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MINISTERE DES AFFAIRES ETRANGERES
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ASSOCIATION FRANCAISE
DES VOLONTAIRES DU PROGRES

REPUBLIQUE DEMOCRATIQUE DE SOMALIE

MINISTERE DE L'ELEVAGE
DES FORETS ET DES PARCOURS

ETUDE PRELIMINAIRE D'UN PROJET DE SUIVI DES PATURAGES DANS LA REGION DU BARI (SOMALIE)

RAPPORT FINAL

ENGLISH VERSION

B. PEYRE de FABREGUES

G. FORGIARINI

Mars 1989

INSTITUT D'ELEVAGE ET DE MÉDECINE VÉTÉRINAIRE DES PAYS TROPICAUX
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PRELIMINARY SURVEY OF A PROJECT OF GRAZING LANDS MONITORING IN THE BARI AREA (SOMALIA)

Final report

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AUTEURS: B. Peyre de Fabrègues, agro-pastoraliste IEMVT
G. Forgiarini, géographe-cartographe IEMVT

avec la collaboration de :
J.P. Lebrun, taxinomiste, IEMVT,
A. Bellinguez, zootechnicien, AFVP
Ph. Durand, vétérinaire, AFVP.

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MOTS CLES : Somalie, Pâturages naturels, Zone aride, Suivi, Télédétection, Elevage, Recherche, Développement.

RESUME : Deux missions sur le terrain dans le Nord-Est somalien, une en saison des pluies, l'autre en saison sèche, ont permis d'identifier les contraintes à lever pour établir un programme de suivi de l'évolution de la végétation des parcours, sous les conditions actuelles d'exploitation. Des axes de recherche et de développement de l'élevage, susceptibles d'appuyer les processus de modernisation prévisibles à moyen terme, sont aussi envisagés.

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Summary

In a test zone near to Gardho corresponding to a SPOT satellite scene, a survey of natural vegetation monitoring is set up. The survey apparatus is made of 18 permanent sites, marked in the field, which have been surveyed in June and in December 1988.

The study has enabled 9 categories of pastoral ensembles to be identified; they have been examined with regard to their vegetal composition and to their topographical situation, and then they have been mapped.

Due to the land pedo-geological structure and to the narrow correlation existing between the geomorphology and the vegetation distribution, the most interesting natural pastures develop on deep soils, on the low parts of the relief. This category covers 45,8 % of the test zone area. The complementary 54,2 % correspond to rocky slopes and plateaux where only a scattered vegetation develops, mostly made of bushes and with a poor fodder value.

The fodder potential of the whole is poor but is able to meet the fodder needs of numerous dromedaries, goats and sheep. Cattle are not numerous and they are foddered more on fenced exclosures of pasture than on open extensive range.

Associating the remote sensing and the informations gathered through the work on the field, the setting up of a vegetation permanent monitoring should enable to determine the degree of degradation of the range and its current evolution.

Some informations concerning the fodder productivity potential will be obtained through planned experiments. Then the results gathered, supporting those of the observations on the field, will enable finally, to propose some methods for the amelioration of the pastoral resources exploitation aiming at a modernization of breeding techniques in order to avoid the degradation of the living standard of the shepherds, and to protect, or even restore, the natural environment and most of all the vegetation.

PRELIMINARY SURVEY OF A PROJECT OF GRAZING LANDS MONITORING IN THE BARI AREA

(Somalia)

1 - INTRODUCTION

1.1 - Aims

This survey had the following objectives :

1° - **an estimation on a test zone** (of about 60 by 60 km, representative of the whole zone concerned) of the availabilities of pastures and of the state of the environment before and after the rainy season.

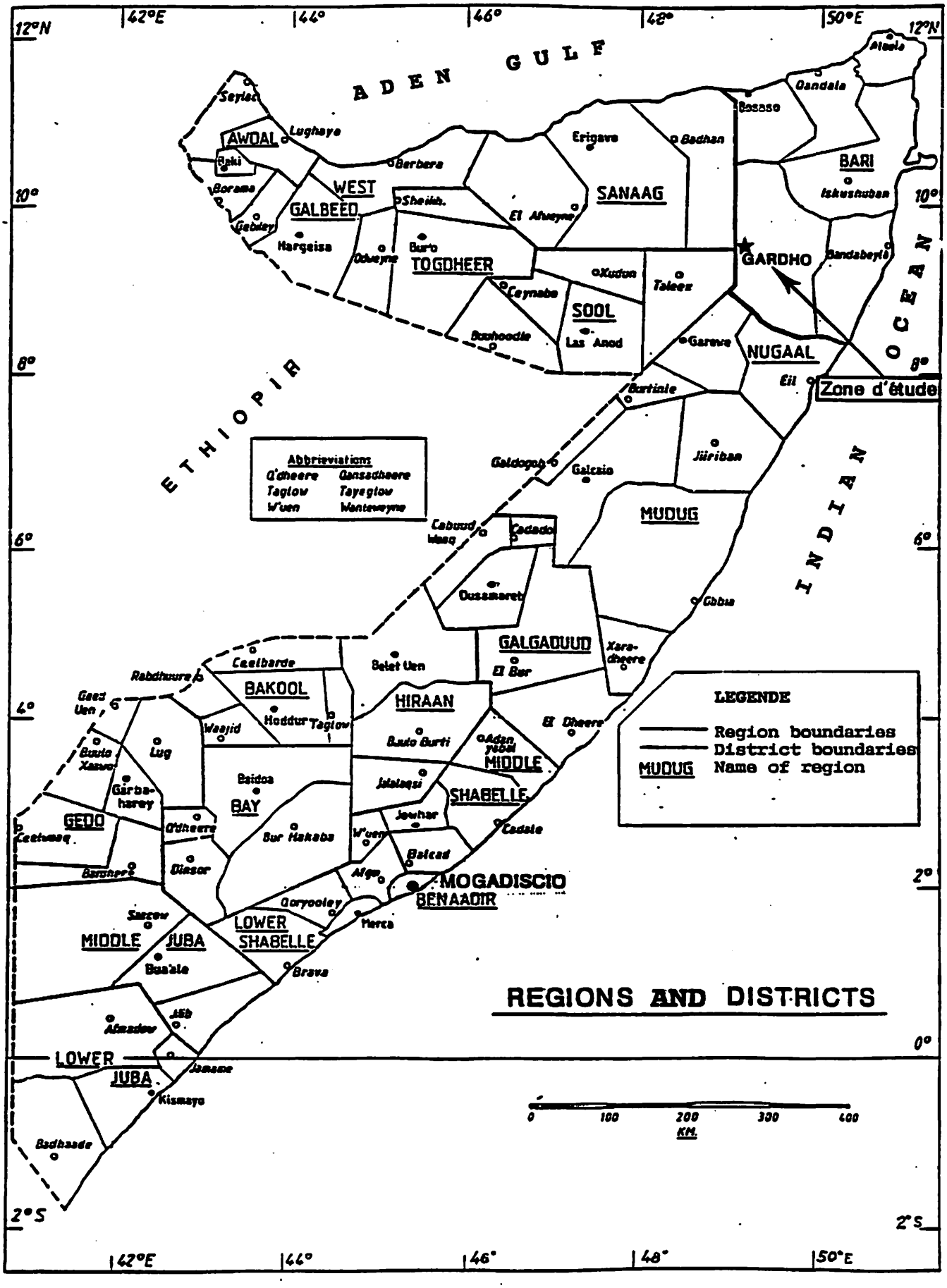
2° - **an elaboration of a pre-operational project of range monitoring** of the whole Bari area by associating the team members on place.

3° - **an accomplishment of a settlement and a free water monitoring test.**

We have not been able to carry out this last point concerning the reference terms; indeed in this test zone area, there is absolutely no stretch of free water which is permanent or even which exceeds the period of the rainy season.

DEMOCRATIC REPUBLIC OF SOMALILAND

Localisation of the test zone



1.2 - The setting

According to the contract mentioned above, the setting up of the work by the IEMVT, should have been done through:

1.2.1 - a one-month work on the field accomplished simultaneously by an ecopastoralist and a geographer-cartographer, at a period favourable to the vegetation development.

During this mission in the field, they had to :

- set up a network of range monitoring sites (in the form of permanent exclosures of 60 by 60 m, located in geographical coordinates.)

- make ecological observations on these sites.

- initiate the agents on the site (of AFVP project) to the monitoring methods, in order to enable them to take over the continuation of the program.

1.2.2 - laboratory works, at the headquarters of the IEMVT concerning :

- the taxonomic identification of the collected botanical samples which are necessary for the study of the vegetation.

This work of precise determination concerning characteristic vegetal species has been carried out in the laboratory of taxonomy of the IEMVT for over 540 samples collected in the field. (List of plants enclosed.)

- the processing and analysis of the SPOT satellite data in order to determine the spectral characteristics of the various elements of the landscape for the cartography of the soils of the test zone, and to try to estimate the biomass production during the rainy season. (On the basis of the biomass measures taken in the field.)

1.3 - Comments on the termes of reference.

Point 1

- selection of the test zone
- estimation of the fodder availabilities and state of environment before and after the rainy season.

- the test zone has been previously selected in the form of a 60 by 60 km quadrilateral, corresponding to the SPOT scene K.J.159.331, the center of which is close to the city of Gardho.

This is only a small part of the Bari area, but it presents accurately some of the Bari characteristics to take into account for the study, especially concerning the vegetation and climatic parameters.

- the estimation of the fodder availabilities and the state of environment before and after the rainy season.

These two points have benefited from the fact that the work in the field has been made during two quite different seasons.

Indeed, owing to the difficulty to forecast the rainfall in the Gardho area, the first work in the field has coincided with a good rainy season, whereas the second one has been made a few weeks after the end of this rainy period.

Point 2

The elaboration of a preoperational project of monitoring has been undertaken,(as agreed), in collaboration with the members of the AFVP/Oasis Project living in the test zone. The conditions suitable for the country and the material and technical availabilities have been taken into account for the practical execution of the planned work.

Point 3

(see commentaries above, in 1-1 3°)

1.4 - Position of the test zone within the country.

The test zone (previously mentioned) covers only a small part of the Gardho district, one of the largest of the 6 districts of the 66 360 km² occupied by the Bari area (see map herewith).

The 6 Bari districts are:

Bender-Beyla	12480 km² ,	18,81 % of the Bari
Bosaasso	7840 km² ,	11,81 %
Callula	5200 km² ,	7,84 %
Gardho	16480 km² ,	24,83 %
Iskhushuban	18040 km² ,	27,19 %
Qandalla	6320 km² ,	9,52 %

The Bari area corresponds to the North-East extremity of the African continent, which constitutes what is called the "Horn of Africa". The Gardafui Cap separates the Aden Gulf on its North-West coast from the Indian ocean on its South-East coast.

This extreme position determines a clear isolation of the Bari area - isolation even more stressed by numerous factors such as orography (mountains which can hardly be crossed), climate (constant aridity and torrid summer temperatures), population (marked ethnic specificity), etc..- and gives it a remarkable originality in numerous aspects.

In addition to the isolation factors mentioned above, the extreme scarcity and the precariousness of the terrestrial ways of communication (indeed the maritime navigation is very ancient but only concerns the coastal areas), at least up to this year (the Mogadiscio-Bosaasso hard surface road is nearly completed) is a major factor to take into account in order to explain the late development of this area.

The Somalian capital, Mogadiscio, as well as Aden or even Djibouti (the nearest important towns, even if it is necessary to cross the sea) are over a one-day's journey from Gardho. Even in 1987, one needed several days and a four-wheel-drive vehicle to travel from Mogadiscio to Gardho.

1.5 - Abridged timetable of the work.

1.5.1 - In the field.

* The first mission in the field, accomplished by the geographer-cartographer, has taken place from the 31st of May to the 27th of June 1988.

This stay has enabled us to set up a network of permanent range monitoring sites and to carry out a first series of observations concerning their vegetation and the main factors of the environment acting upon the distribution and the composition or the development of the vegetation .

On this occasion, some agents of the AFVP have been initiated to the basis techniques of sampling of the sites, of vegetation observation and of exploitation of the spatial image.

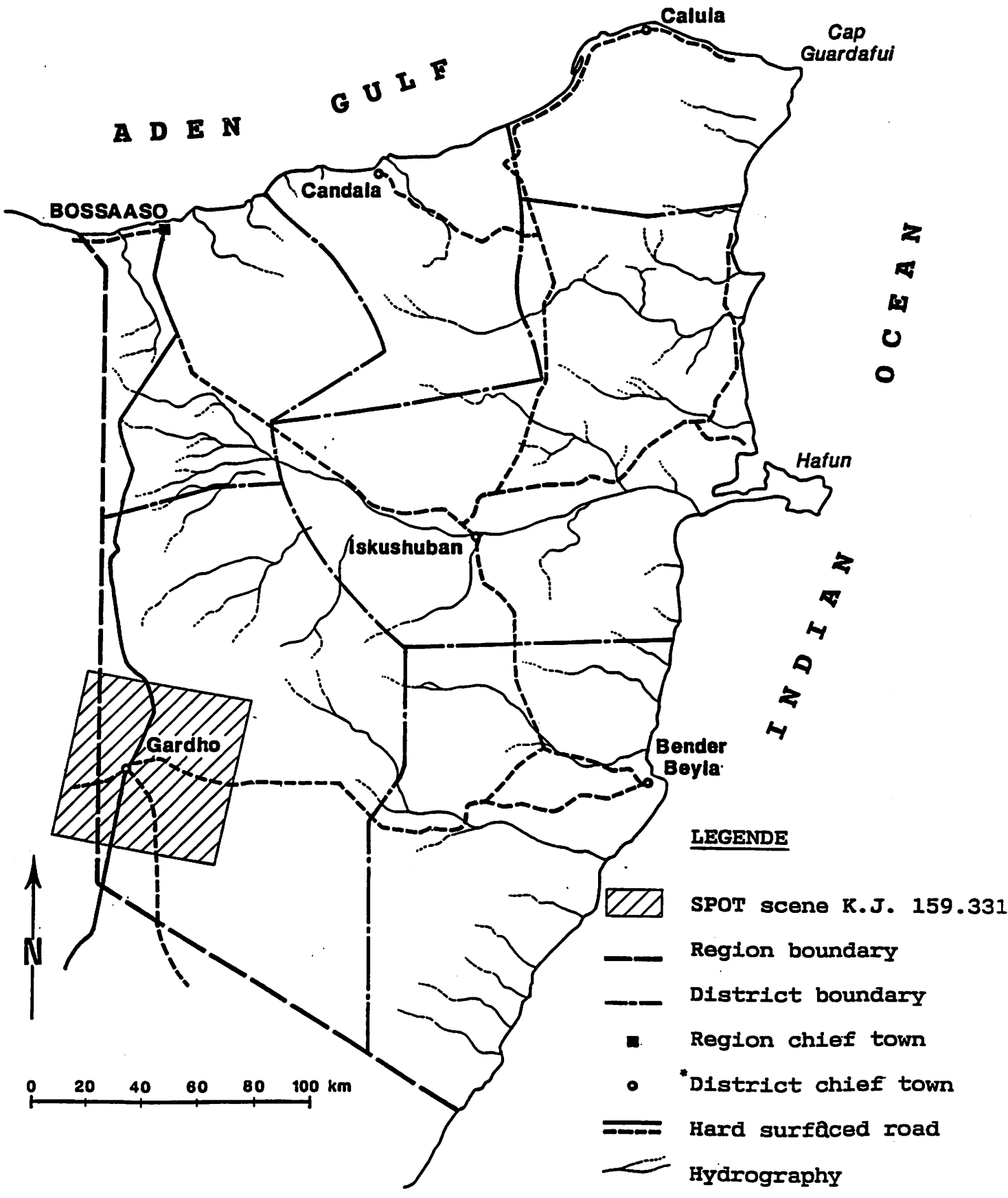
The report of the work in the field has been drawn up (see G.Forgiarini report, IEMVT, nov.88, 32 p.).

* The second mission, accomplished simultaneously by an ecopastoralist and a geographer-cartographer, lasted from the 26th of November until the 19th of December (until the 12th of December for the geographer).

It has enabled us to make more complete ecological and botanical observations, although it took place during the dry season, on the 18 sites previously set up, and around them in the whole test zone.

THE BARI AREA

(SOMALILAND)



Numerous collections of botanical samples were made in order to determine which are the important or characteristic plants (540 samples in two missions).

The work in the field has been done with the logistic support and collaboration of the members of the AFVP who have therefore taken part in the monitoring of vegetation and who will be able to make the observations corresponding to the next favourable season.

Protocols for observations and tests were also elaborated with them, to estimate the importance of various factors concerning the evolution of the vegetation such as the overgrazing, the biomass production potential, the degree of inundation, the eradication of non edible species. Exclosures were provided for this near Gardho.

1.5.2 - In the laboratory.

* Taxonomy

All the plant samples collected during the two work periods on the field were checked and determined by the taxonomy expert of the IEMVT.

Since there are difficulties in identifying plants in Somaliland often particular, the identification rate of 76 % can be considered as excellent. It will improve later on, as the search progresses towards finding the types described earlier. Sometimes, though, they are rare in the accessible herbaria and in the specialised literature.

* Remote sensing

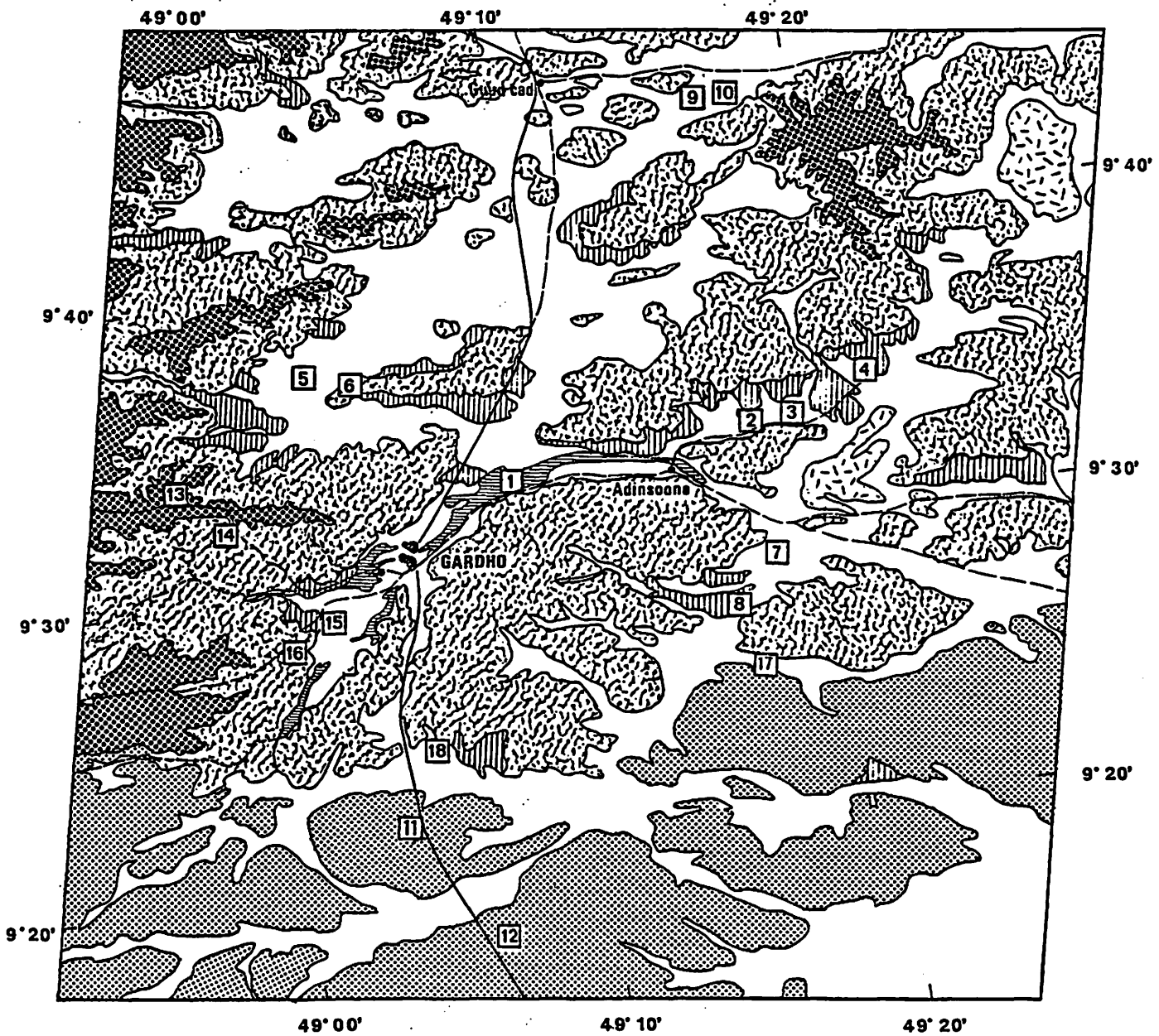
The treatment and the interpretation of satellite data were carried out in the laboratory on the basis of the information characterising the natural environment, including vegetation collected during the two works on the field.

According to the terms of reference of the mission, a cartographic document representing the spatial distribution of types of pastoral vegetation defined by the agropastoralist is given with this report. This document should enable the staff of the AFVP members to complete the work and the observations on the field.

However, considering the interest of the information collected because of to the originality of the Bari area, and considering the new capacity of data processing of the IEMVT, an experimental cartography project has been implemented. This work will lead, firstly to a new cartographic document which will be published, and subsequently to a note on pastoral interpretation.

MONITORING SITES LOCALIZATION IN THE TEST ZONE

1/400 000



Tabular plateaux

Rocky slopes

large plateaux

Alluvial cones and pediments

Valleys liable to inundation

Large plains an valleys

Siliceous hills

(1) (2) (1) hard surfaced road(2) secundary track

Chief town of distric and villages

1 Number of monitoring site

2° DESCRIPTION OF THE ENVIRONMENT IN THE DISTRICT OF GARDHO.

This concerns the test zone and its close surroundings.

2.1 - Local climate

The Bari area is located in the Northern intertropical zone, on the Eastern fringe of the African continent and it takes the form of a peninsula between the two vast stretches of sea, the Aden Gulf and the Indian Ocean; therefore the Bari area comes under a four seasons climate, alternately wet and dry.

These four seasons are:

- **GU** : spring wet season, from March until June.
- **HAGAA** : summer dry season, from June until September.
- **DAYR** : autumn wet season, from September until December.
- **JILAAL** : winter dry season, from December until March.

They closely regulate the pastoral life because the importance of the rain and the length of the rainy season are determining factors for the natural fodder production and therefore for breeding.

The type of climate, with two rainy seasons, is due to the movements of the equatorial low pressures zones following the apparent movement of the sun. It provokes a south-western monsoon in summer and a north-western monsoon in winter.(See table next page)

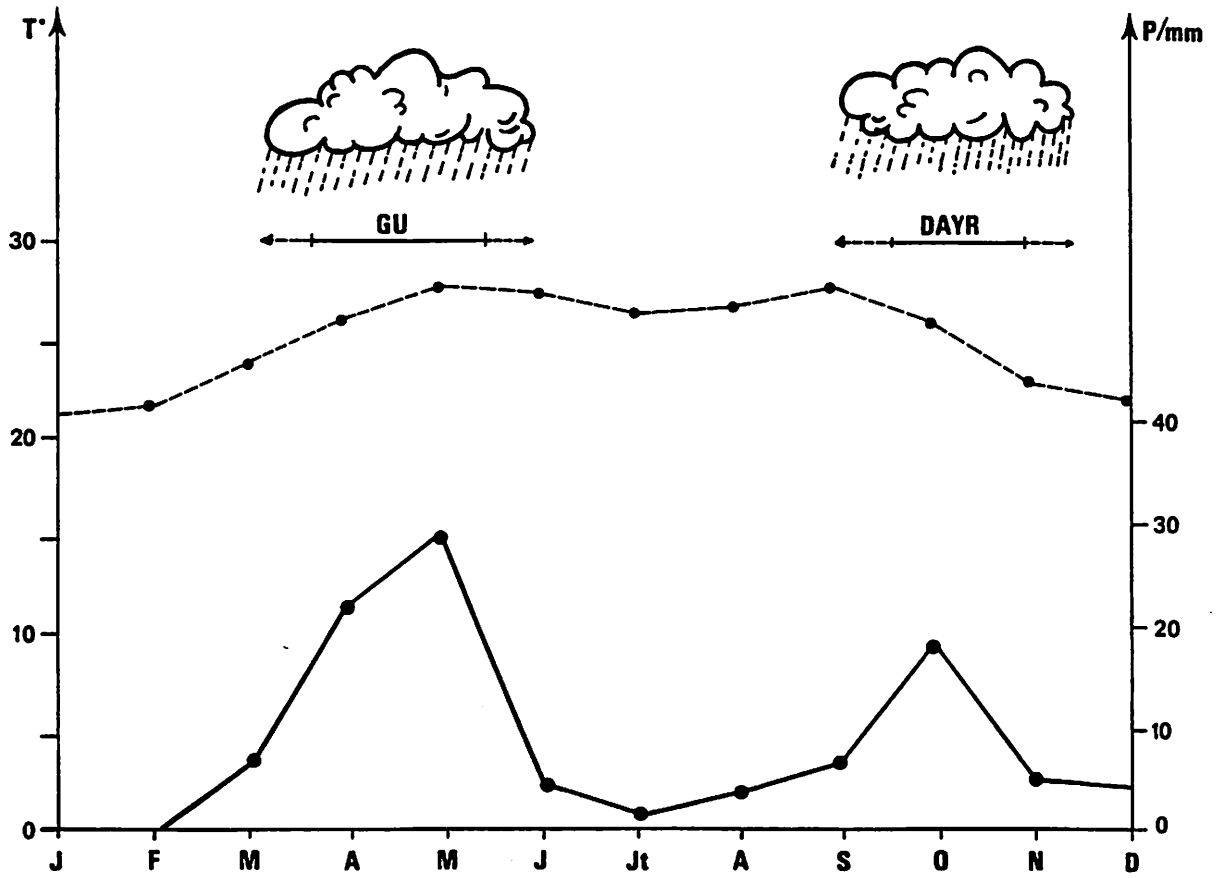
Low pressures can be found over the equator during the equinoxes (March and September). They move towards the North in spring and in summer, from March on, (rising of the intertropical front: ITF) and carry along with them, over the Bari area, the masses of wet air coming from the equatorial ocean area. This corresponds to the rainy season of spring: Gu.

Low pressures go back to the South in autumn and winter, from September on (descending of the ITF), "sucking up ", in a way, the North-East winds which correspond to the West African harmattan, and which arrive over the Bari area after a long crossing over stretches of water. There they fill themselves with humidity; this is the rainy season of autumn: Dayr.

These two rainy seasons are unequal, only Gu seems regular. Dayr is much more changeable in its duration and in the volume of the precipitations.

OMBROTHERMIC DIAGRAM OF MONTHLY AVERAGE RESULTS
(F. BAGNOULS and GAUSSEN 1953) from F.E.W.S. data

GARDHO
(Alt.720m)



They are separated by two dry seasons: Hagaa, in summer, is torrid (thus, in Bosasso, the temperature is said to exceed 50°) and Jilaal in winter.

In summer, the cities on the Aden Gulf's coast, situated at sea level, with no wind, and down at the bottom of the mountains, are so hot that the inhabitants migrate on a large scale towards the interior mountains. During this season, the local authorities leave Bosaasso and establish themselves temporarily in Gardho, which is less torrid since it is at an altitude of 720 m.

As a matter of fact, if the latitude factor is predominant as far as climate is concerned, the height and orientation of the sea coasts, the elevation, orientation and morphology of the mountains, the distance to the sea, determine numerous particularities.

Rainfall is the most important climatic factor for the development of pastoral vegetation, especially in dry zones. In the Bari area it is mainly characterised by its scarcity.

