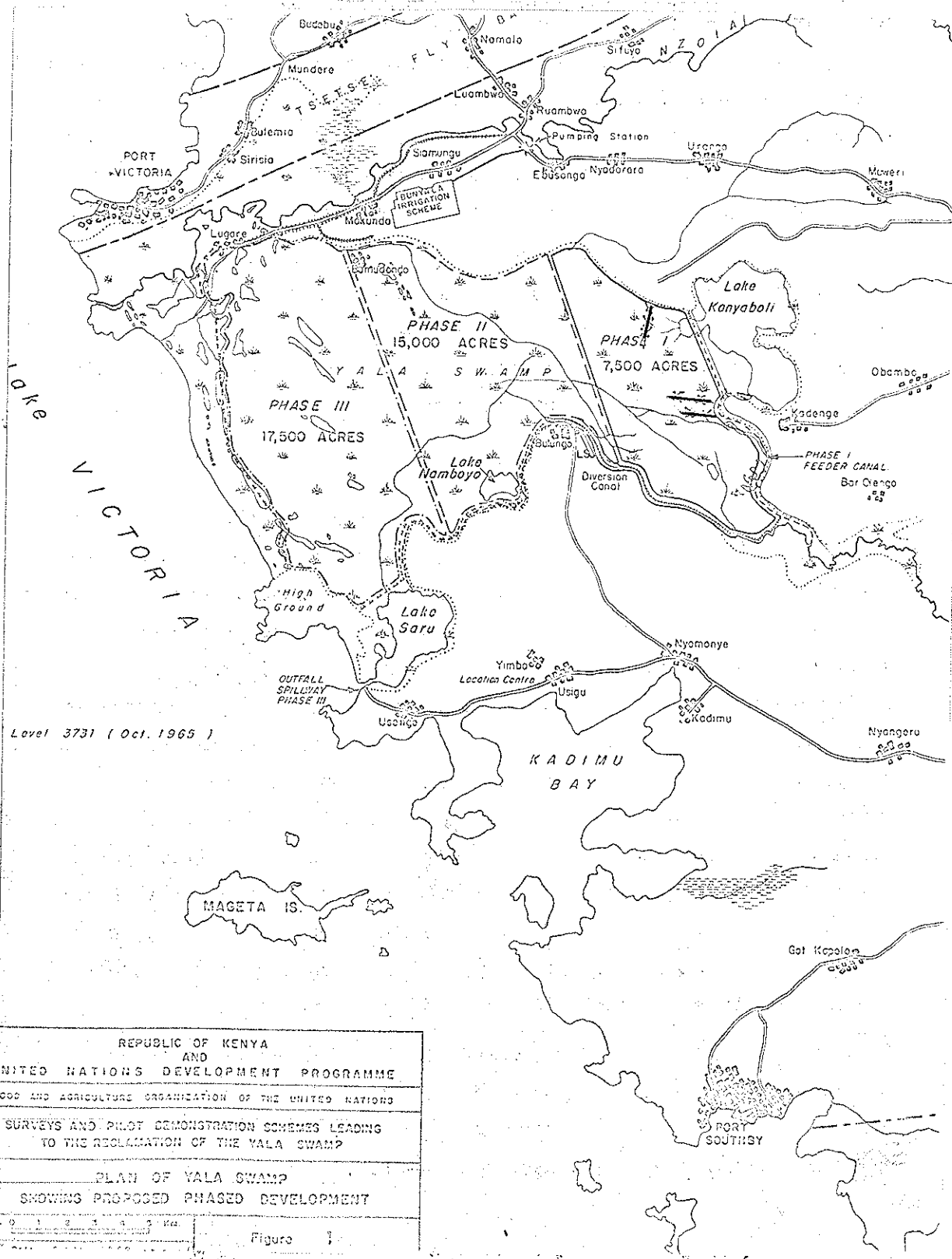
Appendix

INTRODUCTION

At a request from the National Irrigation Board, at the suggestion of the International Agricultural Centre, Wageningen, The Netherlands and the "Directie Internationale Technische Hulp", Ministry of Foreign Affairs, The Hague, The Netherlands, (ref. letter UR/112692/437), a short fact finding mission was made to the Yala swamp, Western Kenya. Taken into account the existing information (see underneath), it was felt necessary to have a closer view on soil conditions in the area.

