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A REPORT OF TAGELAQP/SAPITA PROGRAMME: SAVANNIZATION PROCESSES IN TROPICAL AFRICA.

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As an extension of the "Tropical african geomorphology and late-Quaternary palaeoenvironments research project" (TAGELAQP), we started a multi-disciplinary research programme that emphasizes investigations of "savannization processes" in tropical Africa (SAPITA) in 1987. The term "savannization" used here includes both natural and anthropogenic processes through which various types of savanna landscape have been created and maintained, as well as processes of land and vegetation degradation, i.e."desertification" in a broad sense. The term "savannization" used here, likewise "desertification", not only implies the transformation of forest vegetation into savannas or savannalike landscapes but also connotes the ecological degradation of forested areas caused by clearance, burning, improper cultivation, etc. ..., resulting in accelerated soil erosion and impoverishment of soil productivity.

A comprehensive review on the topic and the papers based on the results obtained from the 1987/1988 season field research work carried out in Zambia and Cameroon in collaboration with the counterparts from the two countries were shaped into a publication, "Savannization processes in tropical Africa I" (TAGELAPQ/SAPITA, n°1, 1989) [1].

This article summarizes the main results described in this publication by chapters.

1.History of savannization [2].

From a review on previous studies on the origin and ages of african savannas the following conclusion can be drawn:
in tropical Africa the first sign of human impact on the forest vegetation dates back to 3,000-2,000 years B.P.. Deforestation has intensified since c.1,000 years B.P. in many areas. However, these dates do not necessarily indicate the onset of savannization towards the present-day savannas in a certain area because under the conditions of subtle human impact the natural ecological potential allows reforestation. On the other hand, there is little doubt that anthropogenic savannas, originally created by ancient human activities and still so maintained, exist in some areas, just as relict savannas originated naturally during the last glacial xeric phase in tropical Africa. So far available knowledge is too limited to reconstruct a detailed history of savannization in a particular area.

2. Climatological studies.

a) Rainfall variability over african savannas [3].

Annual rainfall variability in the semi-arid region of 200-800 mm.annual rainfall in tropical Africa was investigated using the data set updated to 1987. An interhemispheric concurrence of rainfall variation is found between the western Sahel and the northeastern Kalahari in the drought periods of the early 1910s, from the late 1960s to the early 1970s, and in the early 1980s. In the northern hemisphere rainfall continued to decrease until the mid-1980s, along with the retraction of the rainfall zone.

b) Recent drought in Zambia [4].

In Zambia, the 1983-1984 season is a typical dry year in the drought episode of the 1980s. Rainfall is below normal all over the nation except for some regions in the nrotheastern part of Zambia. A large negative anomaly is widespread in the southern part, and the annual rainfall did not reach 500 mm. at Livingstone and Feira. The large negative anomaly is also found in the northern part of the country, and annual rainfall did not reach 1200 mm. at Mwinilunga and Kawamwa. The decrease in rainy days is great particularly in the southern part of Zambia and had a strong impact not only on agricultural production but also on natural vegetation, accelerating savannization.

c) Recent drought in Cameroon and adjacent areas [5].

A comparison of the two recent proximal dry years, 1973 and 1983, shows that the western edge of the great african basin was less influenced by the climatic hazards observed elsewhere within the cameroonian territory. This phenomenon is attributed to the congolian monsoon air mass which derived a fair percentage of its humidity from the closed forests. The influential role of this congolian monsoon air mass has often been overlooked in the previous studies of the Cameroon climate.

3. Geoecological studies.

a) Landform development on the Kalahari sands (north east Zambia). [6].

The sequence of geomorphic processes and associated weathering was investigated in the area around Kabompo, northeastern Zambia, in relation to climatic change and human impact. The last significant eolian sand mobilization and fluvial erosion/deposition are tentatively correlated to the arid phase at c.20,000 years B.P. and to the humid phase c.10,000 years B.P., respectively. The difference in underlying geology, in particular the presence or absence of eolian sand cover, has brought about different geomorphological responses to climatic change, and has resulted in contrasting soils which have invited differentiated human impact on vegetation.

b) Soils over the Kalahari sands (north east Zambia).[7].

Aerosols under dry evergreen forest are well developed with a root mat at their surfaces, while those under Kalahari woodland are poorly developed and largely lacking a root mat. The degree of root mat development in the Kalahari Sands area seems to be closely related to the degree of human influence on the soil surface and forest.

c) Man and the disappearance of zambezian dry evergreen forest [8].