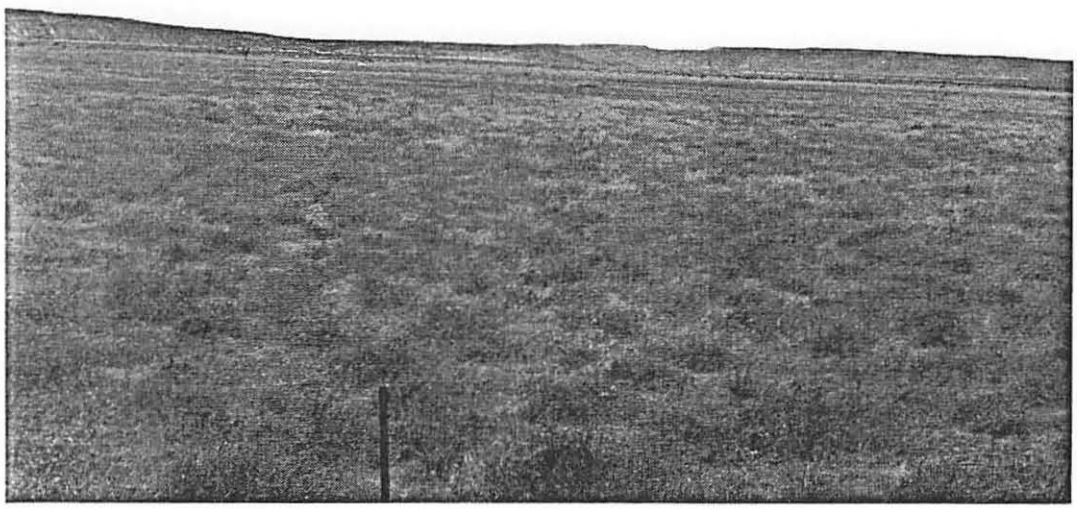
The ombrothermic diagram of Gardho illustrates the distribution of seasons, the monthly rainfall and temperatures. It is representative of the climate in the test zone (see diagram above).

Despite their relative reliability, the annual rainfall totals of the 11 Bari stations show that the scarcity of rainfall can reach an extreme limit, since they have been estimated equal to zero in some years. This proves that the climate is of a subdesertic type since, apart from the low annual rainfall totals, the gap between two rainy periods can exceed a year.

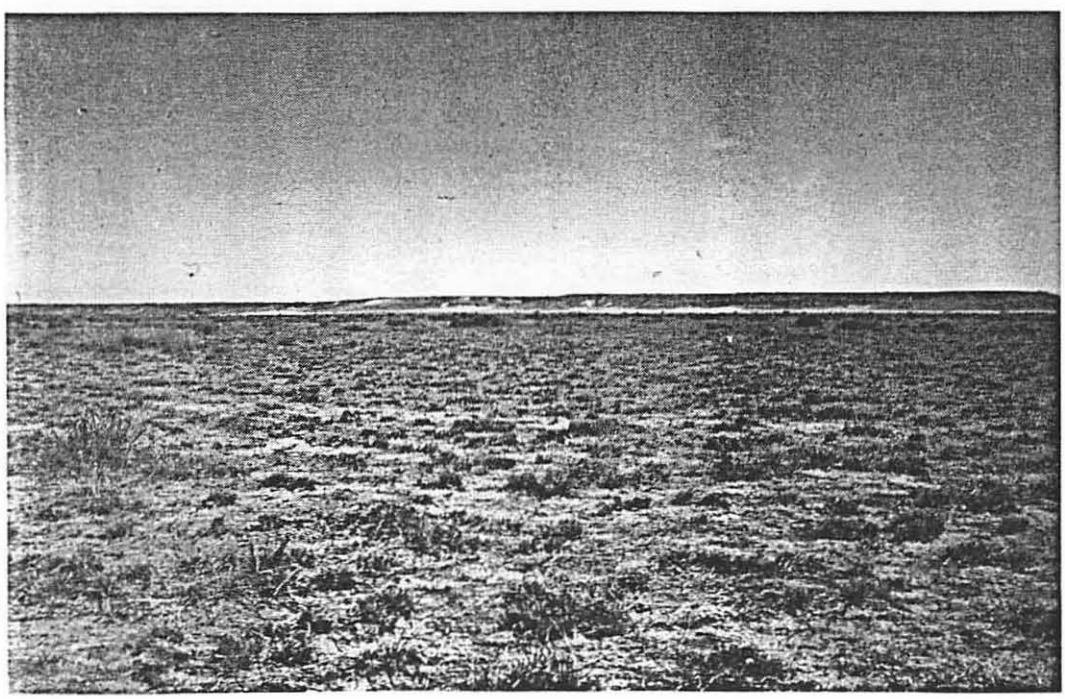
This will have a considerable effect upon the composition of the vegetation able to develop itself in an area under such hydric constraints.

Rainfall in Gardho (month.average, in FEWS proj.)

Month	mm rain fall	n° of days
January	0,2	0
February	0,2	0
March	7,0	0,4
April	23,0	1,1
May	30,5	2,1
June	4,4	0,4
July	0,7	0
August	3,5	0,6
September	5,6	0,8
October	18,4	1,7
November	3,7	0,1
December	2,7	0,1
TOTAL	99,9 mm/year	7,3 days/year



Vallet herbaceous grazing area; June 1988, (rainy season).
Site 1, near Gardho.



Vallet grazing area; December 1988, (dry season) in the South
of Gardho, near the site 18.

Therefore, 53% of the rains fall in April and May, which corresponds to the " large rainy season of spring" (GU).

2.2 - Geomorphology.

The test zone stretches on a whole of plateaux of tabular structure, composed mainly of limestone of the eocene Karkar formation. They are cut by valleys and more or less wide flat plains (2 to 4 km for the most part) filled with silty-sandy deposits of plio-pleistocene formations and forming deep soils. They slowly stretch down to the East with the network flow towards the ocean. However, apart from exceptions, the inclination is not sufficient for the rain water to reach the ocean.

The whole slowly rises from about 700m high in the South-West, to over 800m towards the North-East. The tabular surfaces of the plateaux are sub-horizontal, so that when they are sufficiently extensive the exoreic water flow is slowed down.

Locally, the vegetation consequently shows this difference in the substratum water balance. If the soil is suitable it presents a floristic composition which reminds one of that of the valleys and is different from that of the table-lands and of the slopes.

The limestone deposits are thick, very fractured, of karstic type; their very slow decomposition (owing to the aridity of the climate) does not permit the constitution, of soils favourable to the development of vegetation, at least not on abrupt plateaux and accumulation glacis.

On the contrary, the alluvial and colluvial transported by the erosion agents towards the bottom of the valley have created deep soils of fine texture, more favourable to vegetation. The shortage of watersupply limits the existence of mesophilic plants; the xerophilic plants dominate, but their life cycle is longer than any that the plateaux plants.

Concerning soil morphology (used as a basis for the exploitation of the satellite data), the main identified types which contribute to the definition of vegetation typology can be distinguished as follows:

- **plateaux on limestone deposits** (higher parts of the relief). There are two types:

- **narrow** : the flow of rain water is completely exoreic, towards the adjoining plains. Their outline is dissected, their summit is tabular with abrupt edges, with a karstic relief and little if any soil.

- **wide** : the flow of rain water is partly endoreic. The surface of the plateau is locally concave and a soil can form itself in this depression. These plateaux slope down to meet the valleys. They are situated in the South-Western part of the test zone.

- **Slopes and scree of plateaux edge.** The texture is extremely coarse, with a abundance of stones, no soft soil. The flow of all (or nearly) of the water received is exoreic.

- **Alluvial plains and lower part of the slopes,** below the scree. The texture is less coarse, there is a shallow soil and a sloping surface, so that the exoreic flow is important.

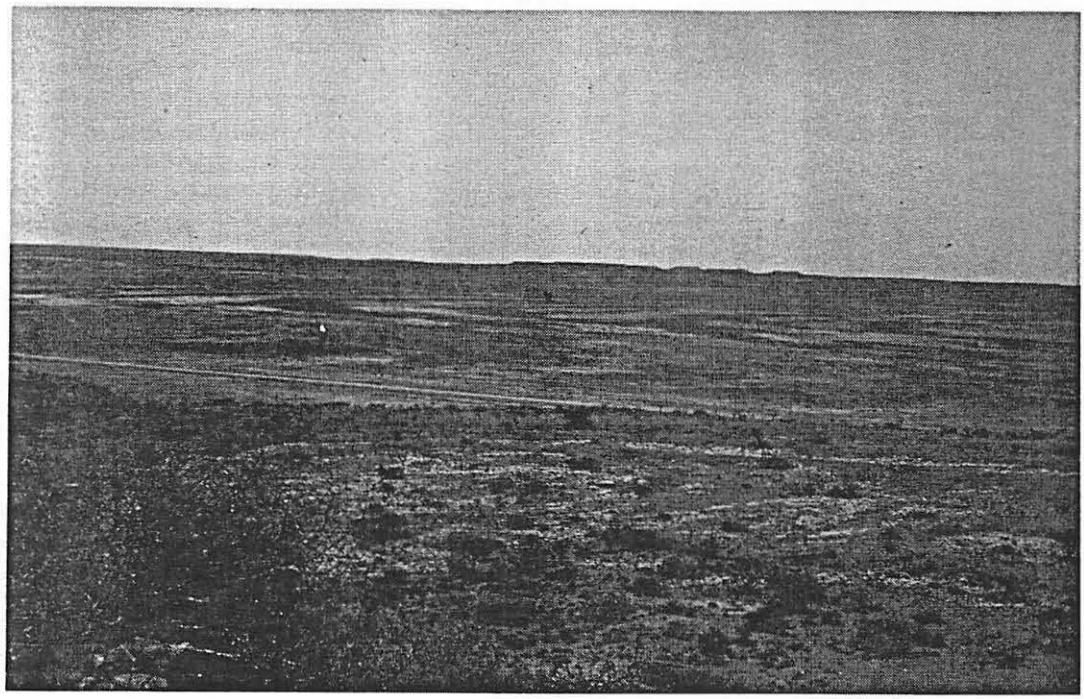
- **Siliceous hills.** The case is very rare in the test zone, constituted by sizeable rounded hillocks of siliceous nodules. Contrary to the limestone relief, there is no edge escarpment. They look down from over 10 m upon their immediate surroundings, and due to their rounded outline, they correspond at the same time to summits, scree and slopes. Their very coarse texture, made out of bare stones, does not retain water, so that there is no surface soil and little if any vegetation.

- **Alluvial cones** . They correspond to delta cones of loose deposit elements, the summit of which is situated at the opening of a wadi ravine on the valley. These small elements have been torn away by the wadi from the relief during their active phase, at the time of the rainy season. Generally only relatively small elements are transported and form rapidly a deposit. This is because the stream of the wadi loses its power as soon as it spreads out, emerging from the gorge.

These deposits have a marked sloping surface and the rare perennial vegetation which takes root there are arranged in line with the stream and never develop well (brief submersions by a violent stream, sandy-soil made impermeable, small infiltration). During the rainy season, annual grasses develop there.

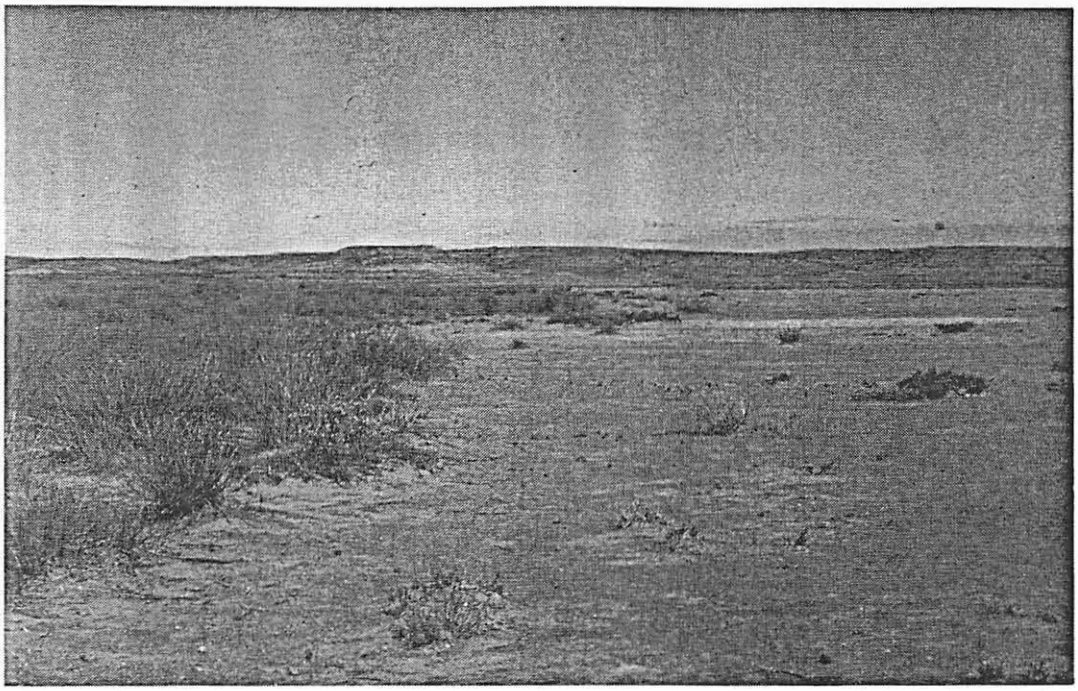
- **Valleys (or plains).** The distinction is based on the width and the length of the slope.

. **valley** : relatively narrow passage, delimited between mountains from which water flows which notably influences the hydrous balance of the soils of the whole valley.

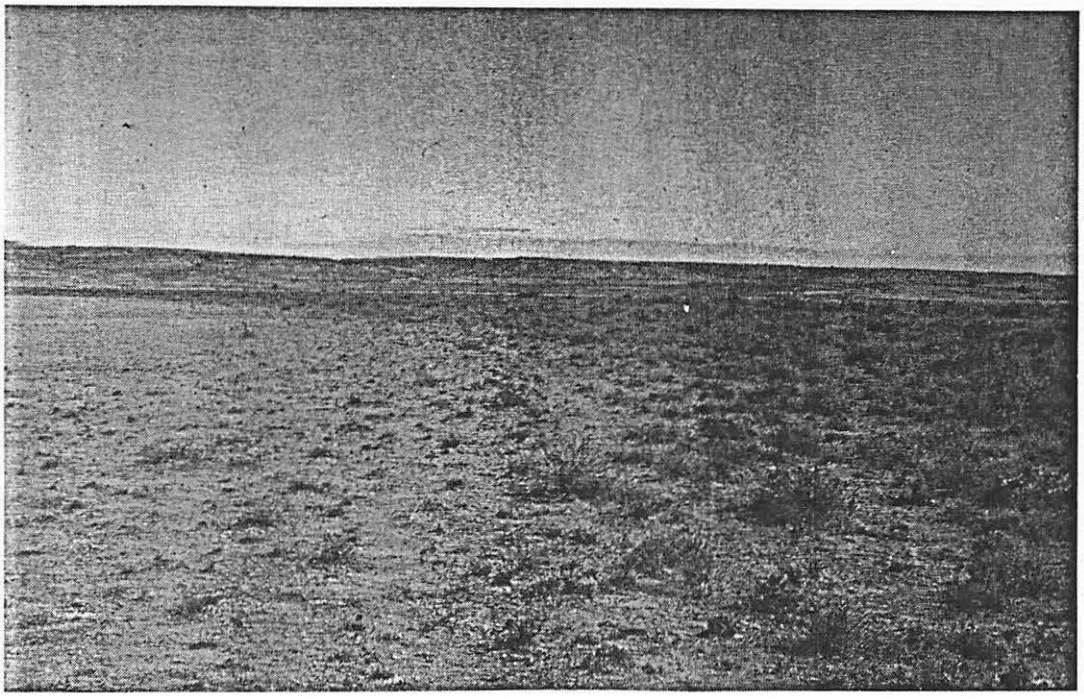


General view of the wadi valley below Gardho.

- foreground: fringe of limestone plateay and rock versant
- middleground: the "vegetation arcs" characterizing this Bari area.



Up-stream front of a vegetation arch.



Downstream side of a vegetation arch.

In the extreme case (for instance the Gediyo wadi to the west of Gardho), the valley is rather narrow and receives a rather important stream during the rainy season. It thus becomes flooded for a more or less long time. The vegetation, occupying the soils thus flooded, can be specific and constitute a particularly interesting pasture.

. **plain** : characters identical to those of the valleys, but the plain is much wider, so that the water flow, coming from the adjoining relief, influences only the edges.

The central part of the plain, as far as the water in the soil is concerned, therefore has a behaviour quite similar to that of deep soils in general. (Including the filling in of depressions on plateaux.)

. **plains and valleys with "vegetation arcs"**: in some cases the lengthwise slope associated with the texture of the silty-sandy soils, determines the appearance of vegetation in the form of relatively regular successive arcs across the dierction of the flow. Their spreading is so important that they are hardly observable from the ground. However, they appear very spectacularly from an vertical aerial view.

2.3 - Hydrology.

The district of Gardho does not have any permanent surface water. Due to its geomorphology and the lithological nature of the rocks, the flow is very important after the rain. The valleys can then be violently flooded for a variable period of time, usually short.

All water courses are wadis; their flow is not very durable, sometimes violent and limited to the rainy season. Except during an exceptionally rainy year, no water is reached the Indian Ocean; all of it infiltrates locally, in the plains, where the stream looses its power as soon as it can spread out.

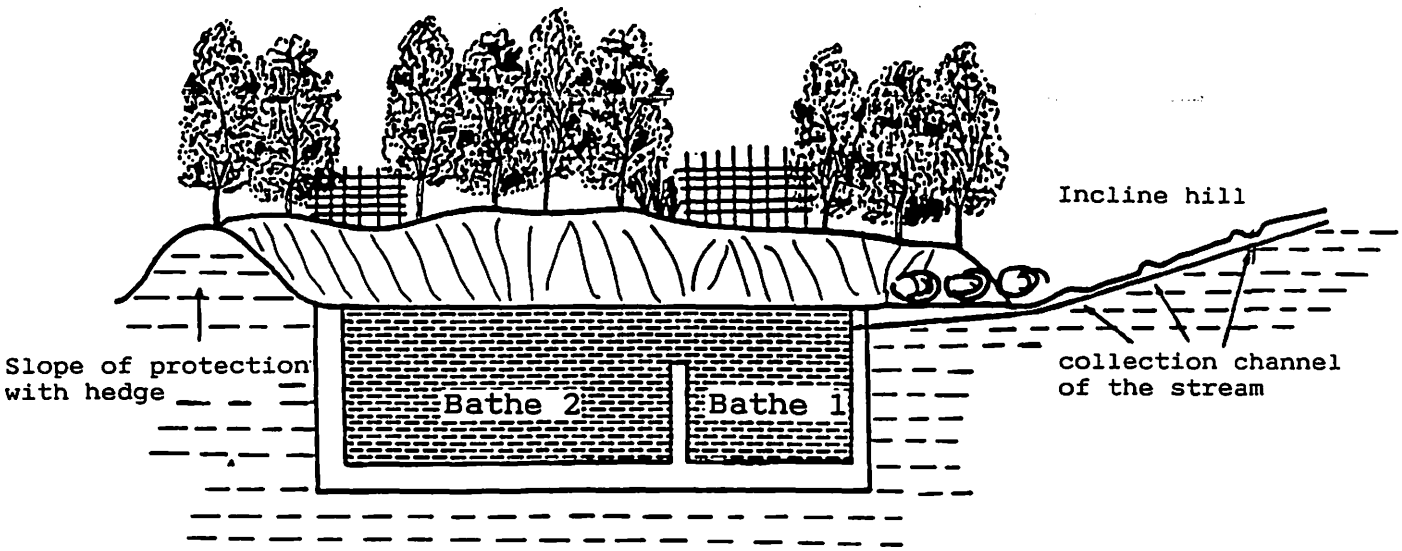
Therefore the possibility of supplying the livestock with surface water (wadis or pools) lasts only a very short time.

Since there are so few borings with pumping stations in the area, the underground water is also likely to be rare or hard to locate and to harness.

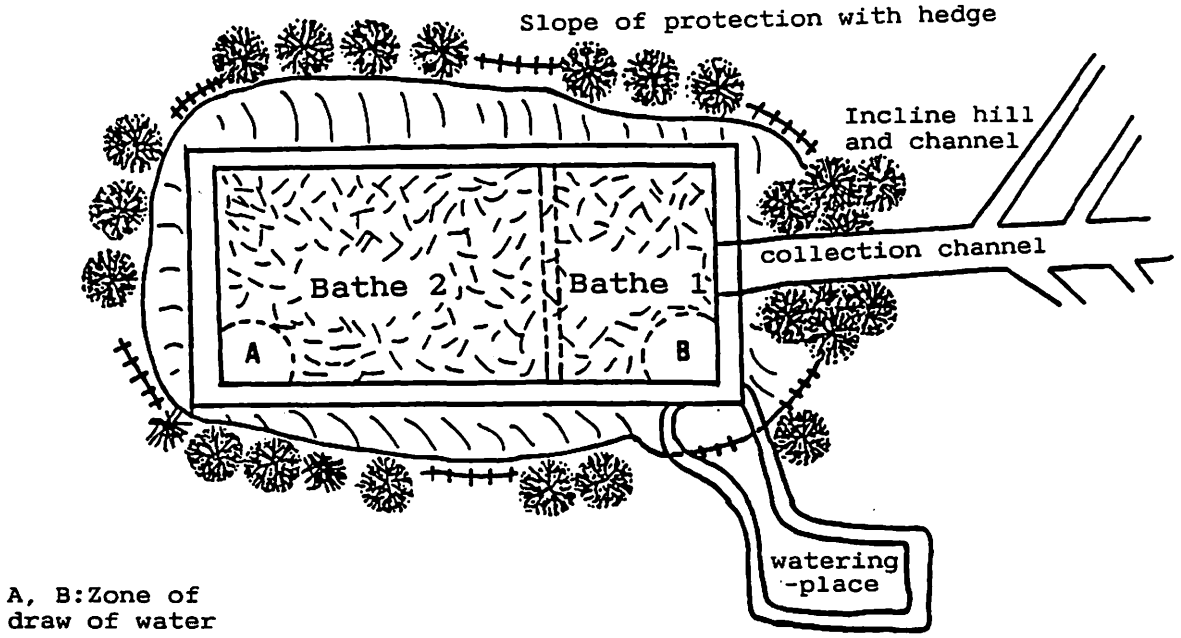
Thus, in order to supply the livestock with water, people set up various structures which collect and accumulate rain water.

The most common in the district of Gardho is called " BARKHAD " (cf sketch of a Barkhad next page).

S K E T C H O F B A R K H A D



Cutting



A, B:Zone of draw of water

Shight of above

It is a tank in the ground (like a swimming pool) with cemented walls and an uncovered surface, built down at the bottom of a silty-sandy slope.A number of rainfall collecting canals or drains, spread fan-wise following the hill-side, converge on it. Hand dug in a non coherent substratum they are quickly damaged and must be frequently renewed.

An improved version, in addition to its bigger size (a few hundred cubic meters) has two successive reservoirs separated up to half their height by dividing wall, as a threshold.

The objective is allow the solid material to settle in the first basin then let the water pass without turbulence over the wall into the second basin where the water will therefore be clear.

After emptying the tanks are cleaned out before the following rainy season. A cover of branches, roughly network disposed on a wire gives shadow to the tank in order to reduce evaporation. A hedge, of dead or live plants, is planted on the wall of earth which surrounds the barkhad, in order to prevent the livestock from approaching.

It is private property and contains enough water (in normal conditions of filling) to meet the needs of the user and his herd, during the whole coming season. All the villages in the Gardho area have numerous barkhads without which permanent settlement would not be possible.

Marty (1985) counts 15 barkhads in the village of Kob-Dexaad (west of Afeyn), Rousvoal (1986) counts 23 of them in the hamlet of Rako-Baaxo (east of Gardho) where the livestock is numerous.

To be used the water is drawn; the watering-place is a few metres away in order to prevent damage and dirt.

2.4 - The breeding

Breeding livestock is the basic economic activity for the production of resources in the area. The constraints proper to the environment fully justify this vocation.

Apart from this consideration, a certain diversification of resources generally takes place at the time of the frankincense gathering (sap of Boswellia carteri Birdw. and B. frereana Birdw.), the collecting of wood, charcoal, the making of lime, commerce, transport, hand-work and temporary wage-earning, as well as to the exodus towards the cities or foreign countries.

Breeding livestock, which is very important, is essentially in the hands of the nomadic tribes, because both families and herds move according to the hazardous pluviometry, in search of pastures. This is the reason for which their migrations are unpredictable.

However, like the nomads, many sedentary people keep livestock, either directly close to the agglomerations where they live, or indirectly through part of the family which stays in the bush with the animals.

The division of the work in the family is rather stable: women take care of the small livestock; young children keep the herd of dairy goats which remains near the camp and comes back every evening for milking; teenagers are in charge of the animals which do not come back every day; finally a group with at least an adult looks after the "nomadic" herd and stays permanently with them in the bush.

The family herds can be put together (or, in some rich families, divided) into groups of 200 to 300 goats or sheep and can be looked after by 2 to 4 children.

2.4.1 - The herd management.

Contribution of MM. J.M. Reynes, P. Chastin, A. Bellinguez, volunteers of the AFVP/project Oasis (Gardho Dec. 1988).

Total numbners and family size.

Among the 6 districts constituting the Bari area, the Gardho one contains the most important animal population. Its census has been carried out from December 1986 to March 1987 by the agents of the "AFVP/project Oasis".

21 villages out of 25 in the district have accepted to answer the questionnaires. The results will have to be added to.

The city of Gardho was not taken into account because every owner who lives there is attached to another village.

The results obtained by this census (1986-87) in the district of Gardho are the following:

	Number of units	Number of owners
Sheep-goats	1 186 221	2 072
Camels	106 703	1 837
Cattle	10 405	397

Most of the time sheep and goats are grouped, especially in plains and when the number of shepherds are insufficient. However when the goats graze the slopes (they are the only ones able to make use of these), the sheep are kept separately in the plains.

The phenomenom is reversed for dromedaries which are grouped into herds of several hundred units and entrusted by their owners (who generally belong to the same family) to a camel-driver.

From that time on the females with calves, the non lactating females, the growing young animals and the adult males are generally separated into different herds.

The cattle are kept near the villages where they come back every day to be watered and eventually milked. They nearly always benefit from particular pastures which correspond to reserved zones (enclosed) benefiting from streaming water during the rainy period.

The migrations

The quasi-totality of herds in the district of Gardho are nomadic. Only a number of small herds of dairy goats and cattle graze around the village where they come back every evening.

The migrations of the herds do not follow precise rules, but vary according to the meteorological conditions.

Nevertheless, a few types of behavioural patterns can be defined, on the one hand concerning the small ruminants, and on the other concerning the dromedaries.

The small ruminants are very dependent on the watering possibilities and their migrations take into account the availibility of water. For one or two months during the rainy season, they are satisfied with the water of pools, or even with the water of the vegetation, if it is very fresh. The grazed zones can, in that case, be situated far from the watering points. During the dry season, they are forced to come closer to the village and to drink every 3 to 6 days; at the same time they consume the fodder-plant reserves, constituted during the rainy season.

As to the small ruminants (the behaviour of which is well-known), there are 3 types of migrations:

- In the North of Karkar (relief in the centre of the Bari area), during the rainy seasons of spring (Gu) and autumn (Deyr), they graze the Daroor depression. During the dry season they go into the mountains of the Karkar, the Cal Madow and the Cal Miskat.

In 1981, by aerial observation, R. M. Watson counted 1 803 000 small ruminants, 109 000 camels and 7 000 bovines.

A census realized in 1985 (source R.N.A ?) counted the following numbers:

Population	District of Gardho	Bari region
Sedentary population	11 150	48 000
Nomadic population	14 820	101 000
Dromedaries	104 350	240 200
Cattle	6 630	14 900
Goats	195 600	1 098 000
Sheep	141 700	1 388 000

These numbers show a remarkable consistancy for the dromedaries and the cattle but apparently cannot used for the sheep and the goats.

This can be explained by the difficulty of counting the number of small ruminants or by the fact that in 1975, during the dry period, the latter had left the region to find refuge in the mountains.

On the contrary, the dromedaries have not left the district in great numbers because they are adapted to endure a certain degree of aggravation of the aridity; as far as the bovines are concerned, their breeding is very "sedentarised" and their incapacity to migrate sets them apart from the traditional animal husbandry system.

As to the dromedaries, we have to point out the fact that Somalilia, with over 6 million units, holds a third of the world population. Most of these animals are in the grazing area situated in the centre and the North-East (Bari) of the country.

The average number of animals per owner is very high: 570 sheep and/or goats, 51 dromedaries and 5 bovines. The maxima evaluated have been 8 800 sheep and/or goats, 1 500 camels and 200 cattle !

Breeding methods

The big flocks of small ruminants are divided into groups and they are herded by women or by other members of the family. Thus the herds kept together are of medium size, less than the number of animals per owner, 300 sheep and/or goats approximatively.