The trip was made from 9th - 11th May 1972, but, as some laboratory data had to be included in this short report, preparation of the report was delayed, till June, 1972. The group consisted of: Mr. Nyandat, Co-Manager Kenya Soil Survey Project, Dr. W.G. Sombroek, Project Manager, Kenya Soil Survey Project and R.F. van de Weg of the same Project.

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REPUBLIC OF KENYA
AND
UNITED NATIONS DEVELOPMENT PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
SURVEYS AND PILOT DEMONSTRATION SCHEMES LEADING
TO THE RECLAMATION OF THE YALA SWAMP
PLAN OF YALA SWAMP
SHOWING PROPOSED PHASED DEVELOPMENT
Figure 1

In Kisumu Mr. J. van der Laan (ILACO), UNDP/SF Irrigation Engineer, Ahero Irrigation Research Station joined the party.

His participation in the trip was very useful as he had visited the Yala swamp area frequently during the last few years.

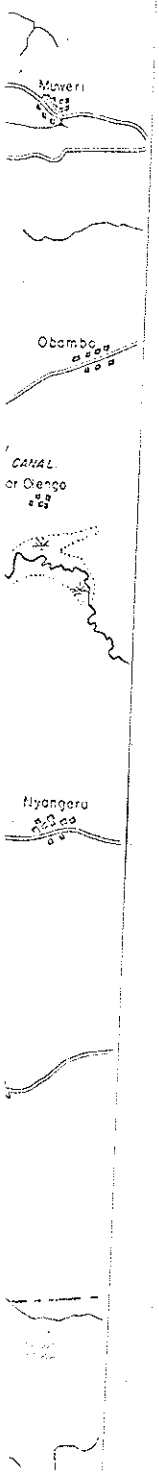
During the trip one full day was spent in the swamp. As phase 2 and 3 areas (for location, see attached map) are still submerged and partly under impenetrable Papyrus vegetation, a closer look was possible only in the phase 1 part of the swamp. This phase 1 area has been cleared partly from Papyrus by squatters which (without the permission of the Government) have moved into the area. The clearings are used for maize and beans cultivation (in general with reasonable results).

Three short transects were made, located in the Northern and Eastern part of the phase 1 area, (see attached map). Several augerings were made, samples of which have been analysed at the N.A.L. routine laboratory in Nairobi. Penetration of the phase 1 area was possible only in the relatively dry parts, that were moreover cleared from papyrus.

BACKGROUND INFORMATION

In Sir Alexander' Gibb and Partners' report: "Kenya Nile Basin Water Resources Survey 1954 - 1956, p. 112" attention was drawn to the low pH values occurring in samples of the Yala swamp. Quote: Reaction is strongly acid to moderately acid (4.1 - 5.5) and we recommend that tests are carried out to determine the effects of drying out these soils. If large quantities of ferro-sulphide are present, the formation of free sulphuric acid and consequent marked lowering of the pH may occur, and in this event a special drainage system would be necessary designed to preserve a reasonably high moisture content at all times." (this sentence was also quoted by Mr. J.H.V. van Baren, part time member of the UNDP/FAO team studying the area). These conclusions were however made on only three soil profiles within the swamp proper (approximate location: boundary of phase 1 and 2 area), examined during the survey carried out by above mentioned Consulting Engineers.

During the UNDP/SF FAO project in the Yala swamp, no topographical nor soil studies were undertaken in the swamp ("Technical report no. 1 - Surveys and pilot demonstration scheme leading to the reclamation of the Yala swamp, FAO, Rome, 1971, p. 9 - 10".).



According to verbal information Mr. Nyandat (N.A.L.) has carried out during the last years also some soil studies in the Yala swamp. Samples were collected and investigated for pH. No pH values were found lower than 4.0 and no significant drop in pH was found between the values for wet and dry samples.