Although there is some evidence for Early Iron Age forest clearance in and around Zambia, this was not extensive. It was only in the last 800-400 years, i.e.after the arrival of Later Iron Age peoples using axes to fell, pollard and burn trees to plant finger-millet in the wood ash -"citemene" system of bush-fallow ash culture - that zambezian dry evergreen forest became the focus of man's burning and clearing. Iron-smelting also contributed considerably to forest destruction. Dry evergreen forest now exists only on the Kalahari Sands or where the forest has been protected. Because of their great biological interest, remaining fragments of zambezian dry evergreen forest must be conserved.

d) Structure and environment of Miombo Woodland (north east Zambia).[9].

Miombo Woodland has been strongly influenced by frequent burning and landsurface disturbance. With the increase of human impact, trees composing the vegetation community tend to decrease their height and density, from dry evergreen forest to Miombo Woodland. Small remnants of dry evergreen forest are always found on the Kalahari Sands which are not suitable for cultivation because of their low water holding capacity and oligotrophic soil condition. In contrast, Miombo Woodland widespreads over the areas of ferralsols and has been continuously used by slash-and-burn cultivation.

e) Role of trees planted around wells in Maroua (north Cameroon) [10].

In the Maroua area, with the progress of recent drought which culminated in 1984, rivers dried up during the dry season and common wells has become more and more important to secure the people and the domestic animals. Persistent drought has accelerated vegetation degradation, particularly in the areas around wells due to the concentration of domestic animals. Trees planted around wells are of drought-resistant species and have played an important role for the life of people and animals by indicating the location of wells, giving the shade, etc. ... .

f) The "320 metre beach ridge and ancient erg (north Cameroon). [11].

With a view to establish a baseline used for reconstructing Holocene histories of savannization and desertification with the climatic changes in the backdrop, a preliminary survey on the origins and ages of the Palaeo-Tchad "320 metres beach ridge" and ancient erg (old dunes) was carried out. A radiocarbon date of charcoal fragment collected from the upper part of an old dune at Kalfou indicates that the remobilization of sand dunes occurred shortly before 4,500 years B.P., corresponding with the onset of late Holocene aridification. However, available data are too limited to establish a chronological foundation of environmental history.

g) Savanna landscape of the Bafia area (south Cameroon). [12].

The Bafia depression, an enclosed topography in the middle course of the Sanaga occupies a special position in the forest and savanna contact zone. While savannas grow on the lower elevation, forest spots are found on the summit of hills. This vegetation pattern has been caused not by climate nor edaphic condition but forest clearance and cultivation. Studies of aerial photographs dating back to 1948 and 1951 reveal the great role played by farmers in the savannization process in the last 30 to 40 years. After deforestation, bush fires and edaphic conditions have contributed to the maintenance of grass-dominated savanna landscape.

h) Deforestation of Mount Oku (west Cameroon). [13].

The forest of Mount Oku, a dissected volcano towering over the west Cameroon highlands with an altitude of 3,011 metres, has been acceleratedly cleared to make way for cultivation of food crops in the last 40 years. Between 1963 and 1983, 3,000 hectares of forest have disappeared and only 7,000 hectares now remain. Although the techniques, means of access to the land, and the crops cultivated differ from group to group, the aim for the exploitation is twofold, for feeding growing local population and for cash cropping. There is urgent need to conserve the forest as well as soils along the steep slopes.

i) Genesis and ages of problematic landscapes in west Cameroon. [14].

There is general agreement that both the domestic landscape of the Bamileke plateau and the treeless landscape of the western Grassfields have been derived from forest vegetation. Direct evidence and data indicating as to when and how it disappeared are still very fragmentary. In an attempt to reconstruct environmental histories of these landscapes by means of palynological study, valley head swamp deposits were cored at three localities. Before presenting the results of pollen analytical study, the landscape characteristics around the coring sites and a preliminary interpretation of landscape change were described on the basis of lithofacies analysis. The core from Baham, near Bafoussam, suggests accelerated sedimentation during the latest Pleistocene/early Holocene and mid-Holocene; the latter probably caused by forest clearance for agriculture. A radiocarbon date obtained from a core drilled near to Shum Laka rockshelter indicates that accelerated sedimentation began c.2,700 years B.P.. However these speculations should be confirmed and reassessed by the results of ongoing pollen analytical study and radiocarbon datings.

An observation on a cattle-grazed *Sporobolus* grassland slope shows that soil and vegetation degradation, induced by combined effects of burning, browsing and stamping, has occurred in close relation with the morphology of slope units and their topographic position.

4.Concluding remarks.

Most of the results described above are preliminary in nature and require further analysis and investigation. The TAGELAQP/SAPITA Programme is an ongoing project; the second field research work was carried out from July to November 1989 in Zambia and Cameroon and the third field work is scheduled to be conducted in the 1990/1991 season in Zimbabwe and Cameroon. The final report of the programme is planned to be published in March 1992.

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