The most common species are: **Rhipicephalus pulchellus, R. sanguineus, Amblyomma lepidum.**

It is noticeable that apart from manual removal, the parasites then being burnt, there is actually no traditional treatment.

2.4.2.2. Contagious caprine pleuropneumonia (CCPP).

CCPP is very frequent during the dry season; it represents the second cause of mortality between birth and 1 year old.

The nomadic population traditionally protects goats against this disease by applying a piece of pulmonary lesion on an incision on the forehead of the healthy animal. But this practice, just as the small pox practice, often leads to an aggravated form of the disease, which is accompanied by a high mortality.

Nowadays, the disease is successfully controlled by I.M. injections of antibiotics (terramycin).

It must be noted that the nomadic population often confuses CCPP and lung worms.

2.4.2.3 Viral diseases

This first of all concerns sheep pox and goat pox, which come back episodically but which has been particularly intense this year 1988.

Foot and mouth disease: an important outbreak has appeared in October 1988 and has quickly spread. It came from the city of Daxar where the animals were concentrated because of the importance of grazing and the existence of ponds.

Rabies exists, although it is rather rare. The main carriers are hyenas and jackals.

2.4.2.4. Bacterial diseases

The most common are footrot and CCPP (of course). Tuberculosis may exist, especially among the cattle, but we have never seen it. Studies are now progressing at the G.T.Z., in Beled Weyn; swabs for the obtention of tuberculosis have always been, up to now, negative.

On the other hand we have been able to identify on animal suffering from CCPP: **Mycoplasma mycoïdes var capri** and **Mycoplasma agalactiae** (G.T.Z. analysis).

Some cases of anthrax (kud) have also been observed.

- In the South of Karkar, towards Gardho. They are regrouped during the rainy season on the Sool plateau (west of Gardho) and come closer to the villages during the dry season.

- In the East of Gardho the stock-breeders tend to stay near the villages, except at the time of the winter dry-season (Jilaal) during which they go towards Bender-Beyla. It is a coastal district where there is sometimes rain in November and December.

- In the South of Gardho, at springtime (Gu) they migrate towards the East, in the triangle: Dangoray, Ceel-Buh, Daxan. Then they come back to the village in winter and summer (Jilaal and Hagaa) after having spent the rainy autumn (Deyr) on the Sool plateau.

We do not know much about dromedaries, except that they systematically avoid the montainous zones and tend to go further and more frequently towards the East, in the coastal plains of the Bender-Bayla district.

The herds of males and dry females are also more mobile than the females with calves (because of the lesser resistance of the calves), in order to permit the commercialization of the milk in the villages or along the roads.

2.4.2 - Animal pathology.

(by Ph. Durand, AFVP veterinary, Gardho 1988)

Pathology of the small ruminants in the district of Gardho

2.4.2.1. Tick-borne diseases

The most important constraint is constituted by the tick-borne diseases. It is pathologically the most frequently mentioned by the nomadic population, under the general term of "Majooga". However the symptoms are always ambiguous and it is very difficult to distinguish Babesioses, Anaplasmoses, or Rickettsioses.

These TBD (tick-borne diseases) are one of the major causes of mortality of the young animals (below 1 year), with diarrhoea and malnutrition.

Today the prevention against the tick "**shillin**" is carried out by a prophylaxis using the toxaphene through dipping or spraying. Surveys are implemented by the project through blood-sampling in order to estimate the degree of infection, especially for Babesia.

2.4.2.5. Parasites

Most of the animals are carriers of intestinal parasites. Coprologies have enabled us to find eggs and larvae of strongyles; but more precise identification has not yet been carried out.

Lung worms also occur and they are probably responsible for most of the chronical coughs.

Summing up of the importance of diseases among small ruminants

This summary is the result of the exploitation of data during a year of herd monitoring in the district of Gardho.

*** Mortality among young animals.**

- 0 to 30 days.

Sheep 9,5 %, goats 14 % . This low percentage can be explained by the attention given by women to the young animals.

By order of importance, the main causes of mortality are: malnutrition (50%), diarrhoea, predators, ticks and tick-borne diseases.

- 0 to 1 year old.

The mortality seems important among the young goats (47%), and results from the very early weaning because goat milk interests the breeders, as well as the incidence of CCPP, lower (19,5 %) among sheep.

The causes are: CCPP (except in sheep), tick-borne diseases, predators, lung worms, diarrhoea, malnutrition, and ecthyma.

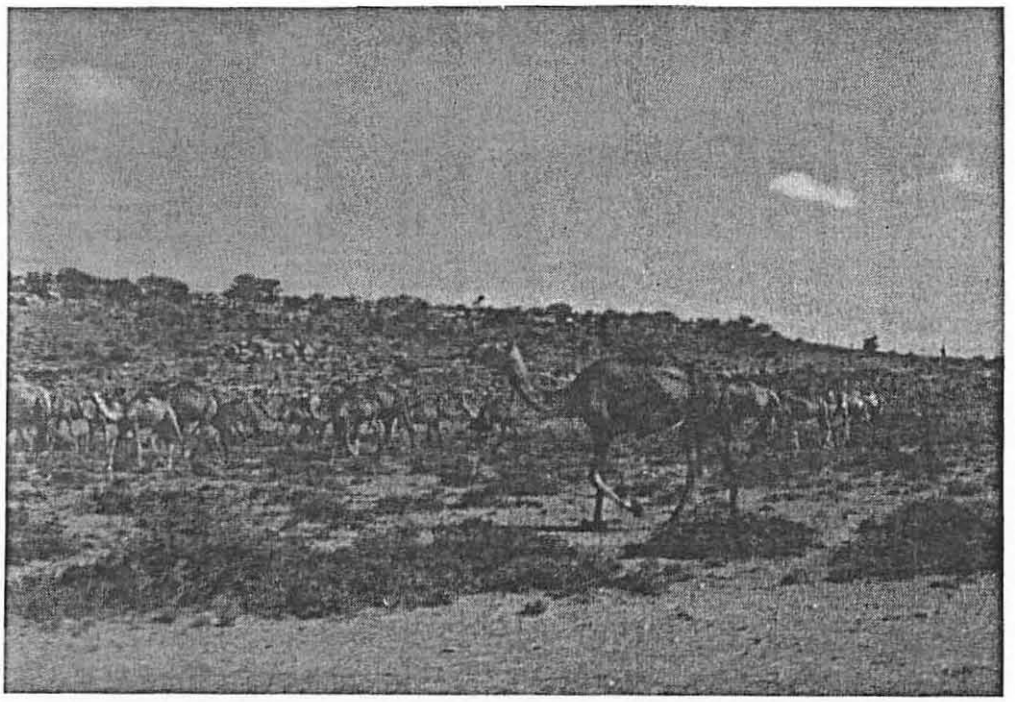
*** Mortality among adults.**

Among the females the mortality is 21,1 % for goats and 18,6 % for sheep.

The causes are: tick-borne diseases, CCPP (caprines), lung worms, predators and others.

Concerning dromedaries

The environment of the camel is hard to enter in Somaliland because of its secret character (one's bank account is not publicized.)



Dromedaries arevery numerous in the Nord of Somaliland.

The dromedary can browse bushes, even the more thorny ones (acacia for instance)

Therefore requests to investigate dromedaries have been very few. However, important morbid entities can be observed:

- camel mange: it is usually cured by a plant concoction (collective name: WAME) in gravy, put on the lesions,
- trypanosomiasis (DUKANKAA),
- camel pox,
- anthrax,
- foot rot,
- mastitis,
- paralysis of the hind legs.

Diarrhoea in young camels is rarely mentioned.

(Note: a specific bibliography to this chapter is given by P. Chastin and J.M. Reynes.)

2.5 - Vegetation

Phyto-ecological studies concerning the Bari area have been carried out by Hemming (1973) and Watson (1981). The first ones have been done out by prospections in 1959 and 1970, and those by Watson by partial prospections completed by aerial reconnaissance and remote-sensing of landsat images registered during two seasons (1979 and 1980).

Both lead to a description of the main types of vegetation developed according to the environment. In view of the immensity of the field concerned, they do not go into details, although the land unit adopted by Watson ("land systems unit") can be compared to phytosociological ensembles of high rank.

Despite its importance, R.M. Watson's work remains insufficient to deduce a detailed cartography as he says himself:

"... 695 monitoring sites have been examined. Although this represents a considerable field operation, it is entirely inadequate as a basis for vegetation mapping, which has been accomplished by more extensively..."

In the case of our pastoral study, Watson's work is interesting because it contains, at least for the sites he has studied on foot, floristic lists to which it is sometimes possible to compare our surveys.

However, since he has worked during the dry season (it was almost impossible for him to move during the rainy season), these lists reflect an abridged floristic composition; there are no short-lived plants, nor unidentifiable ones.

In addition, some lists have been established not directly from the field surveys, but from a reconstitution based on notes (he does not tell the type of notes), from Somalia vernacular names and photographs (probably aerial). They must therefore be used with precaution.

Note : Watson's surveys, which correspond to his observations in the test zone area, are those numbered from 1 to 22, 29 to 32, 65 and 66, 114, 135 to 138, 712 and 713. (Among them, numbers 4 and 7 to 16 were "reconstituted" without direct observation.)

The detailed study of the vegetation in the permanent monitoring sites, established in June 1988 in the test zone, is the object of the following part of this report.

In the district of Gardho, if the different types of grazing are taken into account, the plant formations that are important in the pastoral field, are distributed into a few groups. The latter can be described in a more detailed manner than did the former authors.

The floristic composition of these groups is closely conditioned by the stational and pedological characters. It leads to a classification according to a "continuum" going from the most arid heights to the most easily flooded depressions.

The formations of vegetation which correspond to the main types are the following:

- vegetation of limestone plateaux and siliceous hills (2 aspects: with generalised skeletal soils or locally fairly deep soils).

- scree vegetation (rocky slopes on the relief fringe).

- vegetation of gradual slopes on the plateaux fringe, with sometimes a deep, but always very rocky, soil.

- alluvial cones, with a soil of fine texture, generally deep and with a gradually sloping surface.

- vegetation of valleys and plains (with 3 distinct aspects: a. intensively grazed zones, b. less intensively grazed zones, c. exclosure zones (on the soils of the lowest parts liable to flooding).

As far as these two latter types are concerned (they are the most important ones for grazing) our observations carried out in June and December 1988 confirm those of Hemming and Watson. Indeed their vegetal formations belong to the groups situated on rather deep silty-sandy soils (and not clay soils).

The characteristic plants are the following:

- Acacia Bussei, Boscia minimifolia and Commiphora spp as to shrubby trees and bushes..

- Schizachyrium kelleri (ex. Andropogon kelleri), Chrysopogon plumulosus (ex. C. aucheri), Dactyloctenium robecchii and Dicanthium annulatum, as to the perennial grasses.

There is an abundance of Duosperma eremophilum and other acanthaceae in the permanently overgrazed sectors, and of Dicanthium annulatum and Paspalidium sp. in the low parts liable to flooding; their soil is clayey-silty-sandy.

The other 3 types of environment, on skeletal type soils, are characterized by the abundance of:

- Commiphora spp. and Boswellia sp. on skeletal type soils of the plateaux,

- Acacia leucospina, Jatropha sp. on colluvial type soils of scree,

- numerous fleshy, succulent cactiform species which are most often thorny. They are always unedible and their sap (latex) can be very toxic. They are Euphorbiaceae, Caralluma, Aloe, Adenium, etc...

3 - THE PASTORAL VEGETATION

3.1 - The monitoring method

The monitoring method for the pastoral formations is based on observations done at precise intervals of time on the 18 sites set up in June 1988.

The observations done on each site concern:

* - the parameters describing the environment.

- morpho-pedological characteristics
- topographical position
- apparent hydrous conditions (rain, water-flow, probable infiltration)
- type of soil
- apparent grazing pressure.

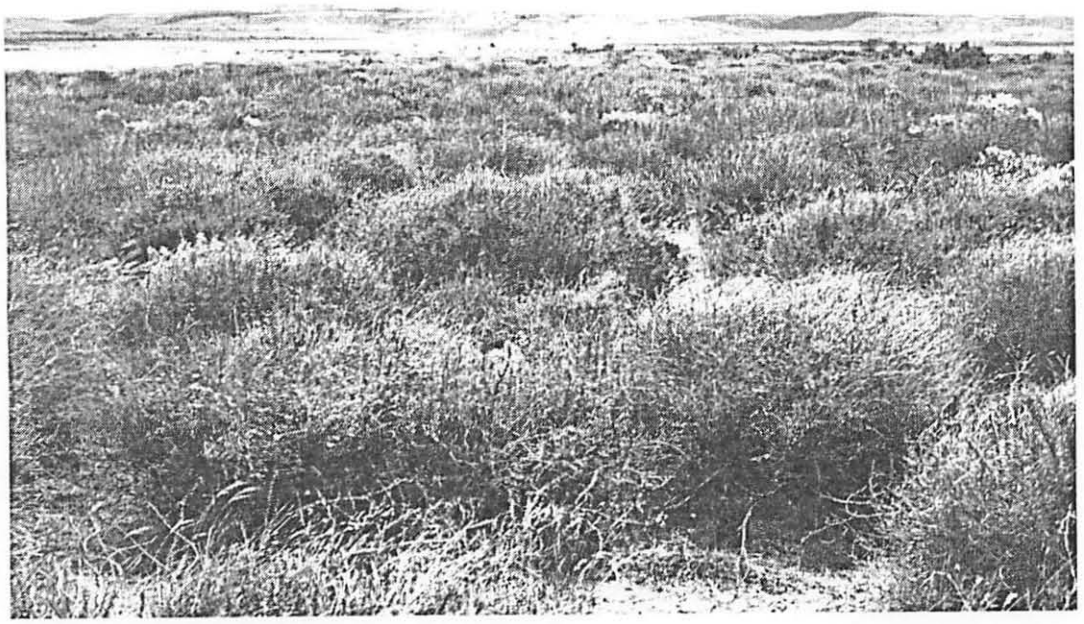
* - the floristic composition.

The list of plants existing in the site perimeter is established during each passage and there is, for each species, a notation concerning:

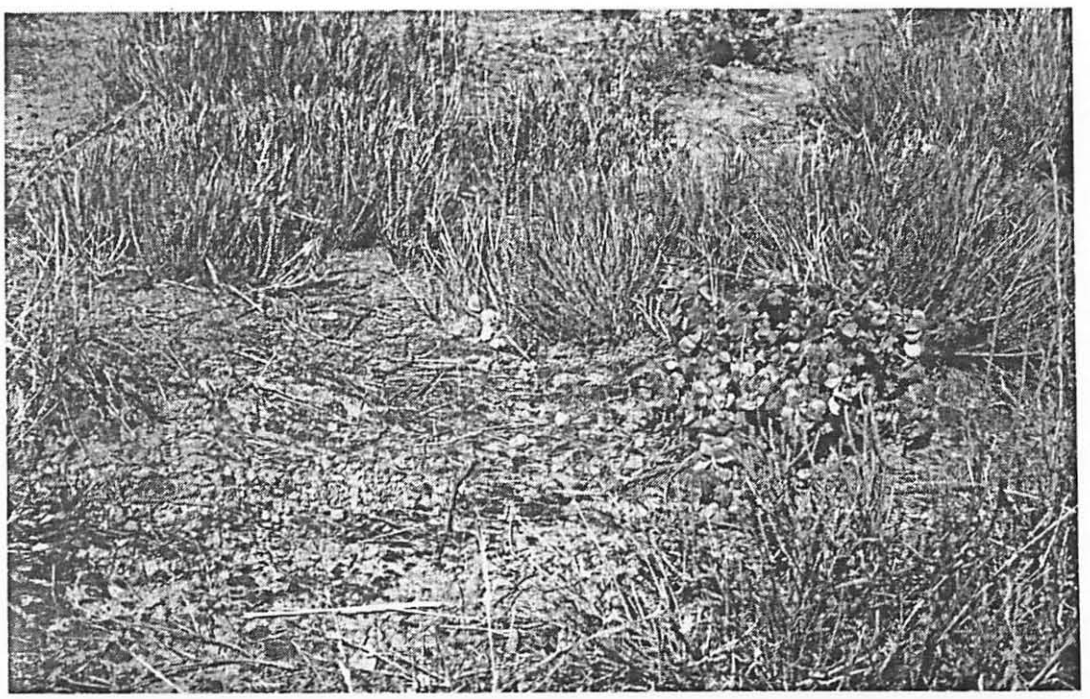
- the biological type (tree, bush, perennial or annual herbaceous...)
- the height of the plants (cm or m)
- the abundance degree of cover (grades range from "+" to "5", according to the classical gradation, which means that "+" corresponds to a rare species whereas "5" is for a species occupying nearly the entire space)
- the phenological stage (vegetation, flower, fruit)
- the apparent edibility (if possible)
- the vernacular name (if possible)

Note: the establishment of a complete floristical list has come up against the previous weak knowledge of the plants in the area. The new aspects of this flora have been aggravated by the absence of systematic works concerning the plants of the area and by the lack of reliability of the vernacular names given by our informants. Besides, between June and December, and even from one floristic list to another, the vernacular names did not always correspond, even for the common species.

An example of the lack of reliability of the vernacular names is given in appendix with the Commiphora spp. named "Xagar" (the word can also be spelled differently).



Valley grazing area. Middle of a "vegetation arc" with perennial graminae, near the site 3. June 1988. Schizachyrium kelleri (big clumps) and Chrysopogon plumulosus.



Detail of the site 1 December 1988. Very grazed clumps of Panicum coloratum, Senra incana (on the left) and a big proportion of bare soil trampled between the clumps.

* - measure of the frequencies of the representation of the plants and of the bare soil in the site by using contact points.

The method consists of making a "contact-sounding" every 20 cm along 2 lines 20 m long, established by using a double decametre stretched between two posts set up on the site. (200 sounded points). The countings are then translated into percentages of contacts for each species and for the bare soil.

* - estimation of the biomass.

When it is not impossible (according to the period or to the pasture) an estimation by cutting - weighing - drying of the plants is performed:

- either for the aerial herbaceous biomass
- or for the edible plants' biomass

Actually in the conditions proper to the area of Gardho (cutting being technically very difficult and a marked overgrazing) and because of the floristical composition of the vegetation during the dry season, this last measure was not carried out on each site.

3.2 - Typology of the vegetal formations

Let us be reminded that these 18 sites (cf. IEMVT/ Forgiarini 7/1988 and test zone map, preceding page) are distributed as follows:

. 10 in plains and valleys,
. 1 on an alluvial sewage cone
. 2 on the lower part of the slopes
. 4 on limestone plateaux
. 1 on rocky slopes.

3.2.1 - Plains and valleys.

The 10 sites (n° 1, 2, 3, 5, 7, 9, 10, 15, 17, 18) situated in the plains and valleys represent the most important grazing areas, as to the occupied surface (38,5 % of the area of the test zone - cf. next chapter) as well as to the fodder value of the vegetation and the accessibility which depends on the nature of the ground and on the existence of watering facilities for animals.

The two major peculiarities which can contribute to differenciate these 10 sites and to influence the pastoral value and the probable dynamics of their floristical composition are the following:

a) the proximity of a village and of the corresponding watering point; it determines the degree of overloading supported by the range of the sector.

b) the fact that the concerned pastoral sector is liable to inundation. This case concerns only 1,5% of the total surface of the valleys and corresponds to about 20 square kilometers in the test zone.

The trees and bushes typical of the station (although they are rare within the perimeter of the site) are the following:

Species	relative freq.	somali name
Boscia minimifolia	frequent	MAYGAAG
Cadaba glandulosa	occasional	GALANGAL
Cadaba rotundifolia	occasional	GALANGAL
Ziziphus hamur	occasional	HAMUR
Acacia bussei	occasional	GOLLOL
Jatropha sp	occasional	TARRAXO
Acacia tortilis	rare	QU HAC

As far as the herbaceous plants are concerned, the list of the main species corresponds to the usual floristical enumeration of the silty-sandy soils found in the plains and valleys in the Gardho area. A typical list is the following :

Plants	Pres. N.	Edibil.	Somali name
Sporobolus ruspolianus	17	VE	SAFAAR
Sericocomopsis pallida	15	NE	GEED CAD
Schizachyrium kelleri	14	VE	DOUR
Chrysopogon plumulosus	13	VE	DUREEME
Dactyloctenium robecchii	12	E	GUBUNGUG
Neuracanthus sp.	11	NE	REKO
Panicum cf. coloratum	9	VE	GALGALO
Arisida spp.	9	VE	XARFO
Leucas urticifolia	8	NE	FOOD CADE
Thamnosma hirschii	7	E ?	WANI IQ
Cenchrus pennisetiformis	6	VE	GAROW
Duosperma eremophilum	5	NE	SAARIN
Senra incana	4	NE	BALANBAL
Blepharis ciliaris	2	NE	YAMARUG

The figure (2d col) corresponds to the number of findings in the 20 site soundings (10 in June, 10 in December); (VE, E, NE = very edible, edible, non edible).

The detail of the floristical lists is given in appendix.

The uncertainty as to precise identification of some of rare plants is the reason for which we have limited our "type lists" to the list of main species. Their specific determination has been checked in the IEMVT laboratory of taxonomy.

Pastoral value

The good pastoral value of the formations of the plains and valleys is corroborated by the influx of herds. It is due first of all to the relative abundance of perennial grasses, which, during the dry season, are the basis of the fodder ration. Secondly, it is due to the abundance of edible bushes which are very important for the feeding of goats and dromedaries.

The abundance coefficients of these plants are, for instance, high for Panicum cf. coloratum, Schizachyrium kelleri, Dactylotenium robecchii, Chrysopogon plumulosus, Sporobolus ruspolianus during the dry season and for Aristida spp. (annual) during the rainy season. All these grasses are very edible, and most of all when green.

The evaluation of the biomass of grasses during the dry season has led to estimate the production:

- **from 1700 kg/ha (site 8, with a dominance of Schizachyrium) to 4000 kg/ha (site 1 with a dominance of Panicum) of dry primary herbaceous biomass (straw and branches), corresponding to the less degradated herbaceous stratum.**

Out of this production, only 20 % at best is edible because it is still sufficently green, in december; this means 150 to 360 **Fodder unities** per Ha (FU/Ha) are available for the animals able to glean them in such a dense but dry bushy vegetation.

- **to 3850 kg/ha of hay with a poor food-value in average** because it is harvested too late (Dicanthium, Paspalidium, Sporobolus, Cynodon,etc...) in a protected patch of land liable to inundation, near Gardho; **this means 1600 FU/Ha** which are disposable only if there has not been any permanent grazing before the harvest (as it is the case out side the exclosures).

In some sites, the remarkable abundance of acanthaceae (Duosperma, Neuracanthus, Barleria) together with Sericocomopsis and Solanum, plants which are usually not consumed (although they are occasionally grazed by dromedaries and goats) shows the degradation by overgrazing.

These damaged sites generally correspond to the areas closest to the watering points during the dry season.

In this group of plains and valleys, the rate of bare soils (empty space separating the plants during the dry season) is the following:

Site N°	% Bare soil	% vegetat.	of which	% domin. species
1	68	32	(15)	Panicum color.
2	74	26	(15)	Panicum color.
3	50	50	(42)	Schizachyrium
5	69	31	(17)	Dactyloctenium
7	42	58	(36)	Schizachyrium
9	29	71	(68)	Schizachyrium
10	96	4	(2)	Aristida sp.
15	49	51	(39)	Duosperma erem.
17	39	61	(52)	Chrysopogon pl.
18	77	23	(10)	Sporobolus rus.
In average:	59,3 %	40,7 %		

The bare space situated between the plants occupies on the average more than half of the surface, at least during the dry season. This sparse distribution corresponds to the adaptation of the vegetation to the aridity of the environment.

3.2.2 - The alluvial cones

Site n°8 is situated on an alluvial cone.

The observations of the vegetation and environment parameters show that this type is related to the preceding category, both as far as its composition and its pastoral value during the dry season are concerned.

However, during the rainy season, the floristical composition seen on these site shows an exceptional abundance of annual plants, especially graminae.

Their edibility and their fragility in view of the spontaneous desiccation at the beginning of the dry season are important. This explains the fact that they rarely persist in December. They have disappeared, either having been eaten or destroyed.

Actually this type occupies only rather reduced surfaces (1,5 % of the test zone); therefore it does not have a big pastoral importance in the area, except for its fodder quality when it is green, and its herbaceous vegetation alive.

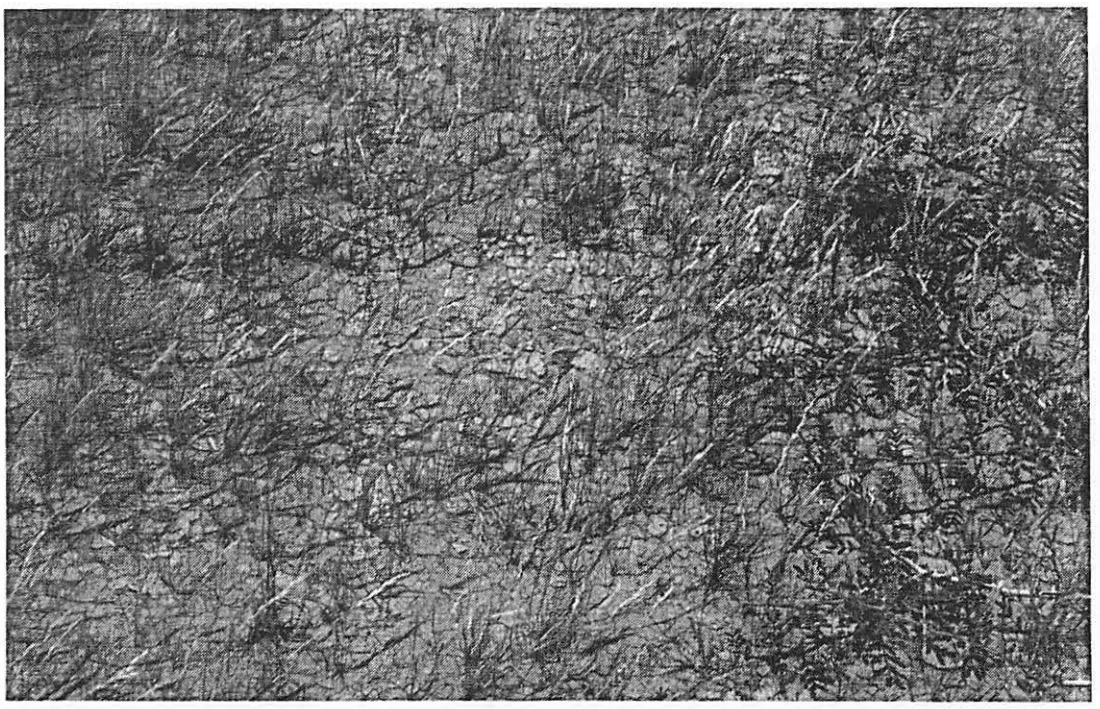
Its appeal during the rainy season, along with its watering facilities in the corresponding wadi, leads to overgrazing which appears through an abundance of acanthaceae plants such as Neuracanthus, Barleria, Duosperma etc...

The most frequent plants are the following:

- as to the bushes:

Acacia bussei, Acacia tortilis, Commiphora sp., Cadaba sp., Boscia minimifolia.

Alluvial cone of the Hodabahol wadi (near the site 4). General view, with plateaux at the bottom.



Alluvial cone of the Hodabahol wadi; view of the herbaceous stratum, which is, during the rainy season (June 1988), dominated by annual grasses (Aristida, Sehima, etc...).

- as to the herbaceous :

- grasses: Aristida spp. (several species, with at least 2 annual ones), Sporobolus sp. (annual), Sporobolus ruspolianus, Eragrostis ciliaris, Tetrapogon cenchriformis, Cenchrus pennisetiformis, Panicum coloratum.

- others : Indigofera articulata, Neuracanthus sp., Barleria sp., Duosperma eremophilum, etc..

The fodder value is very good during the rains, because of a good edibility of the plants and their relative abundance during this season.

The rate of bare soils in this type is the following:

Site N°	% bare soil	% vegetation	of which % domin. species
8	50	50	(31) Aristida sp.

3.2.3 - Glacis and lower part of the slopes.

- 2 sites (n°4 and 14) are established on glacis of a limestone plateau.

This type is mainly represented by a fairly continuous ring which fringes the piedmont of the relief in the area. It is a strip, rather narrow, sloping accross its width and situated between the bottom of the scree and the edge of the plains and valleys.

Its geographical surface is not important (it represents 5,8 % of the test zone). As far as the pastoral element is concerned, this environment is the highest in the topography which still has a generally deep soil, and where all animals can easily walk through.