In the beginning of 1972 a two-days' trip was made in the swamp by Mr. V. D'Costa, lecturer in soil science at the Faculty of Agriculture, Nairobi University, accompanied by Mr. J. van der Lean (ILACO). During that trip 15 augerings were made, samples of which have been analysed at the National Agricultural Laboratories in Nairobi. Mr. D'Costa kindly passed his field and laboratory data to the Project. His findings are incorporated in the present report.

Aerial photographs from the swamp area exist on scale 1:12,500 and 1:50,000. Up till now only the 1:50,000 photos (1967) have been viewed quickly.

FIELD OBSERVATIONS

In order to get more information on the soil conditions in phase 1 area a number of field observations were made:

The phase 1 area of the swamp was at the moment of the trip partly dry. During the trip groundwater occurred at 0-50 cm depth. The area consists of alluvium of the Yala river, deposited in what was a lake bottom or a swamp. But according to local information (which up till now could not be confirmed by literature) the area was not submerged 30-40 years ago.

A slight micro-topography exists in the swamp, as minor surface irregularities were encountered during the traversing. At one place a tiny spot of Upland soils was found on a slightly higher level, occurring like a small island in-between the papyrus swamp. On another place, a spot of ferruginous sand was found, possibly representing a levee of an old streambed of a branch of the Yala river. Some shallow streambeds had to be crossed during the fieldtrip, representing former channels of the Yala river.

The surface layer in the part visited consists always of a layer of raw organic matter, varying in thickness from 20 to 180 cm (dominantly 20-30 cm).

Under this layer a heavy to very heavy textured massive clay was found. The colour of this clay is light to dark grey with sometimes yellowish red to reddish brown mottling. The augerings were made down to 220 cm. but no change in texture or appearance of the clay was observed. pH values were determined in the field with indicator

solutions and the pH was again determined in the laboratory in Nairobi (pH_{H₂O}, 1:1 suspension).

INTERPRETATION OF DATA

- (a) As to the possible danger of "catclay" formation the following can be said:
- pH values varied between 4.5 and 5.5. A tendency exists that pH values slightly increase with depth. No significant difference could be detected in the pH values for wet and dry samples.
 - Using pocket microscope no pyrites were detected.
 - In the field no typical H₂S smell was apparent.
 - Total sulphur analysis carried out in the laboratory revealed low sulphur percentages, in the range 0.02-0.03.
 - On the other hand, no free CaCO₃ nor CaCO₃ concretions or shells were detected.
 - According to the laboratory analysis salt or alkali hazards do not appear.

The above data allow to conclude that no catclay occurs at present in the phase 1 area of the swamp.

(b) The clay found under the organic layer of varying depth seems fully stabilized ("ripe"). This implies, taking into account the other findings, that there exists no danger for the formation of catclay after draining these soils.

The "ripeness" of the clay also implies that no substantial subsidence will occur in these soils after reclaiming the area. The overall level of the land will however be lower in the near future when the organic layer has disappeared.

(c) Phase 2 and 3 areas seem to be much more heterogeneous than phase 1 area. Various sandbars (beach ridges) and several streambeds are visible on the aerial photos, and the vegetative cover is rather heterogeneous. Flooding seems less deep than in the phase 1 area before this area was drained by the river diversion canal, constructed during the FAO project (1968).

FOLLOW-UP

Mr. D'Costa has received in the beginning of this year an official request from the "National Irrigation Board" to advise them on soil conditions in the Yala swamp and to assist them in the selection of a representative site for the planned Irrigation Research Centre.

Following this request Mr. D'Costa plans to carry out a "semi-detailed" soil survey later this year in the phase 1 area. Due to accessibility problems this survey cannot be carried out before July - August. For this survey Mr. D'Costa has requested the participation of the Kenya Soil Survey Project. In principle this has been accepted. It has been agreed that Mr. D'Costa will visit the area in the beginning of July. He will request the National Irrigation Board to lay-out selected transects through the swamp with reference points at regular distances. During August (if these transects are established) Mr. D'Costa will carry out the survey, most likely with the participation of some members of the Project. It should be stressed however that for the moment only plans exist for a survey of phase 1 area.

APPENDIX

Copy of UNDP/FAO map, scale 1:200.000 showing the soil observations made in phase 1 area.

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