On this type of soil the most frequent plants are the following:

- as to the bushes:

Acacia oerfota, Acacia etbaica, Commiphora cf. gowlalo, Boscia minimifolia.

- as to the herbaceous species:

Grasses: Aristida sp., Dactyloctenium robecchii, Chrysopogon plumulosus, Sporobolus spp., Schizachyrium kelleri, Tetrapogon cenchriformis.

Others: Blepharis ciliaris, Barleria sp., Neuracanthus sp. and a bushy convolvulaceae which seems characteristic of this type: Seddera sp.

This floristical composition, very close to the one in the plains and valleys, justifies the fact that the pastoral value is also comparable. Most of the graminae, which represent the most important part of the herbaceous biomass, are edible and have a rhythm of life comparable to the one they have downstream, though it lasts less longer because of the less important watering possibilities.

On this type of soil the rate of the bare soil is the following:

Site N°	% bare soil	% veget.	of which % domin. species
4	73	27	(10) Dactyloctenium r.
8	74	26	(17) Chrysopogon plum.

3.2.4 - Rocky slopes, scree.

- 1 site (n°6) is situated on a rocky slope. This type is situated at the lower part of the calcareous rocky escarpments. It is a steep and irregular slope, most of the time very wide, made out of broken stones which are sometimes unstable. It is within this environment that the most spectacular results of the hydrous erosion can be observed (ravines, mass of fallen earth, removal of the fine elements etc...)

The quasi-absence of soil and the slope are both very selective factors for the vegetation able to develop there. Its distribution is very irregular.

On the whole, the surface occupied by this type in the test zone is very important (31,3 % of the zone).

The most frequent plants are:

- as to the bushes:

Commiphora spp. (numerous species), C. gowlalo, Boswellia sp., Acacia spp., Boscia minimifolia.

- as to the herbaceous species:

Dactyloctenium robecchii, Jatropha robecchii (characteristic), Chrysopogon plumulosus, Indigofera spiniflora, etc...

The pastoral interest of this type is almost non-existent. This is the reason for which only one site was set up there. Indeed, on the one hand, the edible species are not very much represented, and on the other hand no domestic animals, except goats, venture in this almost impassable environment.

The rate of bare soil is the following:

Site N°	% bare soil	% veget.	of which: % domin. species
6	66	34	(10) Commiphora spp.

3.2.5 - Limestone plateaux

- 4 sites (n° 11, 12, 13, 16) are situated on limestone plateaux.

The limestone plateaux are always important in the landscape of the Bari area, though their importance varies according to the sector considered.

In the test zone perimeter two different plateaux morphologies meet :

- in the northern 2/3 of the zone, the plateaux are narrow, very dissected by erosion, and their outline is stressed by a break which sometimes attains a few meters.

- in the southern 1/3 of the zone, they are much more extensive, and they are not sharply demarcated from their surroundings. Their surface is softly undulating so that the soil is alternatively inexistant or rather deep. Therefore there is a juxtaposition of quite different vegetational formations.

In the test zone the height of the plateaux increases from the South-East to the North-West (about 650 to 850 m).

This configuration of the surface of the plateaux (flat and narrow as far as the first ones are concerned, undulated and vast for the second ones) along with their size leads to the fact that the water-flow is completely exoreic on some of them and partly endoreic on others. These latter, which are the widest therefore benefit on some places from rather deep soils, which are well irrigated during the rains and are able to have a vegetation close to the one found on the plains.

On the whole, this type holds the third place in the test zone, by the importance of the occupied surface (22,9 % in the zone) with 7,8 % for the narrow plateaux of the North, 14,6 % for the vast plateaux of the South and 0,5 % for the siliceous hills.

The most frequent plants are the following:

- as to the bushes:

Commiphora spp. (numerous and hard to identify), Acacia mellifera, A. etbaica, A. tortilis, Grewia spp., Jatropha robecchii (characteristic of skeletal soils) with Ziziphus hamur.

- as to the herbaceous species:

Barleria sp., Blepharis sp. Neuracanthus together with perennial grasses (Dactyloctenium, Chrysopogon, Schizachyrium, Sporobolus, all present but rare) and with annual plants; for instance Enneapogon cenchriformis, and a fleshy-cactiform: Euphorbia triaculeata.

Vegetation of limestone plateau in June 1988.

Vegetation of rocky slope in December 1988.

On the pastoral level the fodder value of the plateaux is poor or non-existent. Indeed the main characteristics of the "vegetal formations of the plateaux" (as all those which develop on skeletal soils) is the scarcity of herbaceous edible plants, the relative abundance of ligneous plants, and the difficult access, except for goats.

There are not many herbaceous edible plants and the dominant ligneous plants are species which lose their leaves most of the year.

The rates of bare soil are the following:

Site N°	% bare soil	% veget.	of which % domin. species
11	97	3	(01) Neuracanthus sp.
12	72	28	(20) Commiphora sp.
13	70	30	(13) Dyschoriste ly.
16	27	73	(63) Dactyloctenium r.

3.3 - Present state of the vegetation

In the opened spaces of the Bari area, the simple observation of the vegetal landscape is sufficient to convince one of its degradation.

The scarcity of trees and bushes in the places benefiting from good soils (valleys) compared to their abundance (although they are stunted) in the plateaux and versants (where the soil is very poor) is a sufficient sign to affirm that there has been an elimination of the ligneous plants.

In the same way, the abundance of the annual plants (identifiable during the rainy season) is a sign of degradation of the herbaceous stratum. During the dry season though, perennial plants are the most represented because of the seasonal disappearance of the annual ones.

This degradation of the vegetation is the result of the effects of three main factors:

- **the hydrous erosion:** it is the consequence of frequent and violent sudden showers in sub-arid climates.

- **the overgrazing:** it concerns the easily accessible environment, where herds periodically concentrate themselves.

- **the direct action of the man** : who collects certain vegetal products to meet his needs of fuel, fodder products and various materials.

3.3.1 - Erosion

In the test zone the sides of the plateaux are the most marked by hydrous erosion.

Their morphology shows all the effects of the action of the rain and run-off water: ravines, breaks in the relief, removal of the thin elements in the soil, important exposure of surface rocks etc..

This environment, although it occupies a notable part of the country, presents a poor fodder value. Therefore the effects of the erosion are not very worrying: they concern an environment which is not very much used. Moreover, in such an arid climate, it always happens in the same way on this type of substratum.

A similar form of erosion can be observed on the wadi banks: it is the result of the removal of loose materials from the soil at the time of the sporadic floods which can occur during the rainy season. As opposed to the first, this form only concerns limited surfaces, but it affects sectors where the value of the grazing is good. Their protection should therefore not be neglected when it is possible.

3.3.2 - Overgrazing

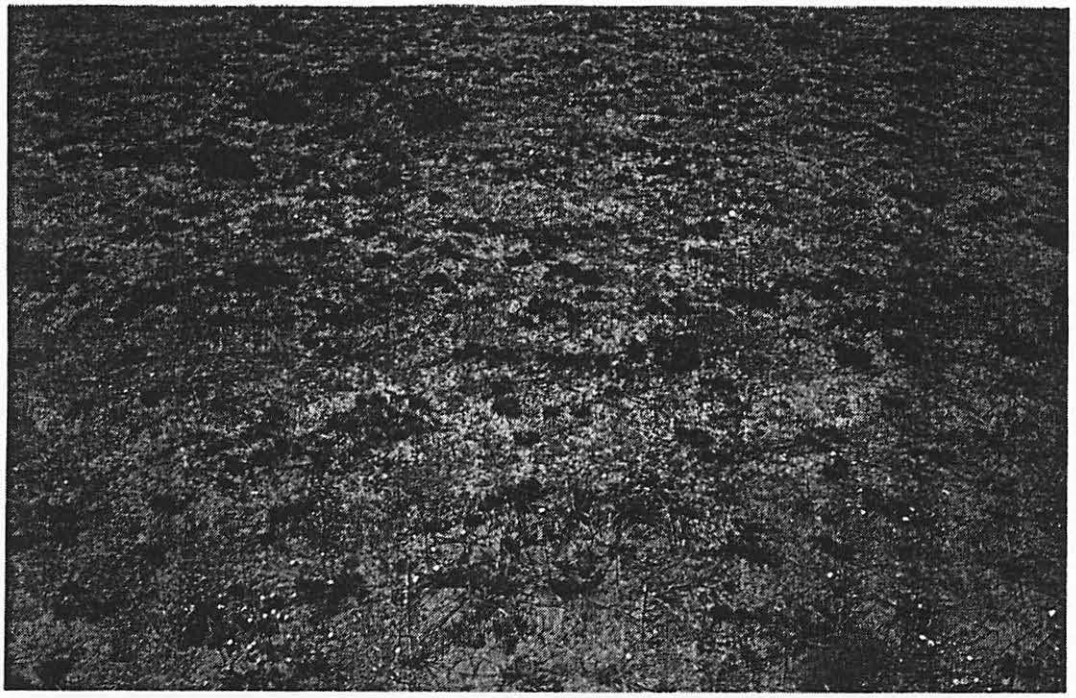
Most of the sites studied during the two missions on the land do not seem damaged irretrievably , even if their floristical composition and their grazing state show an excessive exploitation (in December).

Actually the degradation phenomenon is especially pronounced where the site is close to a permanent watering point. Temporary watering points (for instance in Karin Dismo) are not surrounded by a ring of degradation as marked as the one found around permanent watering points.

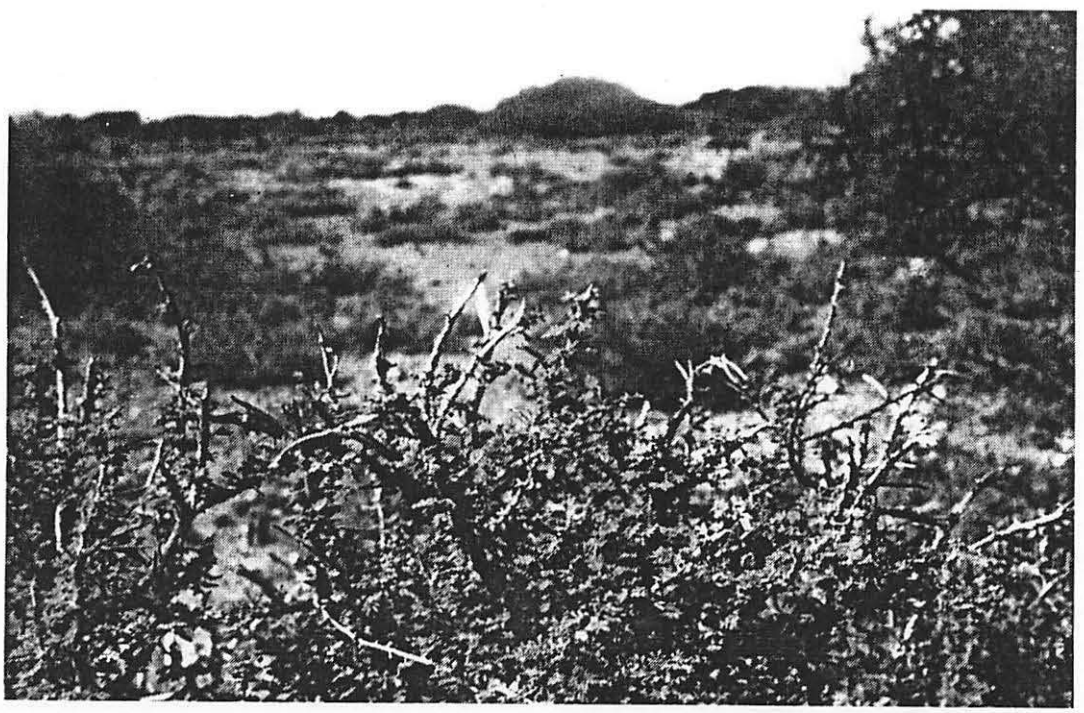
On the plains, the most visible sign of floristical degradation resulting from overgrazing is the predominance of acanthaceae species in the herbaceous cover and the increasing scarcity of trees and bushes.

In the valleys the average surface with vegetation is 40 % (extremes: 23 % and 71 % , cf. measures of frequences). It is not catastrophic for steppic formations, which even without overgrazing, would not be much superior. In a bare sector on the side of a vegetal arch, the cover by the herbaceous vegetation was only 4 %. However this phenomenon is not linked to overgrazing.

In the formations on skeletal soils (plateaux, versants etc...) degradation, if any, is not very visible because of the natural poverty of the environment. Plants are of course very scattered there and the cover by vegetation can not in any case be continuous; the inequality and mediocrity of the soil do not permit it.



Excessive grazing of herbaceous plants; Sporobolus, in December 1988, at the bottom of a pediment (South of Gardho).



Excessive grazing of the top of an acacia dromedaries, on slope. Site 13 near Gardho, December 1988.

3.3.3 - The man.

In fact the destructive action of the man on vegetation seems rather important in the Bari area.

Indeed, in order to constitute hedges of branches to enclose their goats and sheep for the night, the shepherds need to cut an important amount of thorny bushes in each of their camps. In the end this affects large number of bushes and contributes to the deforestation of the zones concerned.

We have been able to observe an important number of these "fencings" spread everywhere in the range. The almost total deforestation charasteristic of the pastures in the valleys, that is to say the best ones, should perhaps be attributed to this practice.

3.4 - Fodder potential and present exploitation.

3.4.1 - Fodder production

The vegetation data give a satisfactory indication of the floristical composition, the abundance and the degree of cover by plants in each stratum...

On the other hand, the edibility and the part of the production attributable to forage are difficult to apprehend in the steppes constituted by both annual and perennial plants, with very different structures.

Roughly speaking this is what can be observed:

- all annual graminiform species (Aristida, Sehima, for instance) are edible and rapidly disappear because of grazing and desiccation.

- all perennial graminae (Dicanthium, Sporobolus, Panicum etc..) have their summit consumed, although the degree varies.

- no simple rule appears for the other plants, especially chamaephytic, which constitute the main part of the vegetation present during the dry season.

As for the bushes, exploited mainly by camels and goats, it is even more complicated because the height factor intervenes. Their production of foliage and edible fruit depends more on the structure and the stage of the plants than on the occupied surface.

When it is impossible to measure the fodder production, it is considered that:

- the presence of some bushes, evergreen (semper virens) and edible in a site, is a notable amelioration factor of the fodder value.

- the total absence of bushes is always defavourable (lack of shadow and lack of pastures for browsers).

- the presence of many dense bushes reducing the low vegetation will be very defavourable except during a brief season and for browser animals only (camels and goats).

In addition to the plant itself, the animal, the season, the "choice given" influence the edibility and the degree of grazing; these notions are consequently very variable and relative.

Moreover the notion of balanced composition of the ration must also be taken into account, and not only the available fodder volume. This is why the values of the fodder potentials of the formations must be used with precaution: taken out of the local context they do not have much meaning.

3.4.2 - Estimation of the productivity

The productivity of these steppes is closely linked, but not proportionally, to the density of the vegetation. It is variable according to the formations (the extremes being the valleys liable to inundation for the richest and on the other hand the limestone plateaux with no soil for the poorest) and it can be estimated by taking into account a 100 mm/year pluviometry in 2 seasons in the area of Gardho.

On the basis of the measures done in December, the possible range of the annual fodder productivity can vary from:

- 100 to 200 FU/year/Ha for the less damaged formations (in deep soils, with a hydrous balance ameliorated by streams) in valleys and plains.

- 10 to 50 FU/year/Ha for the less damaged formations on skeletal soils.

These figures give an idea of the energy productivity on the natural range for an average year.

They are not sufficient to estimate a carrying capacity, even approximate, because of the absence of information concerning the contribution in digestible nitrogenous material which is also essential. More generally, it is also because of the absence of information concerning the nutritious imbalance of rations, which the domestic animals can eat according to their own preferences.

3.4.3 - Present exploitation.

For the rational use of this spontaneous production, the very important seasonal variations must be taken into account. They impose a forage calendar which is difficult to control, especially at the present state of exploiting techniques.

The period of most important production (and even of "fodder stock constitution" of the year) corresponds to the end of the spring rains (Gu). These seem relatively regular, at least as for their timing. Their quantity may vary considerably (for instance from less than 10 mm to over 300 mm in Gardho with an 100 mm accepted average, but there are neither numerous nor liable observations).

Then comes summer (HAGAA). The forage supply is conditioned by the last spring fall and is therefore generally difficult, but sufficient.

Then comes autumn (DAYR). If it is rainy it is a good pastoral season because the fodder grows easily and the reconstitution of fodder reserves for the winter is appropriate.

However if rainfalls are not sufficient (this is rather frequent), the most difficult period for cattle feeding begins. It will culminate at the end of the dry season (JILAAL) probably in February or March.

The rhythm of migration of the nomadic people takes these risks into account. It corresponds to a forage calendar, adapted to meet the needs of the animals in the best possible way; this is done on the basis of the exploitation of the only spontaneous vegetation without needing the use of intentionnaly preserved reserves, except for cattle (standing reserves, protected by fences or exclosures).

It will be possible to act on "management" of the spontaneous fodder ressources. This is a priority in order to induce some modernization of livestock keeping.

Certain effects of the present conjuncture and of the external interventions will force this one day or another. For example, the effects of modern veterinary medecine, or of the demographic increase of herdsmen which are the motors of both the increase of the livestock and thus the indirect causes of overgrazing.

In this new context, the spontaneous fodder resources will not be able to insure sufficient food for animals any more.

3.5 - Conclusion

The above analysis of the data concerning the natural vegetation in the Gardho area (data collected at 2 different periods, the first one during the rainy season and the second one during the dry season) leads to conclusions which support the opinion based on the reflexions on the biotic and ecological parameters in this area: climate, vegetation, animals.

This conclusion can be formulated as follows:

" the capacity of spontaneous fodder production is fully used, it is even already "saturated" and this probably since quite some time.

At the present time, this saturation has led to a very weak balance between the need for forage for the livestock and the exploitable fodder production by the vegetation ".

This balance continues to exist only because animal productivity remains very low so that the animal populations do not increase, or only very slowly (causes: pathology, mediocrity of the feeding conditions ,etc...)

Now, every intervention in this system, aimed at an increase of the animal production,- if not accompanied by a sustained increase of the livestock exploitation rate or by a profound change in the methods of forage production for the livestock, will inevitably lead to an aggravation of the burden on the pastures and will carry along the system into the spiral:

. more numerous animals
-> increased fodder needs
-> increased plant grazing and browsing
-> regression of the potential of recuperation of plants and thus of the natural fodder production
-> worsening of the fodder production for animals
-> degradation of the sanitary state of the livestock
-> accentuation of the importance of disease
-> regression of animal productivity
-> decrease of ressources for lvestock owners
-> trend to look for the increase of the animal numbers to compensate for this loss

-> increase of the importance and cost of nutritive or medicinal inputs in livestock breeding in order to maintain a sufficient security

-> increase of the costs of production without reducing the grazing pressure

-> decrease of the commercial competitivity concerning the export of animal products

-> regression of the market shares

-> over-stocking of animals

-> increase of the grazing pressure on the range because of these "unsold" animals

-> inexorable move towards livestock breeding without land because of the progressive disappearing of the natural vegetation on the range.

This vision - pessimistic ?- of a possible evolution of the present systems can be accepted in two main ways:

- 1° - It may be possible to envisage the development of breeding (even of dromedaries) without land ("zero grazing") (as it already exists in Saudi Arabia and in Oman for example) based on animal feeding of products, concentrated or not, which would be for the most part <u>imported</u>.

But this implies:

- firstly that the country has the financial means to acquire these products on the international market (which does not seem to be the case) and that the system leads to an external consumer market able to pay the meat at the right price...

- secondly, that the country has sufficiently effective means of information to show to the breeders the middle and long term dangers of the destructive over-exploitation of the vegetation; and that the means to help them to avoid this risk do exist.

- 2° - It may be possible to incite the re-adjustments of the production chain by acting from the other side; that is to say by strongly developing the external meat demand. It will create credible incitements for the breeders to out-stock their production in mass.

This incentive, of course, first of all concerns the <u>price</u> !!

We can have confidence in the Somalian breeders: if their livestock is very well sold, they will exploit their herd in the best way and will pay attention to the increase of prolificity in order to maintain their herds and flocks.

The actions for the improvement of animal health and nutrition, initiated within the framework of the "Oasis" project, which are, at present stagnating because they do not seem to interest the breeders, would then develop in a spectacular way.

However the opening of exterior markets depends on a liberal conception of the commercial politics of the country. It is therefore linked to the "politicians" and is hardly compatible with the present orientations of the country and with a currency with a poor exchange value.

So that, while waiting for an opportunity to massively bring in the livestock speculation from Somaliland into the international market, actions should be more modest, at a local level and likely to alert the producers, preserving future possibilities.

To start with and in order to have time to elaborate more radical transformations (of which that of the concerning mentality is important), one should act on the management of the grazing resources presently available.

This will necessarily need a consensus and some constraints, which are always difficult and never well perceived. The whole will be justified by well defined national as well as private objectives , and will rest on a strategy of new development which will need to be accepted by people. It will have to be carefully explained to the persons concerned.

At the same time, adjustments can be provoked by regulations (for instance, concerning the grazing rights, or the livestock market) or simply incentives (for instance, taxes on livestock or supplying facilities in basic products which are ingreat demanded by livestock owners.)

4 - REMOTE SENSING AND CARTOGRAPHY

From the initial phase of recognition of the environment and its components to the cartography of the informations, we have used the data provided by the satellites observing the earth. It corresponds to a methodology already used by the IEMVT in other tropical areas.

The carrying out of the objectives of the study has gone through the four main following stages:

- preliminary phase of recognition of the environment
- observation campaign on the field
- treatment of the spatial data
- execution of the map

In this chapter, the second stage, already described above, will not be further discussed. The 3 other stages will be reviewed, as well as the methodology used in order to take the best opportunity out of the possibilities of remote sensing in this type of study.

The information system used had the following elements:

- choice and acquisition of the spatial data.

- treatment of the original data and of their derived products.

- imaged representation of the information.

- eventual proposal of data up-dating.

4.1 - Choice and acquisition of spatial data

Spatial remote sensing consists of studying the surface of the earth through the measures of the luminous radiation reflected by the objects. This radiation is registered by the receivers of the SPOT satellite on 3 wavelenghts (4 for LANDSAT) and is transmitted to the terrestrial receiver stations.

In order to have a general view of the wide area proposed for study, 2 LANDSAT-MSS (174-053 and 173-053) scenes have first been acquired. Each scene corresponds to a quadrilateral of 185 by 185 Km.

Delivered in the form of coloured compositions on film, at the scale of 1/1 000 000°, these 2 Landsat scenes have permitted to make a reasoned choice for the localization of the test zone. After a photographical enlarging of this zone, it has been possible to stratify the landscape into different geomorphological unities for the needs of the study.

This preliminary photo-interpretation, immediately available, has enabled us to establish (before the campaign on the field) the temporary outline of the network of the sampling sites, taking into account the importance of each unity.

Scenes 174-053 and 173-053 have been recorded on 25/9/79. The fact that they are relatively old does not affect the reality of the outlined limits for the preliminary interpretation.

According to the terms of reference 2 SPOT images have been registered for the same scene (ref: KJ 159-331) at 2 different dates.

The first one, a vertical vision, has been made on 30/5/88, at the end of the rainy season (GU). The next one, an oblique vision, has been made on 5/8/88, in the middle of the dry season (HAGAA).

In addition to the interest of the multitemporal recording of the same scene (particularity offered by spatial remote sensing), this has permitted to obtain a pair of stereoscopical images (by combining two views taken under different angles).

This interesting possibility together with a better quality of resolution, is an important advantage for SPOT compared to LANDSAT (cf: table of the SPOT and LANDSAT parameters, in annex).

The SPOT views were available only for the second campaign in the field.

4.2 - Treatment of the original data and their derived products

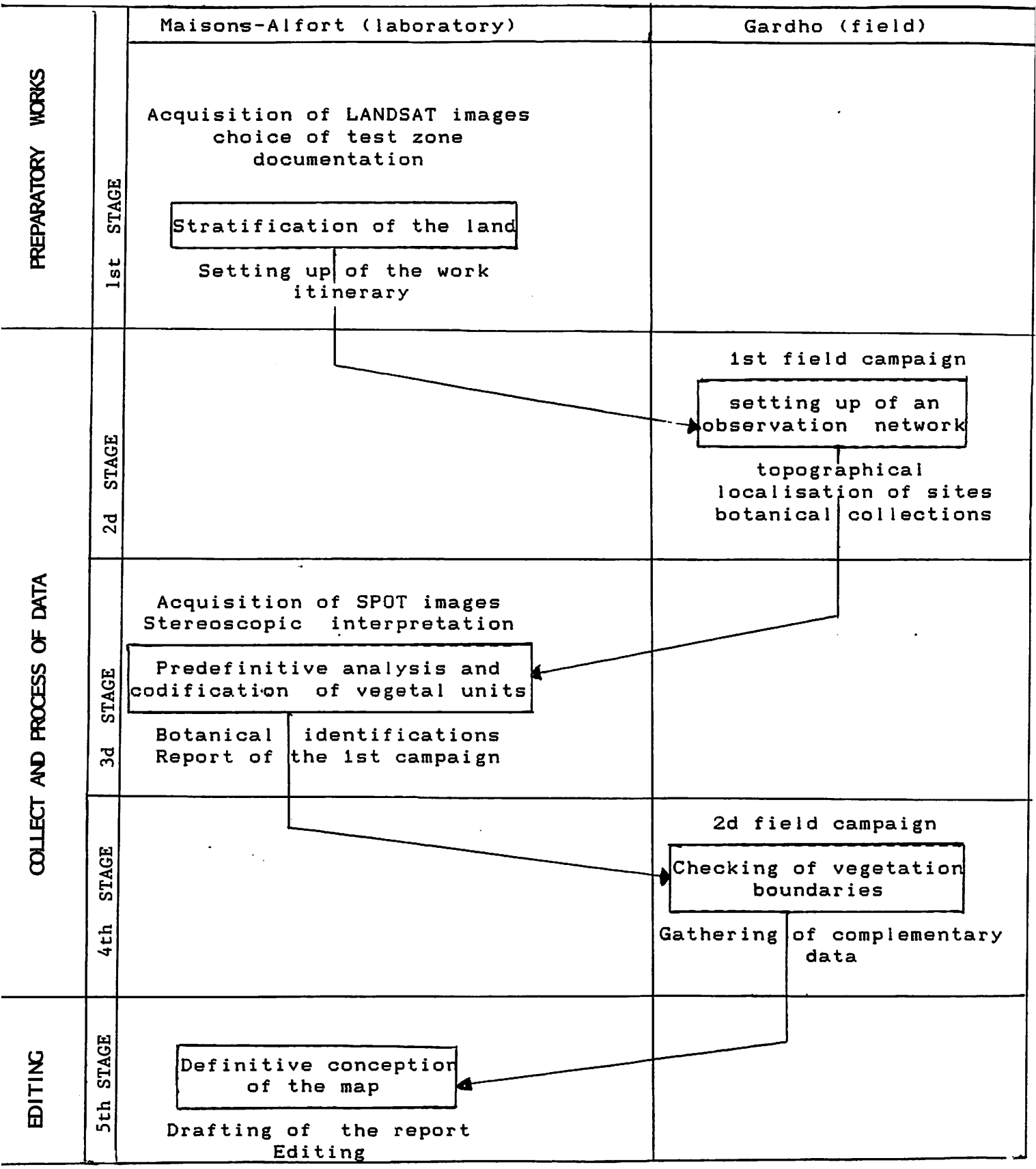
In a semi-arid environment, such as the Bari area, the geomorphology gives an appropriate mean to subdivide an area into units of landscape. To these units of landscape closely correspond major vegetation types. A more precise analysis taking other factors into account allows later to define subdivisions (ex: proximity of a village, presence of running water, etc...).

Finally, in the field, detailed observations will permit to take into consideration the distribution of types of vegetation useful for our study (cf: the types of pastures seen above).

The summary of the operations done is given in the following tables. (see next page)

Only the observations in the field can take into consideration the distribution of the types of vegetation. Therefore the measures and counting done on the 18 representative sites have underlined the qualitative and quantitative differences of the vegetation. The interpretation of the spatial image had permitted to see these differences and outline their limits but had not permitted to explain them.

OPERATING DIAGRAM



4.3 - Interpretation of the SPOT data.

4.3.1 - Methodology.

The choice of the multitemporal acquisition of the data under different angles has two main interests.

1° - The taking of photographies under 2 different angles is very important for thematic cartography since it enables the "relief" vision, which is already recognized as fundamental at an interpretation stage.

After an enlarging of the original films (scale: 1/50 000°, that is to say an enlarging of 8 times), a first delimitation of high-level rank unities of vegetation has been carried out by stereoscopic observation.

2° - The "multitemporal" acquisition of data gives the possibility to study the evolution of vegetation between the different taking of the photographies. The thorough study of this approach which is interseasonal within the framework of the study, is the object of later work which cannot, because of the delay, figure in this report.

In order to carry out such a comparison, it is first necessary to establish a graphic representation of the studied area, based on spatial data, "geometrically corrected". This representation is superposed on pre-existing cartographic documents, and within a given projection system. The geometrical correction is done on the basis of the correspondence between identified reference points on the camp, and of which the geographic coordinates are perfectly known.

In these conditions, registrations acquired at different dates and concerning the same scene can be later numerically compared, pixel by pixel.

At this level of interpretation, the localisation carried forward on the images in due form and associated with the contents of the observations on the camp, will enable to distinguish the vegetal formations, to identify their differences and to proceed to a final codification.

The classification of types of landscapes which derives from it is a hierarchy of unities. They represent permanent (at least during the concerned period) and homogeneous elements of the vegetation.

In the case of heterogeneity of the look of the vegetation, they can be treated as different unities or "mosaics", which coincide with unities of higher rank. The whole then can be seen on the spatial image and enable, by extrapolation, to classify large surfaces, on which a control on the ground will be done.

4.3.2 - Results, map

In the test zone there are 9 unities of "high rank" with their sub-unities (described above in ch. 3); they can be distinguish in the following way:

a) - Plains and valleys:

It is the most extensive unity in the test zone, since it occupies 38,5 % of it (1390 km²) with an uniform distribution except in the East sector. It covers 3 sub-unities:

. large valleys and plains
. narrow valleys
. plains and valleys liable to inundation

Their differences are at a hydrous level, because their soils are uniformly limono-sandy. They are created by alluviums and have a horizontal surface (slope inf. to 1 %).

The plains and large valleys correspond to a complex hydrographical system. Its network is imposed by the local geomorphology. The seasonal flows are flat and "areic", especially in the "plains" which are large with no distinct channel. Sometimes, a reference relief peaks in the middle of the valley and separates the occasional streams.

In addition to their form, they can also be identified on the image by their green colour, which is dominant when the soils have a compact surface with scarcely no vegetation It can also be red if it has a perennial vegetation alive. The damaged zones appear in a whitish colour.

It is in this unity that can be observed the most beautiful "arcs of vegetation" characterizing this Somalian region; they are always oriented with their convexity upstream.

The narrow valleys exist only in a rocky environment. Their versants are steep and they rapidly lead to large valleys. Their thalweg line is occupied by a ligneous vegetation lining the bed of the temporary watercourse.

They can be recognized because of their sinuous outline, narrow and deeply embanked, vividly red-coloured if there is a lining string of vegetation or beige-coloured if the approaches are steep and bare.

The valleys liable to inundation, localised in the Kayr Kulalo, benefit from temporary streams provided by several watersheds which drain large areas in the North, in the West and in the South of Gardho.

On the image they appear in dark red at the height of the activity of the vegetation and in lighter red during the dry season. Their limits vary according to the season.

The first part of this type of valley, in which there is a real forest because of the very favourable hydrous conditions, in the North goes around the locality of Kubo. Its course is semi-circular and embanked. It emerges in the form of a narrow channel on the main valley, which extends to the depressed part of Kayr Kulalo, that is from Gardho to the East of Adinsoone over about 20 km.

On the spatial image it has a dark red coloration which corresponds, in the close infra-red canal (X S3 of SPOT), to the active vegetation.

b) - Pediments

The colluvial accumulation pediments occupy 209,3 km2 that is to say 5,79 % of the surface of the test zone. They form the transition between the plains and valleys on the first hand, and the slopes and plateaux on the other hand.

Stereoscopic observation allows them to be identified unequivocally, by their morphology and their topographic position. Moreover the colour ranges from a striped brown for the most ancient deposits, stratified, to a light grey for the most recent.

Their width does not seem to exceed 1000 m. They are composed of deposits coming from the erosion of the rocky versants. They are very exposed to degradation because of the passage of trails, for which the topography is the most favourable: no stones, no inundation and their outline is relatively flat.

c) - Alluvial cones

Developed at the opening of the most active narrow valleys, the alluvial cones occupy only 53,52 km2 that is 1,5 % of the surface of the test zone. Because of the fine texture of their materials in surface and light colour, they distinctly contrast with the pediments and slopes they cross.

Drainage channels run through them in their lengh and their rather deep soils are better drained than those in the surroundings.

On the image they have a characteristic deltaic form and their light beige colour contrasts with that of the nearby pediments and rocky slopes.

To the North-West of Gardho, the alluvial cone, constituted by the Wadeba Wadi, has been provided with ridges of earth set up across the direction of the flow in order to hold back the rain water for a longer time.

d) - Plateaux and slopes

The whole of the "plateaux and slopes" is homogenous because of the quasi-total absence of soil (this is what distinguishes it from others). They occupy 1935 km2, that is 53,71 % of the surface of the test zone.

The interpretation of this large unit distinguishes 3 sub-units because of their geomorphological character and because of the variations of their vegetation. These are :

* the tabular plateaux
* the large plateaux
* the rocky slopes

*** the tabular plateaux**

They occupy 279,78 km2, that is 7,75 % of the surface of the test zone, where they are concentrated in the North-West sector. In this zone, the highest (about 850m) are delimited by a steep fragmented slope. Its basic part is outlined by more or less coarse limestone scree, without vegetation.

This phenomenon can be observed, concerning the plateaux, each time their surface is horizontal.

Their "structural" morphology and the distinctness of their peripherical limits, corresponding to a dominant green colour, enable them to be easily identified on the image.

*** Large plateaux**

They occupy 528,88 km2, that is 14,65 % of the test zone and they are mainly localized in the South of it. They constitute massifs outlined by large valleys. Their surface, slightly convex, is mainly covered by gravel, except for some small depressions with limono-sandy soils. Their height ranges from 630 to 680m.

The vegetation which develops there can be distributed into "strips" reminding of the "vegetation arcs" of the valleys. This arrangement is not very distinct and, in any way, does not appear from the soil, but only on the analysis of an aerial or spatial view.

Their colours and texture on the image are similar to the preceding ones, but their convex morphology and the characters of their limits enable them to be distinguished.

*** Rocky slopes.**

They occupy 1130,17 km2, that is 31,31 % of the test zone. They are covered with stones, and have a steep uneven surface, between the plateaux and the valleys. The transition with the latter is constituted by the colluvial accumulations of glacis.

The flow of rain waters follows a beginning hydrographic network which is not very much organised.

On the image their grey-blue colour corresponds to a very important proportion of bare soil. This criterion associated with their uneven outline, with their dense and primary hydrographic network and with white zones in the form of aureoles; it allows the tracing of their cartographic limits.

In this category there are also rocky islets in relief in plains or valleys.

e) Siliceous hills

These hills, which can only be seen in the surroundings of Libaax Har, occupy only 17,87 km2, that is 0,49 % of the test zone and are isolated in a large valley.

They appear to be not very high, with no trace of hydric erosion. Thus their image is distinct from the one of the calcareous rocks, more especially as their colour is dark and as their surface (totally devoided of herbaceous vegetation) is constituted by siliceous, angular and vitreous broken fragments of stones.

4.4 - Legend of the map

A map (scale 1/100 000°) of the pastoral types in the test zone perimeter is given as an annex.

Concerning this map, which corresponds to 3609,6 km2 of the test zone, the categories of pastures determined in the field and by remote sensing are identifie by the following abreviations and are distributed in the following way:

Pastoral type of :	**Surface(km2)**	**% of the zone**	**Abreviat.**
Tabular plateaux	279,78	7,75	Pt
Wide plateaux	528,88	14,65	Pl
Rocky slopes and islets	1130,17	31,31	Vr
Siliceous hills	17,87	0,49	Cs
Wide plains and valleys	1343,01	37,21	Vl
Narrow valleys	26,35	0,73	Ve
Inundated valleys	20,72	0,57	Vi
Glacis	209,30	5,79	G
Alluvial cones	53,52	1,50	Ce

5 - PROPOSITIONS

For the moment, taking into account the main objective which is the developement of animal production associated with the protection/restoration of the fodder potential, there are 3 categories of needs:

- need of complementary informations,
- need of monitoring,
- need of experimentation.

5.1 - Complementary informations

Some elements necessary to the maintain once of the coherence of the project actions are not sufficiently known by the agents in charge of the interventions. In order that the actions set up by the agents of the project during their stay do not cease when they leave, the constraints to be respected must be identified, removed or reduced.

This need of informations concerns:

- inventory of the exploitations and of the pastoral systems in the project area.

- the means, rhythms, motivations of the use of the fodder resources and of the other inputs.

- inventory of the constraints linked to the natural and also socio-economic environment, and to their dynamism (fodder-balance evaluation, watering problems, shepherding etc...)

- the relationships between the different categories in the animal production chanel starting from production (nomadic breeder) to the livestock and meat trade on the national and foreign markets. Detailed identification of the commercialization systems.

This knowledge, already well advanced due to the enquiries of the project agents, is a preliminary necessary to all interventions. Its reliability is very dependent on the confidence of the interlocutor.

Here, we have to render tribute to the quality of the human relationships established by the agents of the project with the local populations. We also have to note the interest of the informations already collected, especially in the 22 concerned villages on the district of Gardho.

A proposition of a non-exhaustive enquiry slip concerning the shepherds is given in appendix.

The enquiries could begin immediatly and be progressively carried out. They would begin by the less problematic questions in order to create the confidence which is necessary to obtain precise and honest answers.

The most delicate personal questions would be asked at the end when the shepherds, more confident, will have understood the objective of the project. In this aim, we will show the shepherd as far as possible the current experimentations explaining very clearly the objectives.

5.2 - Monitoring

In the present state of exploitation of the natural pastural resources, grazing pressure can only increase and lead to regressive transformations of the vegetation, that is to say the processes of desertification.

The identification of the current processes and their quantification are necessary for the elaboration of safeguard measures and rehabilitation of the forage potential and the animal production.

The monitoring will concern:

- the evolution of the herds and of the exploitation techniques concerning the forage resources (see above enquiries).

Questionnaire for each topic (livestock populations, itineraries and nomadic or transhumance periods etc...) should be established according to the local realities and carefully updated.

- evolution of the vegetation

Concerning the range vegetation, a monitoring simplified protocol has been set up in 1988 (cf first part).

This has to be continued over several years, in order to allow an impartial judgement on the evolution of the vegetation. It is also important in order to find arguments to propose proper interventions.

- the animal behaviour

In addition to the 2 above monitorings, an observation of the animals on the range is necessary to determine the seasonal edibility of the plants. It is also necessary to determine the other parameters of livestock behaviour which can have a great importance on the evolution of the range floristical composition (daily forage rhythm, watering and importance of the migrations etc.).

5.3 - Research - Experimentation

5.3.1 - Estimation of the potential forage productivity

In the present context of the natural pastures exploitation (which remains through numerous aspects, a "gathering" exercise), it is not possible to estimate the potential of the forage production of the vegetation.

The extreme mobility of the herds never permits the vegetal environment to show its potential, as is always grazed to a greater or lesser extend.

Without these fundamental data, it is risky to establish projects involving modifications of the livestock populations.

The estimations of the forage potential can be done through measurements of vegetal biomass in proper small fenced areas which are rigorously protected from the animals.

They will be situated in representative numbers in each of the vegetal formations to be studied. The small fenced areas will be constituted by squares of 2m x 2m protected by a wire gathered in unities enabling the necessary repetition and at least 4 treatments.

1st treatment.

Pilot small fenced area: there will be no intervention other than measurements of frequence, of presence or absence and of recovering of the plants on the square diagonals. The germination waves and the heights at the different stages will also be determined for each existing species.

2nd treatment.

"Spring small fenced area": the herbaceous plants will be cut at "grazing height" (necessity of a previous observation of this parameter in the surrounding zone. Probably: the annual plants wil be cut at ground level, the perennials on variable heights), at least for the edible species, at the end of the spring rainy season, around June.

3rd treatment.

"Autumn small fenced area": plants will be cut in the same conditions as for the second treatment but at the end of the autumn rains (december).

4th treatment.

"Continuous small fenced area": plants will be cut as described above, but in June and December.

A "cumulative" pluviometer will be set up near each "small fenced area" group and the results will be collected at the right moment.

As far as the biomass measures are concerned, the plants will be cut, classified by species and weighed, then dried and once more weighed in order to draw up a detailed "dry matter" production balance-sheet for each treatment and each period.A comparison with the rainfall quantities will be made systematically.

5.3.2 - Forage reserves and fenced exclosures.

At present these are not seen as a necessity by the breeders except when they concern cattle.

However, they already exist in the form of fenced exclosures of some small areas which benefit from good environment conditions. But they are reserves which are exploited more by direct grazing than through the making of hay, which is always harvested too late.

There does not seem to be any organized grazing rotation, nor sowed or planted pastures even simply in order to ameliorate the spontaneous vegetation.

Areas in fenced exclosures are limited in surface situated in depressions liable to inundation. They are poorly protected by bad fences which are unable to stop large animals nor goats and sheep.

However this corresponds to an astute use of the natural environment, since these depressions liable to inundation and occupied by a grass-land of Dicanthium, Cynodon, Paspalidium (3 good fodder grasses) constitute a vegetal production which is suitable for conservation (even standing) as hay. Unfortunetely these areas are not extensive.

This technique has to be continued because it optimizes the natural forage potential - and this in a very cheap way, the inputs being quasi-nonexistent.

Until now, the fenced exclosures are reserved either for cattle feeding (direct grazing), or for hay making. This hay is given to the commercial livestock waiting in pens.

5.3.3 - Restoration experiments of the range

In the Bari area, the free circulation of nomadic or transhumant herds through the country seems to be the main obstacle that the safeguarding and restoration actions have to face. In this "community" context, each person trying to ameliorate a range area exposes himself seeing either somebody else benefit from it or -and this is worse- his attempts annihilated because of an uncontrolled grazing pressure.

According to the technology used, there are 3 categories of trial:

* - collecting of the run-off water
* - elimination of refuse
* - vegetation re-enriching

* - Collecting of the run-off waters.

The edification of earth dams on deep soils slopes in order to stop the run-off is often practiced in this area.

We have seen some of them on a glacis near Gardho. The curved dams, spaced between 40 to 50 m in rows were 1 m high and 20 to 30 m long. They had been built by taking the earth, higher up, so that regular mini-depressions appeared with a downhill rise to stop the streaming water.

As far as vegetation is concerned, in those depressions the original plants are replaced by grasses (Cynodon dactylon and Sporobolus for example). This new vegetal population is probably not stable; it may change rapidly.

This improvement is due to the vigour of these plants, which are the first that occupy such a soil from which the upper layer and seeds have been artificially taken off. The result is still modest because all the ameliorated zones added together occupy only a little area.

Thus, this method does not seem to give spectacular or generalisable results. However, the fenced exclosures of numerous zones of this type benefiting from a good hydrous balance due to the collecting of water, can constitute seeds reservoirs.

Then good foragze species, while completing their life-cycle protected from grazing, will produce seeds which will then disperse all over the surroundings and thus participate in the preservation of the forage value.

* - Elimination of refused plants

Another type of direct improvement of pasture vegetation consists in controling non consumed plants in order to favour the (spontaneous or assisted) re-introduction of good forage plants.

This eradication can be done manually (by selectively pulling out the plants); this may be done by the shepherd, but it is probable that only small fenced exclosures will really benefit from this kind of intervention.

It can also be done by mechanical "gyro-crushing" of the plant refuse during the most favourable season.

Another technique can be the application of selective herbicides which would destroy certain plants; for instance, selective herbicides which would destroy the acanthaceous plants, to the benefit of the grasses.

But there is no immediately usable, general and cheap solution which could be proposed. In fact these are expensive operations (in monetary terms, in manpower, in machines and in chemical products), the results of which are hardly forseeable and which can reveal secondary harmful effects.

This is why trials are to be carried out under the guidance of experimented technicians, then after evaluation of the results and of the costs, real tests can undertaken. A general protocol for these tests has been discussed with an AFVP member in Gardho. A local shepherd has agreed to lend a piece of grazing land for the preliminary tests.

* - Vegetation re-enriching.

This last approach is very dependent on the two others: actually the specific re-enriching of permanent vegetation (like damaged natural pastures) cannot be done without preparing the place for the new introduced species.

In fact, seeds of interesting species (native or exotic) will be planted on ranges cleared up of their uninteresting -or even harmful- plants (invasive for instance). Interesting species are, for example, Sporobolus, Chrysopogon, Panicum, Schizachyrium. Those plants are already well-known by the shepherds who can then collect fertile seeds on the pastures while guarding their herds. So these plants will remain cheap and failed tests can be renewed without difficulty.

These experiments will begin in the season the most favourable to germinations, that is to say at the beginning of the spring rainfalls. Of course the chances of success are higher with local plants than with exotic ones; but the latter could be more interesting and would therefore justify more expensive care.

In addition, the re-introduction of bushes on the sites where they had disappeared will ameliorate the environmental conditions.

Some local species, although known for their very slow growth (Boscia minimifolia, Cadaba mirabilis or Cadaba rotundifolia, and some Acacia spp.) give however in some seasons a very attractive production for goats and camels. Their high food-value is essential, and their remarkable adaptation to local conditions is a main advantage.

In any case, before starting all these interventions, unwanted plants will have to be destroyed, and effective and respected protection measures will have to be set up.

This leads us once more to the problem of communication; the populations concerned will have to be well informed in order to be able to participate. That is why the members of this project have to be well organized, competent and most of all endowed with great human qualities.

6 - GENERAL CONCLUSION

The transformations observed in the pasture vegetation of the Gardho area show the degradation process of the environment - the end of which is the desertification - which bring a main problem to light: the over-exploitation.

This problem is really serious because, if the evolution of the animal demography carries on normally and if the technology for using vegetal resources is not improved and modified - the end will be the non-reversible degradation of the vegetal wealth.

Now, the growth of the human population and its needs, requires necessarily a corresponding increase of animal production. The increase of herds is a necessary and logical element of the process.

This problem is fundamental because natural vegetation is the " primary resource" which is until now more or less well renewed from year to year- even with some loss - with variations which the human being is unable to control since they depend on the rainfall. Now this spontaneous resource determines in this area almost the whole production activity for man.

Even if it is floristically degradated, the fact is that the vegetation continuous to produce enough forage resources to maintain large herds of cattle, camels, sheep and goats in good condition. In December the conditions of the animals were excellent. It is said that the maximum emaciation comes in March, but the compensating weight recovery, very fast, comes in April-May.

That is why we have to face the following choice:

- either we do not intervene, relying on the adaptation capacity of the breeders.

This is a dangerous attitude, because if there is suddenly a fast environment degradation, the non-reversible point will be quickly reached and the desertification will be ineluctable.

Concerning ranges, this non-reversible threshold is reached when the vegetation capacity to reconstitute itself does not ensure any more the maintaining of a stable floristical composition and biomass production.

- or we intervene massively -and thus expensively- through creating and protecting vegetation, to induce spontaneous or helped regeneration (supplementary costs). Since the making of fenced exclosures means the reducing (even if temporary) of the pastoral zone, this measure will disturb the actual exploiting systems but will lead to an remarkable improvement of the vegetation.

Even if this expensive measure succeeds, it will not have lasting effects for long time, if the former process comes back immediately. And its trend will be more marked as the "regenerated" vegetation will attract more animals.

Finally, all this will not be beneficial to man if there is no increase of the markets for animal products.

Therefore, 2 kinds of actions appear to have priority:

1° in the pastoral field

Monitoring and research programs have to be set up in order to have usable informations, which are actually missing; these informations would allow operations to safeguard and improve the natural environment and forage potential.

The improvement of the feeding of some categories of animals (producing females, herds waiting to be sold) is also to be carried out.

2° in the commercial field

The main action will be the increase of the livestock exploitation rate, as much as possible (for example 12 % for cattle and camels, 35 % for sheep and goats).

This measure, obtained through the setting up of new markets, will enable the grazing zones to be relieved, the herd to be rejuvenated and the shepherds, income to increase. This measure should also create a new context, favourable to the spread of innovations in livestock breeding.

BIBLIOGRAPHY

BIBLIOGRAPHIE

AGIP-MINERARIA
Carta geologica della Somalia e dell'Ogaden, 1:500.000.
1937-38
Foglio di Garoe.

AUDRU (J.), CESAR (J.), FORGIARINI (G.), LEBRUN (J.P.) .
La végétation et les potentialités pastorales de la République de Djibouti.
1987
Maisons-Alfort, IEMVT/CIRAD, 384 p.
carte + 1 spatio-carte, 1/250.000e.
carte 1/100.000e.

BARBIER (Ch.)
L'encens (Frankinsense). Rapport de mission .
1985
AFVP/ Projet "Oasis", Mogadiscio.
Inst. Bota. Labo Bota. Montpellier. FRANCE 24 p.

BOALER
R (S.B.), HODGE (C.A.)
Observations on vegetation arcs in the northern region, Somali Republic.
1964
J. Ecol. vol. 52, n°3 : 511-544.

BOX T.W.
Nomadism and land use in Somalia.
1971
Int. Center For Arid and semi arid land studies
n° 66 - p. 222 - 228
Texas technological college - Lubbock, Texas.

BOX T.W.
Range resource of Somalia.
1968
J. Range management 21-6. p. 388-392.

CALCATERRA E.
A general approach to the problem of Somalia agriculture.
1979
Rivista di Agricoltura substropicale et tropicale.
A. LXXIII n° 1-2 - J.J. 1979 5-21.
Inst. Agro. oltremare - Firenze (Italia).

CHASTIN (P.)
Rapport de fin de contrat, volet élevage Gardho.
1988
AFVP Somalie.

CHASTIN (P.),REYNES (J.M.)
Contribution à l'étude de l'élevage des petits ruminants dans la région du Bari, N.E. Somalie
1987
AFVP Mogadiscio

CHAZEE (L.)
La collecte de l'encens.
1987
Ambassade de France en Somalie, 42 p.

DE WISPELAERE (G.), PEYRE DE FABREGUES (B.)
Evaluation des ressources fourragères par télédétection SPOT dans la région du Sud-Tamesna (Niger).
1988
IEMVT, Maisons-Alfort, Etude thématique (deuxième phase) Campagne 1986-1987. 73 p. + annexes.

DURAND (B.)
"Yebeb" (Cordeauxia edulis Hemsl.) prospecting in Somalia
1988
Propage. FRANCE - mimeo 23 p. + annexes.

F.A.O.
Soil and range conservation in NE Somalia, Draft project doc.
1987
FAO Rome; 22 p.

FERRY (M.)
Compléments d'information et d'analyse sur le projet intégré du Nord-est Somalien.
rapport de mission Sept.- Oct. 84
1985
M A E Paris - 40 p. + annexes.

FOIN (P.)
Cartographie topographique et thématique.
1987
Coll. Télédétection satellitaire, 4, Paradigme, Caen, 127 p.

FORGIARINI (G.)
Etude préliminaire d'un projet de suivi des pâturages à Gardho, région du Bari (Somalie)
rapport de campagne - juin 1988.
1988
IEMVT- MAE/Paris- 32 p.

FOURNIER (Ph.)
Observations terrain et télédétection.
1985
Cahiers de statistiques agricoles, n°1/6.

GILLILAND (H.B.)
The vegetation of eastern British Somaliland.
1952
J.Ecol. vol.40, 91-124.

HEMMING (C.F.)
An ecological classification of the vegetation of the Bosaso region.
1973
FAO-ROME 53 p.

HEMMING (C.F.),
Vegetation arcs in Somaliland.
1965
J.Ecol. vol.53, n°1 : 57-67.

HEMMING (C.F.)
A short list of Somali plant. names. (grazing lands) Compilation.
Somalia range management and development.
1971
FAO-ROME (AGP:SF/Som 12) 10 p.

JOLY (G.)
Traitements des fichiers-images.
1986
Télédétection satellitaire n°3, 137 p., Paradigme, Caen.

KAZMI (S.M.A.)
Somali Plants Names
1985
Somali National Herbarium - NRA - Poboy - 1759, Mogasdiscio. 79 p.

KAZMI (S.M.A.)
Guide to flora of Somalia.
1985
Prepared by L. Berger International, Mogadiscio Somalia, 800 p.

KUCHAR (P.)
The plants of Somalia : an overview and checklist
1986
N R A Mogadishu - C R D P tech. report series - 16 - 335 p.

LANNELONGUE (N.)
La perception stéréoscopique avec SPOT.
1985
Fiche P.S. SPOT-GDTA.

LAYZELL (D.), MC KAY (A.D.)
Soil and water conservation in NE Somalia.
1987
FAO, Rome, TCP/SOM/6654, 28 p.

LEDUC (Ch.)
Hydrogeologie du Nord-Est Somalien
rapport de mission
1985
CEMAGREF - MAE/Paris 64 P.

LEROUX (M.)
Quatrième partie:Les principaux éléments du climat et les climats de l'Afrique tropicale.
1983
Le climat de l'Afrique tropicale. CHAMPION Paris.

LETENNEUR (L.)
Projets de production animale dans le Bari (Somalie)
Rapport de mission - juin 1988
IEMVT- MAE/Paris - 89 p. + annexes.

MARTY (A.)
Pastoralisme. Rapport de mission - Mai 85
1985
Mogadiscio - projet intégré palmier-dattier.
1985
IRAM - MAE/ Paris - 51 p. + annexes

MERLA (G.),AZZAROLI (A.)
A geological map of Ethiopia and Somalia.
1979
C.N.R. Firenze,

MINISTRY OF LIVESTOCK, Foresty and Range
Somali, Livestock statistics 1987/88.
1988
Mogadishu/Somalia - 40 p.

QUESNEL (M.)
Aperçu général de la situation de l'élevage dans le Nord-Ouest Somalien.
1980
SEDES - M A E /Paris , 4 p. + annexes.

ROUSVOAL (D.)
Problèmes agropastoraux dans la région du BARI.
1986
I.E.M.V.T. Maisons-Alfort, 25 p.

TOUTAIN (G.)
Appui méthodologique et technique à l'opération de développement intégré des oasis du N.E. Somalien.
compte rendu de mission Août 85.
1985
INRA - M A E /Paris -12 p. + annexes.

WHITE (L.P.)
Vegetation arcs in Jordan.
1969
J.Ecol. vol.57, n°2:461-464.

YOUNG (S.A.),HERLOCKER (D.J.)
Rangeland inventory method and condition classification for East Africa.
1986
Somali National University, Mogadiscio Somalia, 125 p.

WATSON (R.M.)
Somali democratic républic. Northern rangelands survey.
"The static range resources of northern rangelands".
4 volumes. 16 West central street. London WC1- U.K. 1981.

- vol.1 part 1: Sommaire, méthodologie, 112 p.
  " " 2: cartes au 1/1 000 000.
  " " 3: cartes au 1/ 100 000.
  " " 4: local. sites et photos, 357 p.
  " " 5: description des sites, 300 p.
  " " 6: photographies des sites.
  " " 7: herbier: 2170 exsicata déposés au N.R.A. à Mogadiscioet à Kew, Nairobi, Florence.
  " " 8: première liste des plantes.
  " " 9: imagerie Landsat.
  " " 10: carte "lands systems" 1/250 000.
  " " 11: acetates mêmes cartes 1/100 000.

- vol.2 part 1: résults. 1° recens. aérien. 87 p.
  " " 2: cartes 1° recens. aérien. 28 p.

- vol.3 part 1: résults. 2° recens. aérien. 88 p.
  " " 2: cartes 2° recens. aérien. 30 p.

- vol.4, Commentaires sur recensements aériens.

Anonyme.
Camel pastoralism in Somalia.
Workshop in Baydhabo.
1984 (april)
ed. Mohamed Ali Husein - Mogadiscio. 151 p.

M. ABDI (M.)
Etude géologique et hydrologique du bassin central somalien.
1983
Université de Franche-Comté, Thèse; 148 p.

PICHI-SERMOLLI (R.E.G.)
Una carta géobotanica dell'Africa orientale (Eritrea,Etiopia, Somalia).
1957
WEBBIA, Vol. XIII n:1, 1957, 15-132 p. + carte 1/5000.000

A P P E N D I X

ANNEXE 1

CALENDRIER de la MISSION

26-27 novembre 1988

MM Peyre de Fabrègues et G. Forgiarini arrivent en Somalie par vol Paris (dép 20h) Mogadiscio (arr. 23h)

28 nov.

Mogadiscio.

Réunions AFVP (MM J. Godet, C. et N. Ledoux, G. Ventre, L. Bazin, J. Thomas, P. Bécu), Serv. de l'Elevage (Dr. Fara Hussein, Directeur Serv. Vét.), Serv. Agriculture, National Range Agency, Ambassade de France (M. J.M. Versini)

29 nov.

Mogadiscio.

Visites à la N.R.A., M. Abdi Aindra, M. Bashir Abdulle Osmann, Dir. du Plan au Secrétariat permanent du Ministère de l'Agriculture, M. M. Cervasato, Chef de Projet au Min. de l'Agriculture, au Centre de Documentation, à l'Herbarium de la N.R.A.; visite M. G. Vitillo, Cons. Agro. à la C.E.E.

30 nov.

Voyage par route Mogadiscio à Dusa Mareb

1° déc.

Voyage par route Dusa Mareb à Gardho.

Accueil par l'équipe AFVP résidant à Gardho: MM Ph. Durand; A Bellinguez, Mohgamed Xirsi, Fara Oussein.

2 au 9 déc.

Gardho.

Réalisation des mesures et observations sur les 18 sites permanents établis dans le district.

Le 8 déc. départ de Ph. Durand et G. Forgiarini pour Mogadiscio et Paris pour ce dernier.

Observations dans diverses zones pâturées à des saisons différentes et recherche de sites, éventuellement à retenir, pour densifier le réseau.

10 au 12 déc.

Tournée d'information et de collecte d'échantillons floristiques dans le Bari. Itinéraire Gardho, Karin, Galgala, Bossaasso et retour.

Visite des agents AFVP de Karin (C. Hugon) et Bossaasso (C et N Ledoux).

Le 12 déc. mesures d'évaluation des biomasses sur le site 1 sur le chemin de retour à Gardho.

13 et 14 déc.

Gardho.

Mesures d'évaluation des biomasses sur le site 8 et dans une parcelle mise en défens proche de Gardho.

Conversation avec M. Mohammad pour approche d'essais en collaboration avec lui. Evaluation des stocs de foin collectés, commercialisés et du potentiel de production en la matière.

15 et 16 déc.

Voyage par route de Gardho à Mogadiscio, avec nuit à Bulo Burti.

Réunion à l'AFVP l'aprés midi du 16.

17 et 18 déc.

Mogadiscio.

Visites d'information, de recherche de documents et de compte rendus, à Mogadiscio, avec : l'AFVP, la N.R.A. (M. Abdi Ainab), le Ministère de l'Agriculture (M. Abdi Nour), le Ministère de l'Elevage (Dr. Farah).

19 et 20 déc.

Voyage Mogadiscio - Paris, via Nairobi (dép 14h, arr. 8h.) pour Peyre de Fabrègues.

APPENDIX 2

Model of inquiry form

"Shepherds"

Family situation.

name,
Locality of fasten, how long ?
Composition of "family" (name, sex, age, activity, pastoral status, remuneration...of every person.)

Pastoral situation.

Mode of animal husbandry (nomadic, fixed, affected animals)
Exploited pastures,

- naturals, approximative, vegetal composition, areas, localisation.
- exploitation itineraries, forage calendar, regularity of the system.
- statuts of the rangeland : private, collective, reserved, other.
- competition with other herders.
- improved pastures : nature, importance, aim of improvement.
- complementation of livestocks. Nature, costs, affected animals, economical aims.

Management of livestock.

Livestock (species, size, fertility, mortality)
Dominant problems (feed, health, management)
Exploitation rate.
Commercialisation (animals, importance, localisation, commercial circuit, primary income

Economical situation.

Livestock primary resources
Other resources
Wages resources
Commercialised and self-consumed production...
Estimated rate of recovering of the basic needs.

APPENDIX n°3

Presentation of 18 monitored sites :

- site number.
- localisation, latitude, longitude, altitude.
- type of formation.
- Photography (date of view)
- Brief description of the vegetation.

Floristical list in june and in december 1988, with :

- scientific name
- somali local name
- biological type H.V. = Perennial herbaceous
  H.A. = Annual herbaceous
  Cham = Shrubby-ligneous plant
  Géo = Bulbous or tuber plant
  Arbri = Shrubby-tree
  Arbus = Bush
  Arbre = Tree

- abundance/cover rate

  - - = isolated plant
  - x = few plants
  - 1 = plants occupying 1 to 5 % of the area
  - 2 = " " 5 to 15 % "
  - 3 = " " 15 to 33 % "
  - 4 = " " 33 to 66 % "
  - 5 = " "more than 66 % "

This "rate" is accompagnied by identification of the list (001 to 018 for december 1988, 101 to 118 for juin 1988) and by the serial number of the plant in the floristical list set up during the work in the field.

SITE 1

Lieu-dit : Kayr Kulalo

Latitude : 9°32'10'' Altitude : 710 m.

Longitude : 49°9'50''

Vallée

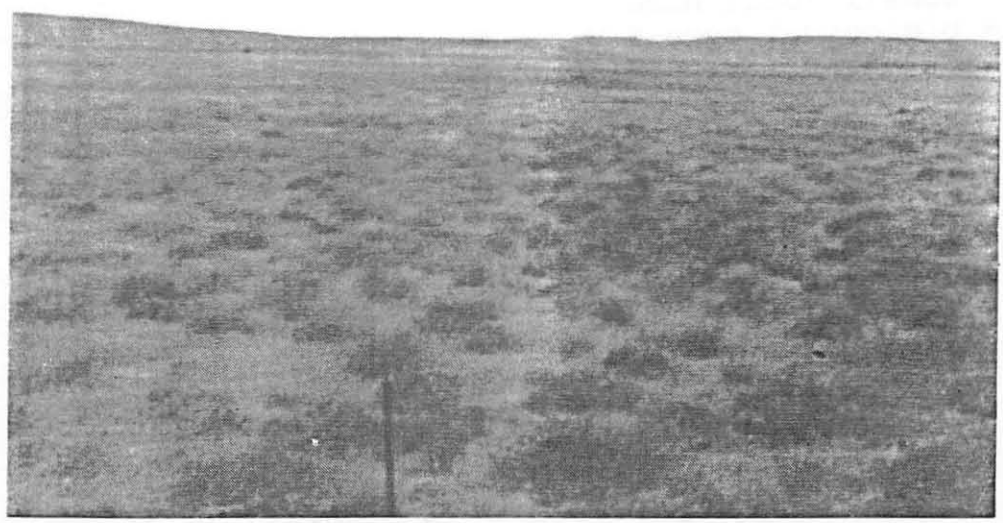


Photo : Juin 1988

Secteur de vallée à sol limoneux temporairement engorgé, à 5 Km à l'est de Gardho.
Herbacées dominantes : Panicum coloratum, Senra incana, Duosperma eremophilum.

RELEVE 101 9 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Alysicarpus glumaceus		?	X	(101	17)
Amaranthus graecizans	dabaaseye	H.A.?	X	(101	19)
Aristida adscensionis	xarfo	H.A.?	X	(101	22)
Asteraceae	ilcas	?	X	(101	12)
Asteraceae	burdad	?	X	(101	05)
Cenchrus pennisetiformis	garow	H.A.?	X	(101	18)
Convolvulus rhiniospermum	agagaro	H. ?	X	(101	04)
Crotalaria saltiana	gabaldeye	H.A. ?	-	(101	21)
Cyperus amauropus	gargoor	H.V.?	X	(101	20)
Eragrostis aethiopica	iaac	H.V.?	2	(101	10)
Eriochloa fatmensis	gaaso	H.?	3	(101	08)
Euphorbia	bacaroor	?	X	(101	15)
Jatropha glauca		H.?	X	(101	09)
Leucas urticifolia	foodcade	H.V.	1	(101	01)
Neuracanthus	reko ou rako	H.V.	X	(101	11)
Panicum cf coloratum	gargalo	H.V.	4	(101	07)
Peristrophe paniculata		?	X	(101	06)
Rhynchosia minima		?	X	(101	14)
Sehima ischaemoïdes	ayax makaré	H.A. ?	1	(101	02)
Senra incana	balanbal	H.V.	X	(101	03)
Solanum	dhagaweyn	?	X	(101	13)
Sporobolus ruspolianus	safaar	H.V.	X	(101	16)

RELEVE 001 - 2 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
asteraceae		H.V.	X	(001	02)
Alysicarpus cf glumaceus		H.V. ?	X	(001	17)
Barleria sp.	daalé	H.V.	X	(001	06)
Cadaba cf rotundifolia	qalanqal	Arbus	-	(001	13)
Cadaba glandulosa		Arbust	X	(001	12)
Cenchrus pennisetiformis	garow	H.A.	X	(001	16)
Duosperma eremophilum	sarin	H.V.	2	(001	01)
Euphorbia (grosse racine)	bacaroor	Geo	-	(001	11)
Indigofera hochstetteri		H.A.	X	(001	15)
Jatropha sp.	ouamé	Geo	X	(001	14)
Leucas urticifolia		H.A.	X	(001	04)
Neuracanthus	reko	H.V.	1	(001	05)
Orthosiphon pallidus		H.V. ?	X	(001	18)
Panicum coloratum	gargalo	H.V.	4	(001	07)
Peristrophe cf paniculata		H.A.	X	(001	10)
Senra incana	balanbal	H.V.	1	(001	03)
Solanum	dhagaweyn	H.V.	-	(001	09)
Sporobolus ruspolianus	safaar	H.V.	X	(001	08)

SITE 2

Lieu-dit : Duur Kumaris

Latitude : 9°32'50'' Altitude : 710 m.

Longitude : 49°16'50''

Vallée

Photo : Juin 1988

Faciès végétalisé d'un "arc de végétation", dans la vallée de Duur Kumaris, à 6,5 km à l'est d'Adinsoone.
Sol limono-argileux.
Herbacées dominantes : Schizachyrium kelleri, Panicum coloratum, Sporobulus ruspolianus, Leucas urticifolia, avec, en saison des pluies : Aristida adscensionis,et Geigeria alata.

RELEVE 102 - 9 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Aristida adscensionis	xarfo	H.A.?	4	(102	01)
Asteraceae	adaar		X	(102	02)
Blepharis ciliaris	yamaarug	H.A.?	X	(102	09)
Cadaba glandulosa	qalaanqal	Arb?	X	(102	18)
Cassia holosericea	jaleelo	H.V.	X	(102	12)
Chrysopogon plumulosus	dureeme	H.V.	X	(102	11)
Dactyloctenium robecchii	gubungub	HV	X	(102	19)
Dicanthium foveolatum	uurweyn	H.V.	1	(102	04)
Enneapogon desvauxii	urhaad	H.A.	X	(102	10)
Euphorbia	bacaroor	?	X	(102	17)
Geigeria alata	caano quaraar	H.A.	X	(102	08)
Leucas urticifolia	food cade	H.?	1	(102	06)
Panicum cf coloratum	gargalo	H.V.	1	(102	05)
Pterodiscus kellerianus		?	X	(102	20)
Pulicaria	adaar	?	2	(102	03)
Schizachyrium kelleri	duur	H.V.	2	(102	15)
Sericocomopsis pallida	geed cad	H.V. ?	X	(102	14)
Sporobolus kentrophyllus	duxi	H.V. ?	X	(102	07)
Sporobolus ruspolianus	safaar	H.V.	X	(102	16)
Zygoplyllaceae	qod xando	?	X	(102	13)

RELEVE 002 - 2 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Boscia minimifolia	jiic	arbust	-	(002	10)
Cadaba rotundifolia	galangal	Arbust	X	(002	07)
Dactyloctenium robecchii	gubungug	HV	X	(002	06)
Eragrostis cf. papposa	duxi	H.A.	X	(002	03)
Euphorbia		?	X	(002	04)
Leucas urticifolia		H.V.?	X	(002	05)
Neuracanthus	rako	H.V.	X	(002	09)
Panicum cf coloratum		HV	2	(002	01)
Schizachyrium kelleri	dour	H.V.	1	(002	02)
Sporobolus ruspolianus	safaar	H.V.	1	(002	08)

SITE 3

Lieu-dit : Duur Kumaris

Latitude : 9°33'00''

Altitude : 710 m.

Longitude : 49°18'10''

Vallée

Photo : Juin 1988

Site proche du 2, dans la faciès végétalisé d'un "arc de végétation", dans la vallée de Duur Kumaris.
Herbacées dominantes : Schizachyrium kelleri, et Sporobulus ruspolianus.

RELEVE 103 - 10 juin 1988

nom scient	nom vernac	type b	cote	abo	re
asteraceae	burdaad	H ??	X	(103	14)
Cadaba sp.	qalanqal	arbust	X	(103	24)
Cassia holosericea	jaleelo	H.V.	X	(103	20)
Cenchrus pennisetiformis	garow	H.A.	X	(103	35)
Chrozophora oblongifolia	geed biciid	H.V.?	X	(103	01)
Cleome brachycarpa	geed xamar	H.A.?	X	(103	36)
Commelina albescens	raxaas	H.A.?	X	(103	25)
Convolvulaceae	xarig		X	(103	30)
convolvulaceae	dabro	H ?	X	(103	05)
Corchorus depressus	neylo narsh	H.V.??	X	(103	32)
Cucurbitaceae	qalfoon	liane	X	(103	09)
Eragrostis cilianensis	xulé	H.A.??	3	(103	04)
Eragrostis cilianensis	caws	H.?	X	(103	07)
Glossonema revoilii	sadkax	H.V.?	X	(103	23)
Heliotropium aegyptiacum		H.A ?	X	(103	12)
Leucas inflata	soone	H.V.?	X	(103	37)
Leucas inflata	cargow	H.V.?	X	(103	28)
Leucas urticifolia		H.V.?	X	(103	06)
Leucas urticifolia	food cad	H. ?	X	(103	13)
Littonia revoilii	cidi waylood	H. ?	X	(103	34)
Orthosiphon pallidus		H.A.?	X	(103	26)
Polygala		H ?	X	(103	15)
Pulicaria sp.	adaar	H ?	X	(103	29)
Rhynchosia	murdis	??	X	(103	19)
Rhynchosia minima	riyo xira	??	X	(103	08)
Schizachyrium kelleri	duur	HV	4	(103	03)
Sericocomopsis pallida	geed cad	H.V.	1	(103	04)
Sida sp.		H V ?	X	(103	16)
Solanum	dhaga weyn	H.?	X	(103	27)
Solanum sp.	kiriiri	?	X	(103	10)
Sporobolus ruspolianus	safaar	H.V.	1	(103	17)
Thamnosma hirschii	waniiq	H.A.	X	(103	31)
Tribulus sp.	qod xando	H A	X	(103	21)
Ziziphus hamur	mur canyo	arbust	X	(103	11)
zygophyllaceae	qod xando	??	X	(103	33)
zz indét	damal		X	(103	18)
zz indéterminé	madoyaa		X	(103	22)

RELEVE 003 - 3 Décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Abutilon fruticosum	adaar	H.V.	-	(003	18)
Aerva cf. javanica		H.??	-	(003	22)
asteraceae (cf 001 02)	burdad	H.V.	X	(003	10)
Cadaba cf glandulosa		arbust	X	(003	16)
Chrozophora oblongifolia	geed biciid	H.V.	X	(003	12)
Chrysopogon plumulosus	dureeme	H.V.	X	(003	05)
Convolvulus rhyniospermus	ilcas	H.V.	X	(003	08)
Corchorus fascicularis	cabo qoys	H.V.	1	(003	09)
Gomphocarpus integer	dhufeecd	H.V.	X	(003	21)
Kohautia caespitosa	iboqor	H.V.?	X	(003	11)
Leucas inflata		H.V.	-	(003	25)
Panicum cf coloratum	galgalo	H.V.	X	(003	15)
Phyllanthus maderaspatensis		H.V.	-	(003	19)
Pulicaria	aana karash	H.V.	-	(003	24)
Reseda sp.	geed madow	arbust	2	(003	04)
Schizachyrium kelleri	dour	H.V.	4	(003	01)
Sericocomopsis pallida	geed kad	H.V.	X	(003	03)
Sporobolus ruspolianus	safaar	H.V.	X	(003	06)
Stapelia sp.	garcesan	HV Cra	X	(003	02)
Tephrosia purpurea		H.V.?	-	(003	23)
Thamnosma hirschii	waniiq	H.A.	X	(003	17)
Tribulus terrestris	qod xano	H.A.	X	(003	13)
Withania sp.	geed dhalaan	H.V.	X	(003	07)
Ziziphus hamur	hamur	arbust	X	(003	20)

SITE 4

Lieu-dit : Adin Laas

Latitude : 9°34'25''

Longitude : 49°21'00''

Altitude : 750 m.

Glacis

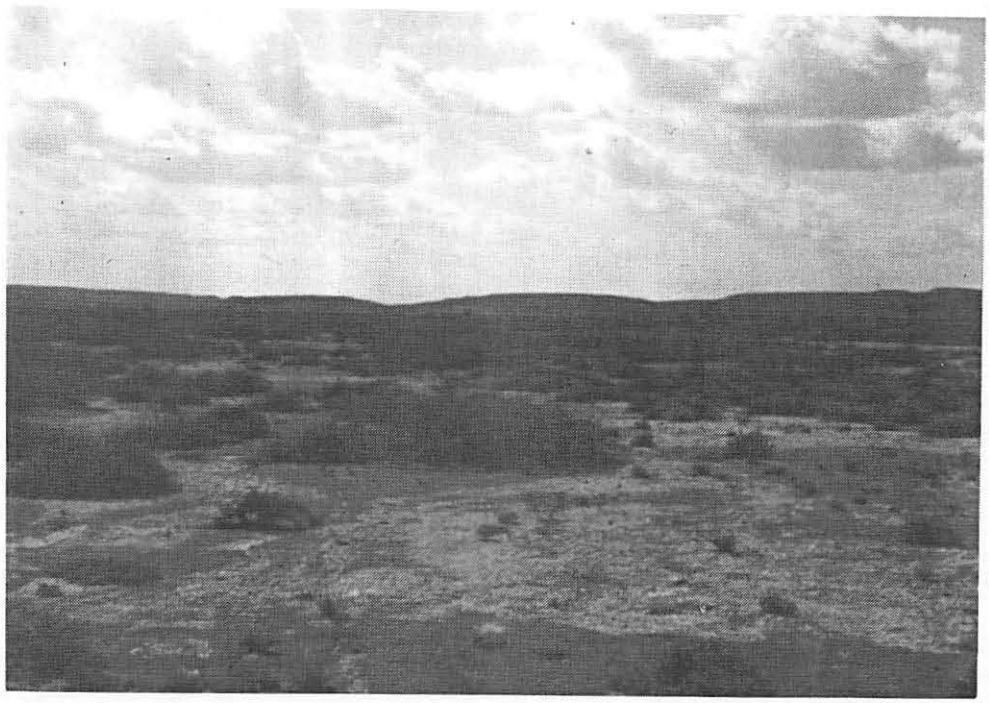


Photo : Juin 1988

Site établi sur glacis de piémont, vers Qalwo, à 8,6 km à l'est du site 3.
Surface du sol gravillonnaire, incisée de cheneaux de ruissellement, à vastes espaces dénudés entre les touffes végétales.
Herbacées dominantes : Dactyloctenium robecchii, Seddera sp.
Ligneux dominant : Acacia oerfata.

RELEVE 104 - 10 juin 1988

nom scient	nom vernac	type b	cote abo	re
Acacia oerfota	gumar	arbust	4 (104 08)	
Aristida adscensionis	gocoso	H ??	X (104 21)	
Aristida	taacug	H ?	X (104 05)	
Aristida sieberiana	maxaansuga	H. ??	X (104 22)	
Asclepiadaceae		?	X (104 13)	
asteraceae		??	X (104 10)	
Barleria sp.	daclé	H ??	X (104 12)	
Blepharis ciliaris	yamaarug	H.??	X (104 24)	
Burseraceae	qaroon	arbust	X (104 09)	
Cadaba	qalangal	arbust	X (104 03)	
Chrysopogon plumulosus	dureeme	H.V.	X (104 20)	
Crotalaria	caweer	H.?	X (104 18)	
Crotalaria sp.	weelo	H.?	X (104 24)	
Dactyloctenium robecchii	gubungub	H.V.	2 (104 01)	
Fagonia arabica	irmaan riija	H.?	- (104 11)	
Farsetia stylosa		H.?	X (104 23)	
Heliotropium sp.	cidiguduushe	H ?	X (104 14)	
Indigofera spiniflora	xajiin	H ?	X (104 06)	
Leucas inflata	soone	H.V. ?	X (104 16)	
Neuracanthus	reko	H.V.	X (104 15)	
Seddera sp.		?	2 (104 02)	
Sericocomopsis pallida	geed cad	H.V.	X (104 04)	
Sporobolus kentrophyllus	duxi	??	X (104 07)	
Sporobolus ruspolianus	safaar	H.V.	X (104 19)	
Vernonia cinerascens	murgis	H.??	X (104 26)	
zz indéterminé	qandhurgofil	?	- (104 18)	

RELEVE 004 - 3 décembre 1988

nom scient	nom vernac	type b	cote abo	re
Acacia oerfota		arbust	1 (004 01)	
Acacia sp (défeuillé)	deeroleged	arbust	X (004 07)	
Blepharis sp.	yamaarug	H.A.	X (004 05)	
Dactyloctenium robecchii		H.V.	1 (004 02)	
Eragrostis	duxi	H.V.	X (004 04)	
pulicaria sp.	xuldi	H.A.	X (004 06)	
Seddera sp.	nagaar	Arbris	X (004 03)	
zz indeterminé	madooya	buiss	- (004 09)	

SITE 5

Lieu-dit : Ded Boni

Latitude : 9°36'50'' Altitude : 780 m.

Longitude : 49°2'20''

Vallée

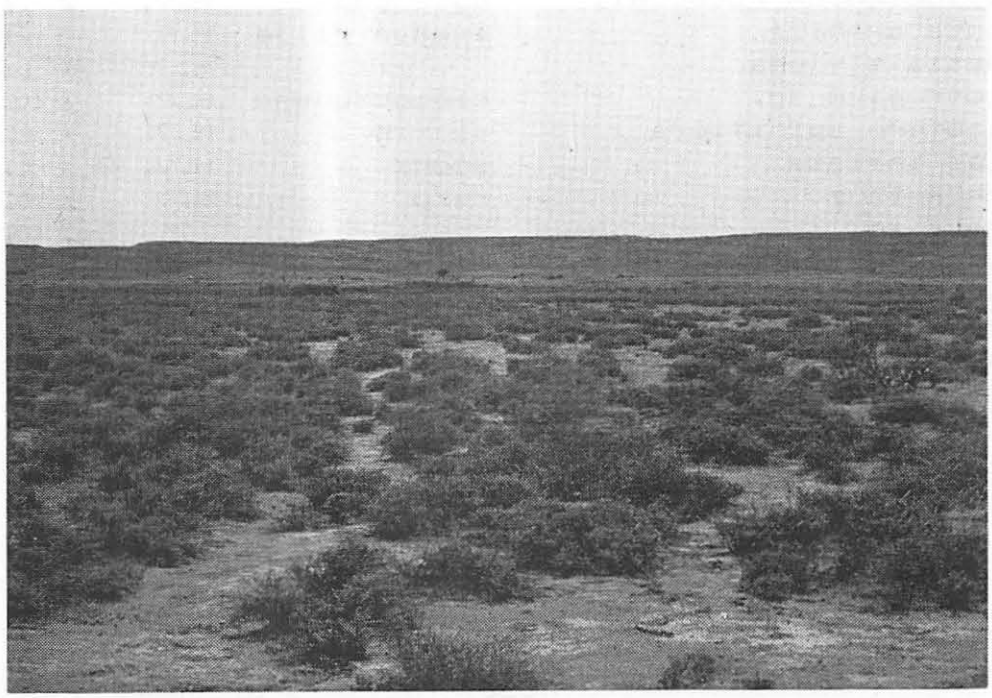


Photo : Juin 1988

Site localisé à l'extrémité Nord-ouest de la plaine de Ded Boni, sur sol sablo-limoneux.
Beaucoup de sol nu entre les touffes de plantes.
Herbacées dominantes : Dactyloctenium robecchii et Chrysopogon plumulosus.

RELEVE 105 - 11 juin 1988

nom scient	nom vernac	type b	cote abo re
Barleria eranthemoides			X (105 26)
Blepharis ciliaris	yamaruug	H.V.?	X (105 14)
Cadaba sp	qalangal	arbus	X (105 10)
Cassia holosericea	jaleelo	H.V.	X (105 19)
Chrysopogon plumulosus	dureeme	H.V.	3 (105 02)
Convolvulaceae	xarig	H ?	X (105 13)
cucurbitaceae	dabayood	lian	X (105 07)
Dactyloctenium robecchii	gubungub	H.V.	4 (105 01)
Dichantium foveolatum	urweyn	H.V.	X (105 12)
Echiochilon longifolium	torojo		X (105 22)
Euphorbia	bacaroor		X (105 21)
Euphorbia inaequilatera			X (105 15)
Fagonia arabica	irmaan riiji	H.?	X (105 20)
Hibiscus aponeurus	ubax	H.?	X (105 18)
Indigofera	al magaado	?	X (105 11)
Indigofera	murdis	?	X (105 17)
Indigofera spiniflora	xajiin		X (105 24)
Jatropha rivae	taraxo	Cham ?	X (105 04)
poaceae	gocoyo	??	X (105 05)
rubiaceae			X (105 25)
Sericocomopsis pallida	geed cad	H V	X (105 08)
Sporobolus ruspolianus	safaar	H.V.?	X (105 16)
zz indéterminé	carmo		X (105 23)
zz indéterminé	geed madow	?	X (105 03)

RELEVE 005 - 4 décembre 1988

nom scient	nom vernac	type b	cote abo re
Aristida (annuel-petit)		H.A.	- (005 10)
Barleria parviflora		Cham	X (005 09)
Barleria proxima		Cham	- (005 19)
Blepharis ciliaris		H.V.	X (005 15)
Cadaba cf rotundifolia		Arbus	X (005 06)
Chrysopogon plumulosus		H.V.	1 (005 05)
Dactyloctenium robecchii		H.V.	4 (005 01)
Dyschoriste lycioides		Cham	- (005 17)
Enneapogon		H.A.	- (005 14)
Fagonia bruguieri		H.V.	- (005 16)
Jatropha cf.		Arbri	X (005 02)
Latipes senegalensis		H.A.	- (005 12)
Schizachyrium kelleri		H.V.	X (005 08)
Seddera latifolia		Cham	- (005 18)
Sericocomopsis pallida		H.V.	X (005 03)
Sporobolus ruspolianus		H.V.	X (005 04)
Stipagrostis uniplumis		H.V.	X (005 11)
Tetrapogon cenchriformis		H.A.	- (005 13)
Vernonia cinerascens		Cham	X (005 07)

SITE 6

Lieu-dit : Karin Dismo

Latitude : 9°36'10'' Altitude : 790 m.

Longitude : 49°3'40''

Versant rocheux

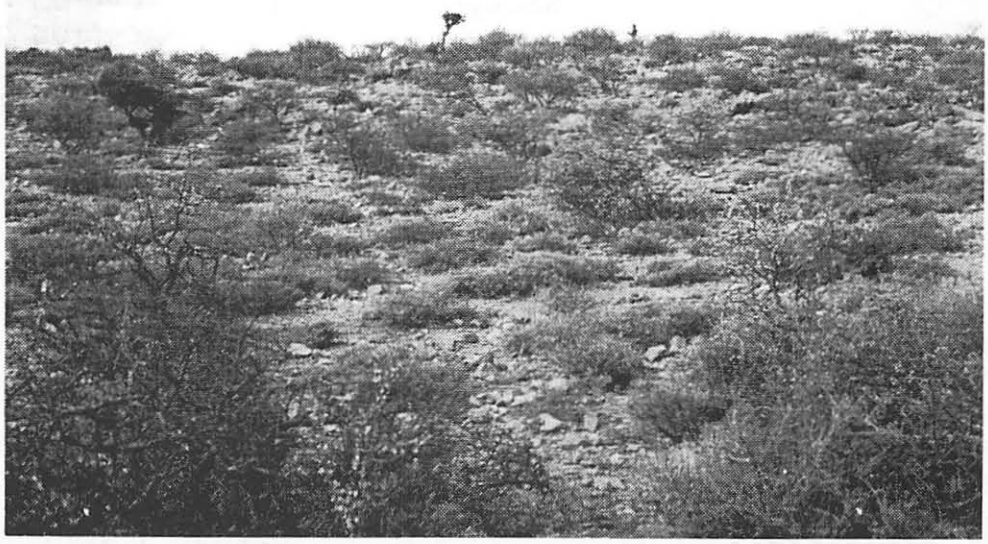


Photo : Juin 1988

Site localisé en milieu de versant, à forte pente, sur calcaires, proche de Karin Dismo
Surface pierreuse, calcaire, fortement dénudée.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, et Indogofera sp.
Ligneux dominants : Commiphora ssp. et Jatropha robecchii.

RELEVE 106 - 11 juin 1988

nom scient	nom vernac	type b	cote abo re
Acacia sp.	sarmaan	arbus	X (106 28)
Acacia leucospira	jeerin	arbus	X (106 32)
Aristida sieberiana	maxansuga	H.V.	X (106 26)
Barleria eranthemoides		Cham	X (106 09)
Blepharis			X (106 17)
Boscia minimifolia	maygaag	arbus	X (106 36)
Cadaba glandulosa	qalanqal	arbus	X (106 31)
Cassia holosericea	jaleelo	H.V.	X (106 35)
Chenopodiaceae			X (106 15)
Chrysopogon plumulosus	dureeme	H.V.	1 (106 07)
Cleome brachycarpa	dufnood	H.?	- (106 23)
Commiphora	kabog	arbus	X (105 08)
Commiphora	gabraro	arbus	1 (106 05)
Commiphora ?	qaroon	arbus	X (106 10)
Crotalaria	caweer		X (106 25)
Crotalaria sp.	waalo		X (106 19)
Dactyloctenium robecchii	gubungub	H.V.	X (106 11)
Enneapogon schimperanus		H.?	X (106 14)
Eragrostis cilianensis	caws	H.?	X (106 27)
Hermannia boranensis		H.?	X (106 22)
Hibiscus aponeurus		H.?	X (106 08)
Indigofera sp. ? (cf 109)	murdis		X (106 16)
Indigofera spiniflora	xaajin	H.V.?	2 (106 01)
Jatropha parvifolia	dhigloho	Arb?	X (106 13)
Jatropha sp.	taraxo		2 (106 02)
Leptothrium senegalense		H.A.?	X (106 18)
Malvaceae	adear ?		X (106 24)
Neuracanthus	reko	cham.	X (106 04)
poaceae			X (106 29)
Schizachyrium kelleri	duur	H.V.	1 (106 06)
Solanum forskalii	geed shimbir		X (106 33)
Sporobolus ruspolianus	safaar	H.V.	X (106 34)
Triunfetta trigona	garanacays		X (106 03)
Vernonia spatulata			X (106 30)
zz indéterminé	maragudag		- (106 20)
zz indéterminé	uraa		X (106 12)
zz indéterminé	sadkax		- (106 21)

RELEVE 006 - 4 décembre 1988

nom scient	nom vernac	type b	cote abo re
Acanthaceae Barleria ?		H.V.	X (006 06)
Aerva cf. javanica		H.A.?	- (006 08)
Aristida (épi dense)		H.A.	- (006 12)
Barleria proxima	rako	cham	X (006 11)
Boscia minimifolia		arbus	- (006 15)
Chrysopogon plumulosus		H.V.	X (006 04)
Commiphora ?	gowlalo	Arbus	1 (006 02)
Dactyloctenium robecchii		H.V.	1 (006 05)
Euphorbia triaculeata		Crass	- (006 14)
Halothamnus bottae		cham	- (006 17)
Indigofera karinensis		cham	- (006 18)
Jatropha robecchii	dhallool	arbus	1 (006 01)
Lamiaceae		cham	- (006 13)
melhania ??		cham	X (006 09)
Neuracanthus sp.	rako	H.V.	X (006 07)
Pupalia cf. robecchii		H.V.	- (006 16)
Sporobolus ruspolianus		H.V.	X (006 03)

SITE 7

Lieu-dit : Gobanti

Latitude : 9°28'30'' Altitude : 680 m.

Longitude : 49°17'00''

Plaine

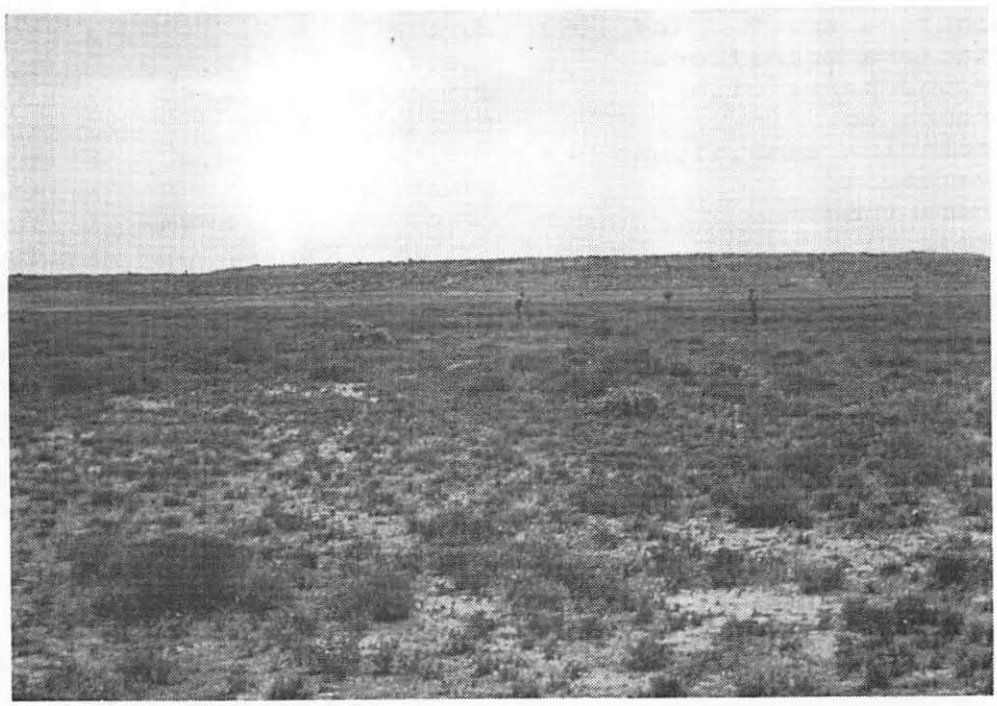


Photo : Juin 1988

Plaine de Gobanti, sur sol sablo-limoneux, avec beaucoup d'espaces dénudés.
Herbacées dominantes : Panicum coloratum, Chrysopogon plumulosus, Duosperma eremophilum, Neuracanthus sp. Sporobulus ruspolianus, et Geigeria alata en saison des pluies.

RELEVE 107 - 12 juin 1988

nom scient	nom vernac	type b	cote abo re
Acanthaceae			X (107 02)
Aristida adscensionis	xarfo	H.A.?	X (107 28)
Asclepiadaceae	cano nuux		X (107 32)
Cadaba sp.	qalanqal	arbus	X (107 27)
Cassia holosericea	jaleelo	H.V.	X (107 22)
Cenchrus pennisetiformis	garow	H.A.?	X (107 29)
Chrysopogon plumulosus	dureeme	H.V.	2 (107 12)
Cleome brachycarpa	dufhood		X (107 04)
Corchorus depressus	neylo narsh		X (107 09)
Cucumis prophetarum	sadkax ido	H.?	X (107 23)
Duosperma eremophilum	sarin	cham	1 (107 14)
Eragrostis cilianensis	caws		X (107 06)
Euphorbia inaequilatera	kabagoys		X (107 07)
Geigeria alata	cano xararis		4 (107 01)
Heliotropium aegyptiacum			X (107 26)
Hermannia paniculata			X (107 19)
Hibiscus aponeurus			X (107 30)
Indigofera spiniflora	xajiin		X (107 24)
Leucas urticifolia	food cad		1 (107 11)
Neuracanthus	reko	cham	X (107 15)
Orthosiphon pallidus		H.A.?	X (107 33)
Panicum cf. coloratum	gargalo		3 (107 08)
Pterodiscus kellerianus	burjugle		X (107 03)
Schizachyrium kelleri	duur	H.V.	X (107 21)
Senra incana	balanbal	H V	X (107 34)
Sericocomopsis pallida	geed cad		X (107 20)
Solanum	daghaweyn		1 (107 16)
Sporobolus ruspolianus	safaar		1 (107 13)
Zygophyllaceae	qod xando		X (107 10)
zz indéterminé	murcanyo		X (107 31)
zz indéterminé	fugdo		X (107 05)
zz indéterminé	caamo		X (107 17)

RELEVE 007 - 5 décembre 1988

nom scient	nom vernac	type b	cote abo re
Barleria ?		Cham	X (007 12)
Cadaba glandulosa		Arbus	X (007 07)
Caraluma	gawracato	Crass	- (007 10)
Cassia holosericea		H.V.	- (007 03)
Chrysopogon plumulosus		H.V.	X (007 05)
Duosperma eremophilum	saarin	Cham	X (007 15)
Euphorbia triaculeata		Crass	- (007 17)
Geigeria alata		H.A.	X (007 11)
Lactuca sp. ? fl. jaune	buurdet	H.V.	- (007 14)
Leucas inflata		H.A.	- (007 08)
Neuracanthus		Cham	1 (007 02)
Panicum cf coloratum		H.V.	3 (007 01)
Pulicaria ?	adaar	H.A.?	- (007 06)
Schizachyrium kelleri		H.V.	- (007 16)
Solanum cf. incanum	deg weyn	Cham	- (007 13)
Sporobolus ruspolianus		H.V.	1 (007 09)

SITE 8

Lieu-dit : Gobanti

Latitude : 9°26'50'' Altitude : 680 m

Longitude : 49°15'50''

Cône d'épandage

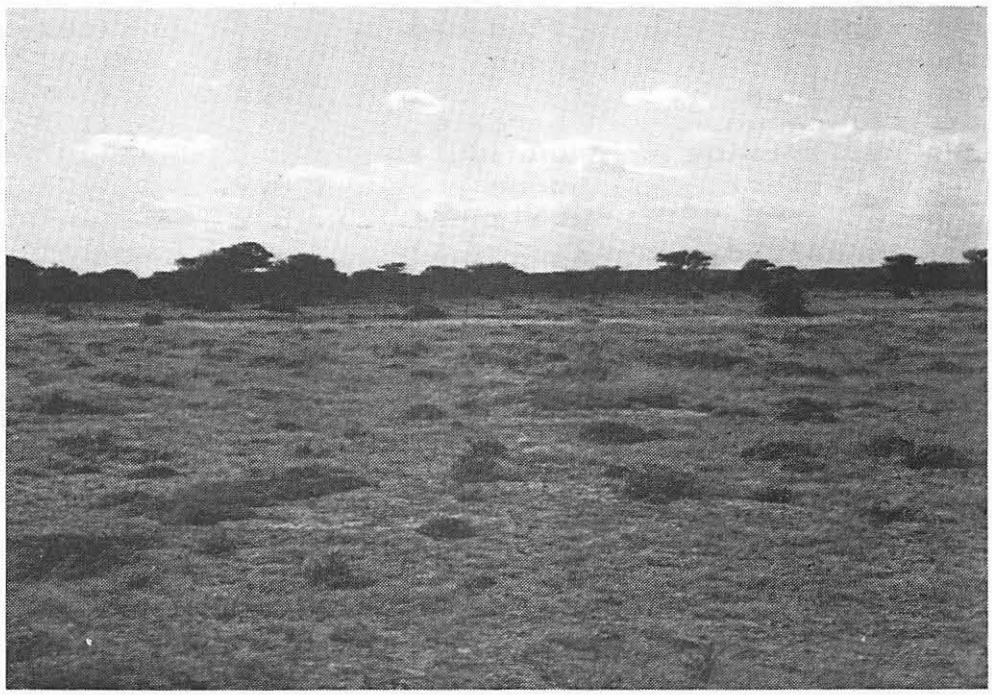


Photo : Juin 1988

Site localisé sur la pente du cône d'épandage de Gobanti. Présence de cheneaux latéraux.
Sol sablo-limoneux.
Herbacées dominantes : annuelles en saison des pluies : Aristida spp., Cenchrus pennisetiformis.
Herbacées vivaces : Sporobulus spp., Blepharis sp., Duosperma eremophilum, Neuracanthus sp.

RELEVE 108 - 12 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Acanthaceae	cayo		X	(108	23)
Acanthaceae ?			X	(108	29)
Aristida adscensionis	xarfo	H. ?	3	(108	07)
Aristida sp.	tacuug	H. ?	3	(108	02)
Barleria sp.	dacle		X	(108	28)
Cadaba	qalanqal	arbus	X	(108	11)
Cenchrus pennisetiformis	garow	H.A. ?	1	(108	05)
Chrozophora oblongifolia	geed biciid		X	(108	20)
Cleome brachycarpa	dufnood		X	(108	19)
Commiphora sp.	xam xamaa	arbus	-	(108	10)
Crotalaria sp.	caweer	H. ?	X	(108	16)
Cucurbitaceae	geed saar	H. ?	X	(108	12)
Cucurbitaceae ? acanthaceae?	xerig dheere		X	(108	21)
Duosperma eremophilum	sarin		X	(108	03)
Eragrostis cilianensis	caws	H. ?	X	(108	22)
Heliotropium aegyptiacum			X	(108	25)
Hermannia paniculata	narsh		X	(108	17)
Indigofera spiniflora	xajiin		X	(108	04)
Momordica dissecta		H.A.?	X	(108	15)
Neuracanthus	reko	cham	X	(108	06)
Sericocomopsis pallida	geed cad		X	(108	09)
Solanum sp.	dhagaweyn	H.?	X	(108	18)
Sporobolus ruspolianus	safaar	H.V.	1	(108	08)
Sporobolus kentrophyllus	duxi	H.V.	3	(108	01)
Svensonia laeta			X	(108	26)
Withannia somnifera	dhalaan		X	(108	14)
zz indéterminé	murdis		X	(108	30)
zz indéterminé	xabow		X	(108	13)

RELEVE 008 - 5 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Acacia bussei		Arbus	-	(008	01)
Acacia tortilis	hanon	Arbus	-	(008	15)
Acacia? fol. grass. rond ?	xowel	arbri	X	(008	14)
Aristida cf. mutabilis	xarfo	H.A.	2	(008	07)
Barleria (à feuil longs)	dacle	H.V.	X	(008	12)
Blepharis lanata ?	reko	Cham	1	(008	13)
Cassia holosericea		H.V.	X	(008	09)
Commiphora sp.	maddoya	arbus	X	(008	11)
Dobera ??	caday	cham	-	(008	17)
Duosperma eremophilum		Cham	1	(008	02)
Indigofera (Fl Fr pet arg.)	xatjiin	cham	-	(008	05)
Indigofera articulata	caweer	H.V.	X	(008	10)
Neuracanthus	reko	Cham	1	(008	08)
Panicum cf. coloratum	galgalo	H.V.	-	(008	04)
Physalis ? Withania ?	geed halan	Cham	-	(008	16)
Sporobolus sp	doxi	H.V.?	1	(008	03)
Tetrapogon cenchriformis	uurweyn	H.A.	-	(008	06)

SITE 9

Lieu-dit : Garamo

Latitude : 9°43'50'' Altitude : 780 m.

Longitude : 49°17'10''

Vallée

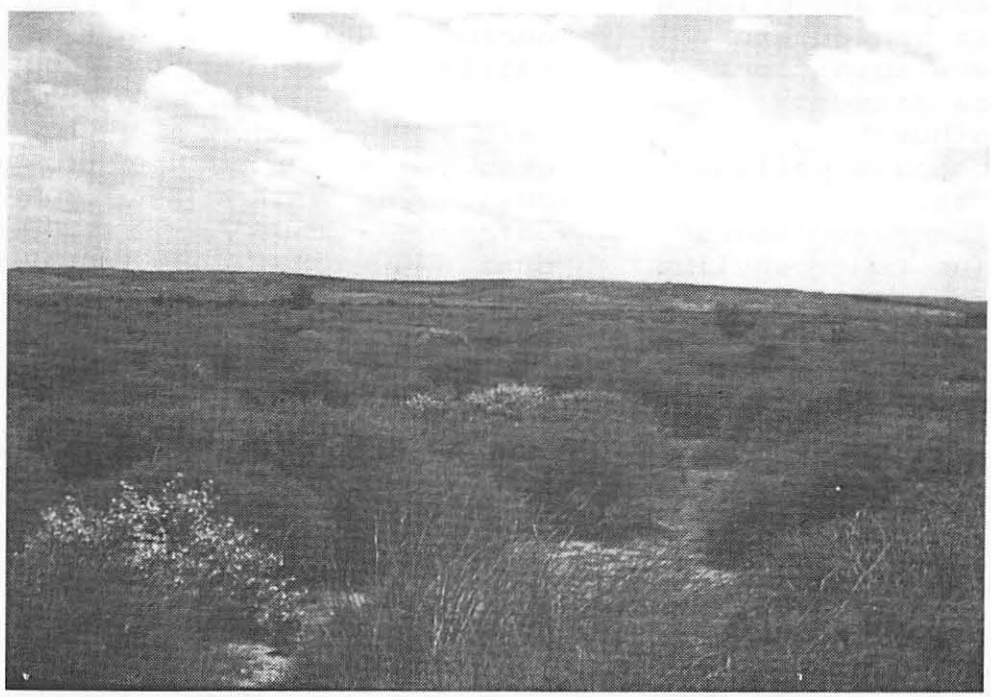


Photo : Juin 1988

Site placé dans le faciès végétalisé d'un "arc de végétation", dans la vallée de Garamo. Formation très dense de grosses touffes herbacées, avec quelques ligneux.
Sol limono-sableux.
Herbacées dominantes : Chrysopogon plumulosus, Schizachyrium kelleri, avec Aristida adscensionis en saison des pluies.

RELEVE 109 - 13 juin 1988

nom scient	nom vernac	type b	cote abo re
acanthaceae ?	cayo		X (109 33)
Aristida adscensionis	xarfo		2 (109 03)
Asteraceae	burdaad		X (109 18)
Barleria sp.	dacle		X (109 32)
Barleria parviflora	jafre		X (109 40)
Barleria parviflora	nagaar		X (109 17)
Blepharis ciliaris	yamaaruug		X (109 37)
Cadaba glandulosa	higlo		X (109 39)
Cassia holosericea	jalelo		X (109 09)
Chrozophora oblongifolia	gees biciid		1 (109 01)
Chrysopogon plumulosus	dureeme		3 (109 27)
Cleome brachicarpa	dufnood		X (109 07)
convolvulaceae	xarig		X (109 11)
Corchorus depressus	neylo narsh		X (109 05)
Corchorus depressus	narsh		X (109 31)
Crotalaria emarginella	ilcas		X (109 15)
cucurbitaceae	qalfoon		X (109 35)
Dactyloctenium robecchii	gubungub		X (109 13)
Eragrostis aethiopica	iaac		1 (109 28)
Fagonia arabica	irmaan riija		X (109 12)
Farsetia stylosa	iboroor		X (109 06)
Heliotropium sp.	cidi gudushe		X (109 20)
Heliotropium strigosum	dhurbe		X (109 25)
Helycrysum glumaceum	waxaro wecis		X (109 19)
Helycrysum glumaceum	ulul		X (109 34)
Hibiscus aponeurus	ubax		X (109 22)
Indigofera sp.	hagagaro		X (109 08)
Indigofera spiniflora	xajiin		X (109 24)
Leucas cf.inflata	sarar cadeye	H.V.?	X (109 10)
Leucas inflata	soone		X (109 21)
Pterodiscus kellerianus	burjugle		X (109 26)
Schizachyrium kelleri	duur	H.V.	4 (109 14)
Sericocomopsis pallida	geed cad		1 (109 04)
Solanum sp.	daghaweyn		1 (109 23)
Sporobolus ruspolianus	safaar		X (109 36)
Striga sp.			X (109 42)
Thamnosma hirschii	waniiq		X (109 30)
Tragus berteronianus			X (109 38)
zygophyllaceae	qod xanob		X (109 02)
zz indéterminé	kulmoloh		X (109 29)

RELEVE 009 - 4 décembre 1988

nom scient	nom vernac	type b	cote abo re
Acacia sp (ép long bla rect)	hanoon	arbus	- (009 06)
Aerva javanica	soone	H.V.	X (009 12)
Cadaba glandulosa		arbus	- (009 07)
Cassia holosericea	jaleelol	H.V.	X (009 10)
Chrysopogon plumulosus	duremme	H.V.	X (009 05)
Corchorus depressus	neylonaxsh	H.V.	X (009 13)
Dactyloctenium robecchii	gubungub	H.V.	X (009 08)
Indigofera sp.	dufnoot	cham	- (009 16)
Indigofera spiniflora	xajjiim	H.V.	X (009 14)
Ruellia sp.	murdis	cham	X (009 04)
Schizachyrium kelleri		H.V.	4 (009 01)
Sericocomopsis pallida	geed had	H.V.	1 (009 02)
Sporobolus ruspolianus	safaar	H.V.	X (009 09)
Tephrosia purpurea	agagara	HV	X (009 11)
Withania ?	geed dalcan	H.V.	X (009 15)
Ziziphus hamur	hamur	arbus	- (009 03)

SITE 10

Lieu-dit : Garamo

Latitude : 9°43'50'' Altitude : 780 m.

Longitude : 49°17'20''

Vallée

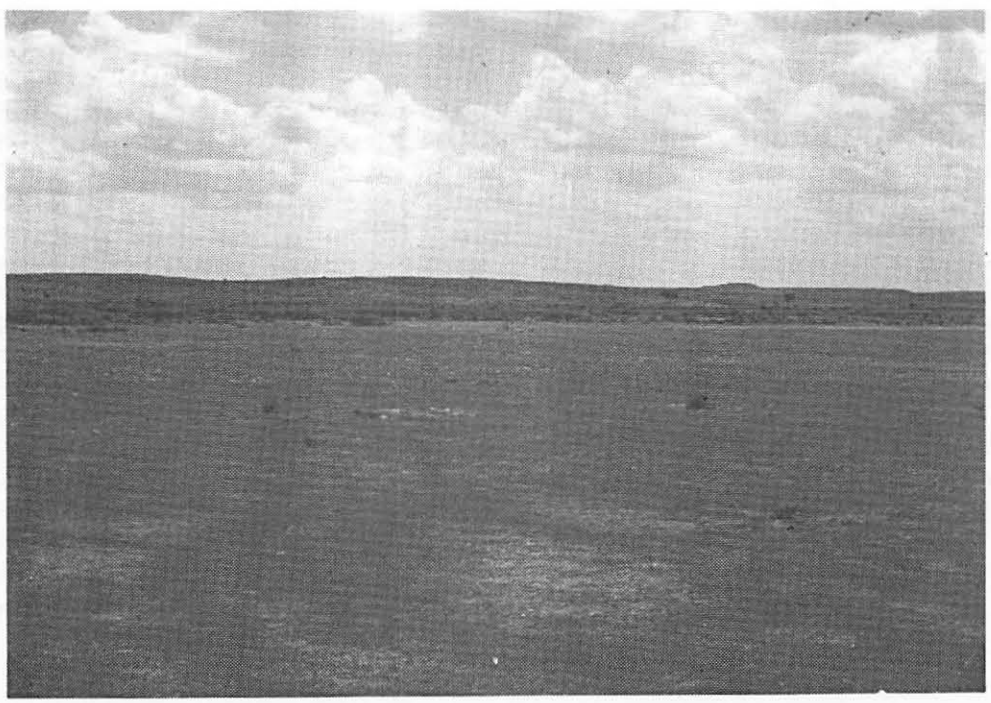


Photo : Juin 1988

Site localisé à proximité du 9, dans la plaine de Garamo, dans le faciès dénudé d'un "arc de végétation" Le sol, limoneux compact à surface gravillonnaire n'est que peu recouvert par la végétation et seulement en saison des pluies.
Herbacées dominantes : Aristida spp., Corchorus depressus, Hermania paniculata, Thamnosma hirschii.

RELEVE 110 - 13 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Aristida sp.	tacuug	H.A.?	1	(110	04)
Aristida adscensionis	xarfo	H.A.?	3	(110	02)
Asteraceae sp.			X	(110	18)
Blapharis ciliaris	yamaruug	H.A ?	X	(110	19)
Cassia holosericea	jaleelo	H.V.	X	(110	06)
Chrozophora oblongifolia	gees biciid	H.V.	X	(110	21)
Chrysopogon plumulosus	dureeme	H.V.	X	(110	20)
Cleome brachicarpa	dufnood	H.A ?	1	(110	03)
Corchorus depressus	neylo narsh	H.V.	X	(110	23)
Corchorus depressus	narsh	H.V.	1	(110	13)
Crotalaria sp.	caweer		X	(110	14)
cucurbitaceae sp.	qalfoon		X	(110	25)
Dactyloctenium robecchii	gubungub	H.V.	X	(110	28)
Eragrostis cilianensis	caws	H.A.?	X	(110	09)
Euphorbia inaequilatera	gabagoys		X	(110	24)
Fagonia arabica	imaan rijii	H.V.	1	(110	10)
Farsetia stylosa	iboroor	H.A.	X	(110	21)
Glossonema revoilii	askax		X	(110	15)
Hermannia paniculata	narsh	H. ?	3	(110	01)
Indigofera sp.	cagagaro	H.?	X	(110	05)
Indigofera spiniflora	xajiin		X	(110	29)
meremia ? convolvulaceae	xarig	H.A.?	1	(110	08)
Neuracanthus	reko	cham	X	(110	17)
Seetzenia lanata	neylo narsh		X	(110	11)
Sericocomopsis pallida	geed cad	H.V.	X	(110	27)
Sporobolus ruspolianus	safaar	H.V.	X	(110	15)
Thamnosma hirschii	waniiq	H.A.	X	(110	07)
zygophyllaceae	qod xando		X	(110	12)
zz indéterminé	marogudog		X	(110	30)

RELEVE 010 - 4 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Aristida mutabilis	laac	H.A.	X	(010	06)
Corchorus depressus		H.V.	X	(010	03)
Euphorbia cf. aegyptiaca	qodxando	H.A.	X	(010	05)
Fagonia	irmaal riiji	H.V.	X	(010	01)
Pulicaria ?	adaar		X	(010	04)
Thamnosma hirschii	waniiq	H.A.	X	(010	02)

SITE 11

Lieu-dit :

Latitude : 9°21'00'' Altitude : 790 m.

Longitude : 49°03'50''

Plateau

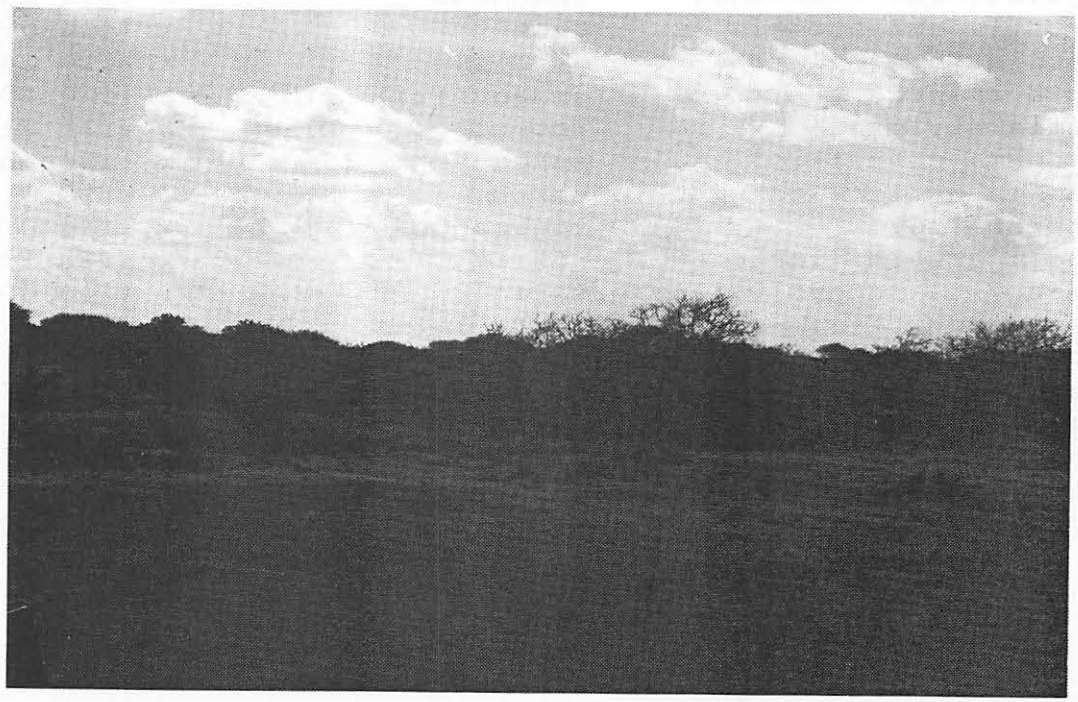


Photo : décembre 1988

Site localisé sur plateau calcaire à 17,5 km au sud de Gardho. Sol à surface très caillouteuse, portant une végétation éparse, arbustive, avec de vastes espaces dénudés.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, Schizachyrium kelleri, Sericocomopsis pallida, et Sporobulus ruspolianus
Ligneux très abondants, des genres Acacia, Boscia, Boswellia, Commiphora, et Grewia.

RELEVE 111 - 14 juin 1988

nom scient	nom vernac	type b	cote abo re
Acacia bussei	galool	arbus	X (111 43)
Acacia leucospina	jeerin	arbus	X (111 37)
Acacia tortilis	qurac	arbus	X (111 40)
Barleria parviflora	jafre	cham	X (111 05)
Blepharis ciliaris	yamaruug	H. V?	X (111 13)
Boscia minimifolia	shunbiit	arbus	X (111 45)
Cassia holosericea	jaleelo	H.V.	X (111 21)
Chrysopogon plumulosus	dureeme	H.V.	2 (111 02)
Cleome brachicarpa	dufnood	H.V.	X (111 11)
Commiphora	xagar	arbus	X (111 34)
Commiphora	kabog	Arbus	X (111 26)
Dactyloctenium robecchii	gubungub	H.V.	1 (111 12)
Diceratella incana		H.V.	X (111 30)
Echinops longifolius	niriq		X (111 20)
Eragrostis cilianensis	caws	H.V.	X (111 09)
Euphorbia	tuur cuso		X (111 33)
Euphorbia	bacaroor		X (111 16)
Farsetia stylosa	iboroor	H.A.?	1 (111 04)
Glossonema revoilii	sadkax		X (111 39)
Heliotropium	cidi gudushe	H.V.	X (111 41)
Heliotropium			X (111 19)
Indigofera sp.	cagagaro		X (111 07)
Indigofera spiniflora	xajiin		X (111 25)
Leucas inflata	sararcadeyel		X (111 18)
Leucas inflata	cargow		X (111 31)
Leucas inflata	sooné	H.V;	X (111 28)
Melhania stipulosa	xaciin		X (111 29)
Momordica sessilifolia	casanghas	H.A.?	X (111 24)
Neuracanthus	reko	cham	X (111 01)
Pavonia procumbens		cham	X (111 48)
Pavonia zeylanica			X (111 27)
Schizachyrium kelleri	dour	H.V.	1 (111 32)
Seetzenia lanata	neylo narsh		X (111 10)
Sericocomopsis pallida	geed cad	H.V.	1 (111 08)
Sporobolus ruspolianus	safaar	H.V.	2 (111 14)
Thamnosma hirschii	waniiq	H.A.	X (111 17)
Tragus berteronianus	xarfo	H.A.	X (111 22)
Withania somnifera	geed dhalaan	cham	X (111 46)
zz indéterminé	luug dheer		X (111 23)
zz indéterminé	murdis		X (111 06)
zz indéterminé	murdis		2 (111 03)
zz indéterminé	wara weeshe		X (111 35)

RELEVE 011 - 7 décembre 1988

nom scient	nom vernac	type b	cote abo re
Acacia bussei		cham	- (011 14)
Acacia cf. leucospina		arbus	X (011 11)
Acacia tortilis		cham	- (011 20)
Acanthaceae sp		cham	- (011 10)
Arnebia Echiochilon ??		H.A.	x (011 12)
Blepharis ciliaris (lanata)		cham	X (011 07)
Blepharis linariifolia		H.A.	X (011 19)
Boscia minimifolia		arbus	- (011 18)
Boswellia boranensis		arbus	X (011 16)
Chrysopogon plumulosus		H.V.	X (011 06)
Commicarpus squarrosus		cham	X (011 02)
Commiphora sp.		arbus	X (011 04)
Commiphora sp. (africana ?)		arbus	X (011 17)
Dactyloctenium robecchii		H.V.	X (011 01)
Digitaria pennata		H.V.	- (011 21)
Dyschoriste lycioides		cham	X (011 03)
Euphorbiaceae sp.		geo	- (011 15)
Grewia tenax		arbus	- (011 23)
Leucas cuneifolia		H.V.	- (011 24)
Pleuropteranthera revoilii	var. rhodop	cham	- (011 25)
Pulicaria sp.		cham	- (011 08)
Schizachyrium kelleri		H.V.	X (011 05)
Sericocomopsis pallida		cham	X (011 11)
Solanum cf incanum		cham	- (011 22)
Tetrapogon cenchriformis		H.A.	X (011 08)

SITE 12

Lieu-dit : Boco

Latitude : 9°16'40'' Altitude : 780 m.

Longitude : 49°6'20''

Plateau

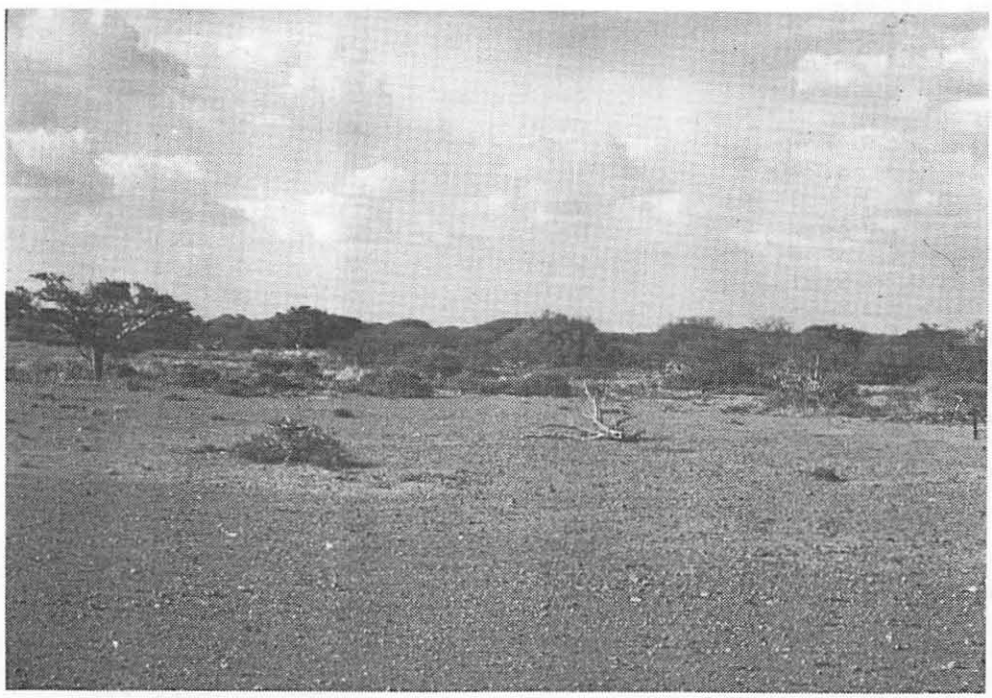


Photo :Juin 1988

Site placé sur plateau gravillonnaire large, à 20 km au sud de Gardho.
L'ensemble présente de vastes espaces dénudés alternant avec des formations arbustives contractées dans les creux.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, Sporobulus spp. et plusieurs acanthaceae.
Ligneux des genres Acacia, Commiphora, Jatropha, et Ziziphus.

SITE 13

Lieu-dit : Gediyo

Latitude : 9°33'40'' Altitude : 880 m.

Longitude : 48°57'20''

Plateau

Photo : Juin 1988

Site localisé sur le plateau Gediyo, à 15,5 km à l'ouest de Kubo, sur la piste de Daranhar.
Sol à surface pierreuse, calcaire.
Vastes plages dénudées, entourées d'auréoles végétalisées.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, Schizachyrium kelleri, Sporobulus ruspolianus.
Ligneux nombreux rabougris, des genres : Acacia, Boscia, Boswellia, Commiphora, Grewia, Jatropha, et Ziziphus.

RELEVE 112 - 14 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Acacia tortilis ?	qurac	arbus	1	(112	17)
acanthaceae sp.	cayo iss		X	(112	37)
Acanthaceae sp.	murdis	cham	1	(112	21)
Adenium obesum	habar ticaa	Arbus	-	(112	36)
Aristida sp.	tacuug	H.A.	X	(112	02)
Barleria parviflora	jafre	cham	X	(112	10)
Blepharis ciliaris	yamaruug	cham	X	(112	13)
Cassia holosericea	jaleelo	H.V.	X	(112	06)
Cenchrus pennisetiformis	garow	H.A.?	X	(112	12)
Chrysopogon plumulosus	dureeme	H.V.	4	(112	08)
convolvulaceae sp.	harac		X	(112	31)
Dactyloctenium robecchii	gubungub	H.V.	2	(112	19)
Digitaria pennata		H.V.?	X	(112	29)
Echinops longifolius	niriq		-	(112	24)
Eragrostis cilianensis	caws	H.V.	X	(112	33)
Farsetia stylosa	iboroor	H.A.	X	(112	04)
Geigeria alata	xam xamaa	H.A.	X	(112	28)
Halothamnus somalensis	al madadaane	cham ?	X	(112	35)
Indigofera sp.	cagagaro		X	(112	16)
Indigofera spiniflora	xajiin		X	(112	03)
Leucas inflata	soone	H.V.	X	(112	23)
Momordica sessilifolia	gasangas	H.A.?	X	(112	07)
Neuracanthus sp.	reko	cham	1	(112	26)
Peristrophe paniculata			X	(112	25)
poaceae sp.	xarfo	H.A.	1	(112	01)
Polycarpaea pulvinata		H.A.?	X	(112	39)
Schizachyrium kelleri	duur	H.V.	1	(112	32)
Sericocomopsis pallida	geed cad	H.V.	X	(112	20)
Sporobolus kentrophyllus	duxi		1	(112	05)
Sporobolus ruspolianus	safaar	H.V.	X	(112	09)
Thamnosma hirschii	waniiq	H.A.	X	(112	14)
zz indéterminé	caduuro		X	(112	22)
zz indéterminé	murdis		1	(112	11)
zz indéterminé	dufnood		X	(112	15)
zz indéterminé	uraa		X	(112	27)

RELEVE 012 - 7 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Acacia mellifera		arbus	X	(012	01)
acanthaceae sp.		cham	X	(012	09)
Blepharis ciliaris (lanata)		cham	X	(012	03)
Boscia minimifolia		arbus	-	(012	16)
Commiphora africana		arbus	X	(012	10)
Commiphora sp.		arbus	X	(012	05)
Commiphora sp. (noir)		arbus	X	(012	06)
cucurbitaceae sp.		liane	X	(012	11)
Dactyloctenium robecchii		H.V.	X	(012	02)
Enneapogon brachystachyus		H.A.	-	(012	07)
Jatropha robecchii		arbus	x	(012	12)
Polycarpoea pulvinata		cham	-	(012	14)
Sericocomopsis pallida		cham	-	(012	15)
Tetrapogon cenchriformis		H.A.	-	(012	08)
Ziziphus hamur	hamur	arbus	X	(012	04)

RELEVE 113 - 15 juin 1988

nom scient	nom vernac	type b	cote	abo	re
Acacia tortilis	qurac	arb.	X	(113	29)
Acanthaceae	al mogado	cham	-	(113	11)
Aristida	xarfo	H.A.	X	(113	47)
Asparagus	cargeeg	H.A.?	X	(113	35)
asteraceae			X	(113	03)
Barleria parviflora	jafre		X	(113	21)
Barleria sp.	dacle	cham	X	(113	37)
Blepharis ciliaris	yamaarug	cham	X	(113	19)
Boscia minimifolia	may gaag	arbus	X	(113	39)
Boswellia sp.	moxor	arbus	X	(113	43)
Cassia holosericea	jaleelo	H.V.	X	(113	38)
Cenchrus pennisetiformis	garow	H.A.?	X	(113	17)
Chrysopogon plumulosus	dureeme	H.V.	3	(113	06)
Commicarpus	garas		X	(114	42)
Commiphora gowlalo	gowlalo	arbus	X	(113	09)
Commiphora sp.	xam xamba	arbus	X	(113	36)
Commiphora sp.	xagar	arbus	X	(113	33)
Crotalaria sp	caweer		X	(113	12)
Crotalaria sp.	liilan		X	(113	31)
Dactyloctenium robechii	gubungub	H.V.	4	(113	01)
Euphorbia inaequilatera	kabagoys		X	(113	28)
Farsetia stylosa	iboroor	H.A.	X	(113	27)
Glossonema revoilii	sadkax		X	(113	44)
Grewia tembensis	dhafaruur	arbri	X	(113	24)
Grewia villosa	gomoshe		X	(113	45)
Hibiscus aponeurus	ubax	H.V.?	X	(113	05)
Indigofera spiniflora	xaajiin		X	(113	46)
Jatropha	dhigle		X	(113	22)
Leucas inflata	soone	H.V.	X	(113	10)
Momordica sessilifolia	gasangas	H.A.?	X	(113	02)
Neuracanthus sp.	reko	cham	X	(113	04)
Peristrophe paniculata	cidi gudushe		X	(113	18)
Schizachyrium kelleri	duur	H.V.	1	(113	13)
Sericocomopsis pallida	geed cad	H.V.	X	(113	16)
Solamum forskalii	geed shimbir		-	(113	23)
Solanum	dhagaweyn		X	(113	25)
Sporobolus ruspolianus	safaar	H.V.	2	(113	15)
Triunfetta trigona	garanacays		X	(113	40)
Ziziphus hamur	hmur canyo	arbus	X	(113	32)
zygiphyllaceae	qod xando		X	(113	20)
zz indéterminé	murdis		X	(113	07)

RELEVE 013 - 6 décembre 1988

nom scient	nom vernac	type b	cote	abo	re
Acacia bussei		arbre	X	(013	18)
Acacia etbaica	qansax	arbri	X	(013	12)
acanthaceae sp.		cham	X	(013	16)
Aerva javanica		cham	X	(013	13)
Barleria proxima		cham	-	(013	15)
Blepharis ciliaris		H.A.?	-	(013	21)
Boscia minimifolia		arbus	-	(013	06)
Boswellia boranensis	moxor	arbus	X	(013	08)
Commiphora "gowlelo"	gowlalo	arbus	-	(013	07)
Commiphora (écorce blanche)	xagar	arbus	X	(013	01)
Commiphora sp.		arbus	X	(013	17)
Crotalaria emarginella		cham	X	(013	14)
Dactyloctenium robecchii		H.V.	X	(013	02)
Grewia tenax	murayo	arbri	X	(013	10)
Ipomoea cicatricosa		cham	-	(013	11)
Jatropha robecchii		arbri	-	(013	22)
Neuracanthus "lanatus"		cham	X	(013	04)
Ochradenus randonioides	algeg	cham	-	(013	19)
Schizachyrium kelleri		H.V.	X	(013	09)
Sericocomopsis pallida		cham	-	(013	05)
Sporobolus ruspolianus		H.V.	X	(013	03)
Tribulus terrestris		H.A.	-	(013	20)

SITE 14

Lieu-dit : Gediyo

Latitude : 9°33'30''

Longitude : 48°59'30''

Altitude : 860 m.

Glacis

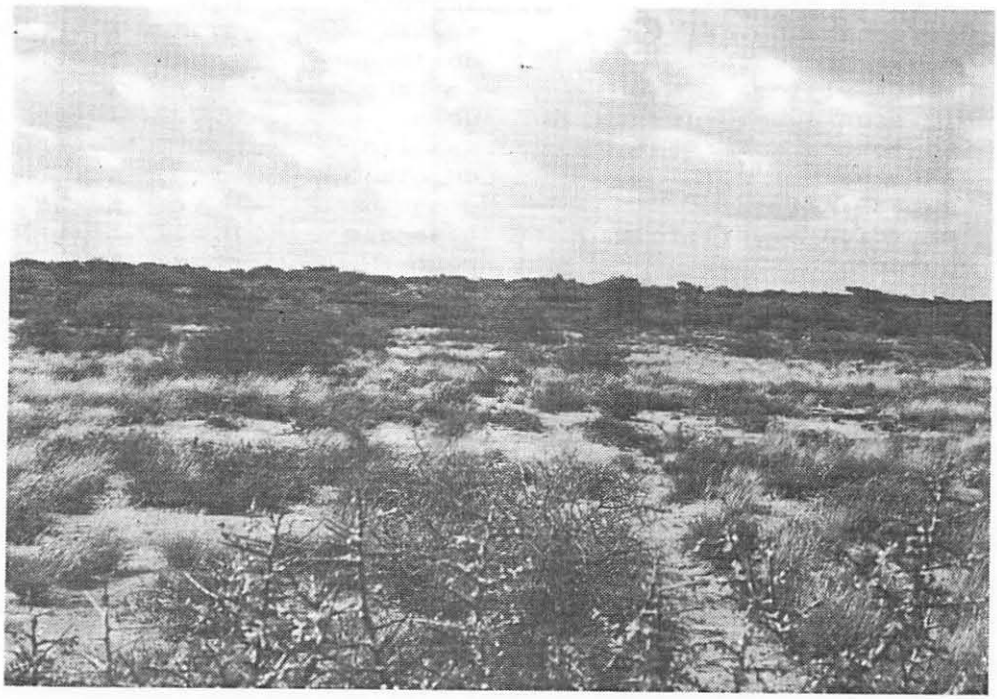


Photo : juin 1988

Site localisé sur un glacis du plateau de Gediyo à 4,8 km au sud du 13. La pente est orientée au sud-est et striée de rigoles de ruisellement.
Sol sableux à surface gravillonnaire.
Végétation en mosaïque de plages herbacées et arbustives.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, Schizachyrium kelleri Sporobulus ruspolianus.
Ligneux dominants : genres Acacia, Boscia, Commiphora, Grewia.

RELEVE 114 - 14 juin 1988

nom scient	nom vernac	type b	cote abo re
Acacia sp.	deero legad	arbus	X (114 23)
Acalypha crenata			X (114 31)
Aristida ou Tragus ber.	xarfo	H.A.	X (114 13)
Aristida sp.	taacug	H.A.?	X (114 35)
asteraceae	burdad		X (114 55)
asteraceae			X (114 05)
Barleria parviflora	jafre	cham	X (114 21)
Blepharis ciliaris	yamaruug	H.A.?	X (114 09)
Boscia minimifolia	jiie	arbus	X (114 51)
Cassia holosericea	jaleelo	H.V.	X (114 16)
Cenchrus pennisetiformis	garow	H.A.	X (114 38)
Chrozophora oblongifolia	gees biciid	cham	X (114 44)
Chrysopogon plumulosus	dureeme	H.V.	3 (114 02)
Commiphora sp.	xagar	arbus	X (114 25)
convolvulaceae sp.	xarig		X (114 27)
Corchorus depressus	neylo narsh	H.V.	X (114 37)
Crotalaria sp.	caweer		X (114 56)
Dactyloctenium robecchii	gubungub	H.V.	4 (114 01)
Farsetia stylosa	iboqor	H.A.	X (114 34)
Glossonema revoilii	sadkax	cham	X (114 18)
Heliotropium sp.	gidi gudushe	H.V.?	X (114 36)
Heliotropium sp.	murdis	H.A.?	X (114 24)
Indigofera spiniflora	xajiin		X (114 20)
Jatropha parvifolia	dhigloho		X (114 12)
Leptothrium senegalense	duxi	H.A.	X (114 11)
Leucas inflata	soone	H.V.	X (114 39)
Leucas urticifolia	food cad		X (114 46)
Momordica sessilifolia	gasangas	H.A.	X (114 14)
Neuracanthus	reko	cham	X (114 03)
Portulaca sp.		H.A.?	X (114 47)
Schizachyrium kelleri	duur	H.V.	X (114 17)
Sericocomopsis pallida	geed cad	cham	X (114 15)
Solanum sp.	dhagaweyn		X (114 53)
Sporobolus ruspolianus	safaar	H.V.	2 (114 07)
Sporobolus sp.	duxi	H.V.?	X (114 04)
Thamnosma hirschii	waniiq	H.A.	X (114 50)
Triunfetta trigona	garanacays		X (114 43)
Zygophyllaceae	qod xando		X (114 28)
== indéterminé			X (114 54)
== indéterminé	murdis		X (114 22)

RELEVE 014 - 6 décembre 1988

nom scient	nom vernac	type b	cote abo re
Acacia bussei		arbus	- (014 12)
Acacia etbaica	qansax	arbus	- (014 06)
Acanthaceae (16 du 013)		cham	- (014 03)
Aloe sp.	darqar	cham	- (014 08)
Boscia minimifolia		arbus	- (014 09)
Commiphora gowlalo	gowlalow	arbus	X (014 01)
Dactyloctenium robecchii		H.V.	1 (014 02)
Grewia sp.		arbus	- (014 07)
Ochradenus randonioides	argeg	cham	- (014 11)
Schizachyrium kelleri		H.V.	X (014 04)
Sericocomopsis pallida		Cham	- (014 05)
Tetrapogon cenchriformis		H.A.	- (014 10

SITE 15

Lieu-dit : Qaroon Weyn

Latitude : 9°27'50'' Altitude : 747 m.

Longitude : 49°2'10''

Vallée

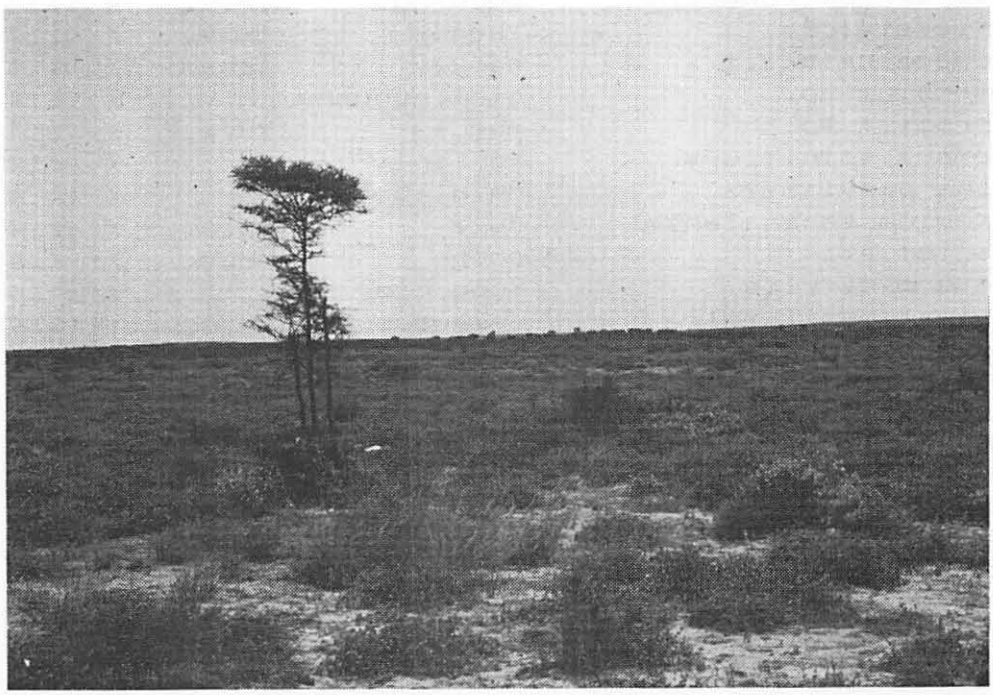


Photo : juin 1988

Site localisé dans la vallée de Qaroon Weyn, à 3 km au Sud-ouest de Kubo, près d'une vaste zone d'épandage. Sol sableux; végétation laissant de nombreux espaces dénudés. Très peu de ligneux.
herbacées dominantes : Chrysopogon plumulosus, Indigofera spp., Sporobulus ruspolianus, Duosperma eremophilum, Neuracanthus sp.

RELEVE 115 - 19 juin 1988

nom scient	nom vernac	type b	cote abo re
Abutilon sp.			X (115 10)
Acacia sp.	xanan	arbus	X (115 57)
Acanthaceae	cargo	cham	X (115 61)
Anticharis sp.			X (115 49)
Aristida ou Tragus ber.	xarfo	H.A.	X (115 15)
Aristida sieberiana	maxaan sugaa	H.A.?	X (115 04)
Asteraceae	burdad		X (115 06)
Asteraceae sp.			X (115 17)
Barleria parviflora	jafre	cham	X (115 22)
Barleria sp.	dacle	cham	X (115 28)
Blepharis ciliaris	yamaruug	H.A.?	X (115 14)
Cadaba glandulosa	higlo	arbus	X (115 44)
Cassia holosericea	jaleelo	H.V.	X (115 24)
Cenchrus pennisetiformis	garow	H.A.	3 (115 02)
Chrysopogon plumulosus	dureeme	H.V.	1 (115 21)
Cleome brachycarpa	geed xamar		X (115 62)
Commicarpus sp.	ugaabdays		X (115 53)
Commiphora cf. gowlalo	gowlalo	arbus	X (115 64)
convolvulaceae	xariig	H.A.?	X (115 48)
Convolvulus rhyniospermum	agagaro	H.A.?	X (115 09)
Crotalaria sp.	liilan		X (115 42)
Cyclocheilon somaliense	shan bogsi		X (115 26)
Dactyloctenium robecchii	gubungub	H.V.	X (115 47)
Diceratella incana			X (115 43)
Euphorbia sp.	bacaroor		X (115 52)
Euphorbiaceae	bago xsugeed		X (115 44)
Fagonia arabica	irma rijii	H.V.?	X (115 46)
Farsetia sp.	weys	H.A.?	X (115 12)
Farsetia stylosa	iboqor	H.A.	X (115 05)
Geigeria alata	cano qararshe	H.A.	X (115 66)
Heliotropium aegyptiacum			X (115 51)
Heliotropium sp.	gidi gudusshe		X (115 50)
Heliotropium stylosum	dhurbe		X (115 08)
Hibiscus aponeurus	ubax		X (115 45)
Indigofera	sariin	cham	4 (115 03)
Indigofera spiniflora	xajiin		X (115 18)
Ipomoea			X (115 11)
Leucas inflata	soone		X (115 19)
Leucas urticifolia	food cad	H.V.?	X (115 07)
Momordica sessiliflora	gasangas	H.A.	X (115 43)
Neuracanthus sp.	reko	cham	X (115 27)
Panicum coloratum	qarqalo	H.V.	X (115 45)
Phyllanthus sp.		H.A.?	X (115 47)
Pulicaria sp.	adaar		X (115 42)
Rhynchosia minima	iicas	H.A.?	X (115 49)
Schizachyrium kelleri	duur	H.V.	X (115 58)
Seetzenia lanata	neylo narsh		X (115 48)
Sehima ischaemoides	ayax makare	H.A.?	X (115 01)
Sericocomopsis pallida	geed cad	cham	X (115 25)
Solanum sp.	dhaga weyn		X (115 59)
Sporobolus sp.	duxi	H.V.	X (115 23)
Thamnosma hirschii	waniiq	H.A.	X (115 41)
Tribulus sp.	qod xando		X (115 20)
Ziziphus hamur	mur canyo	arbri	X (115 56)
zz indéterminé	murdis		X (115 55)

RELEVE 015 - 2 décembre 1988

nom scient	nom vernac	type b	cote abo re
Blepharis ciliaris		H.A	X (015 06)
Cadaba mirabilis		arbus	X (015 02)
Cenchrus pennisetiformis		H.A.	X (015 08)
Commiphora sp.		arbus	X (015 15)
Dactyloctenium robecchii		H.V.	1 (015 13)
Duosperma eremophilum		cham	3 (015 01)
Farsetia stylosa		H.A.	X (015 05)
Leucas urticifolia		H.A.	1 (015 11)
Neuracanthus sp.		cham	2 (015 03)
Ochradenus baccatus		arbri	- (015 12)
Schizachyrium kelleri		H.V.	1 (015 07)
Sericocomopsis pallida		H.V.	X (015 10)
Sporobolus ruspolianus		H.V.	2 (015 04)

SITE 16

Lieu-dit :

Latitude : 9°27'50'' Altitude : 780 m.

Longitude : 49°00'30''

Plateau

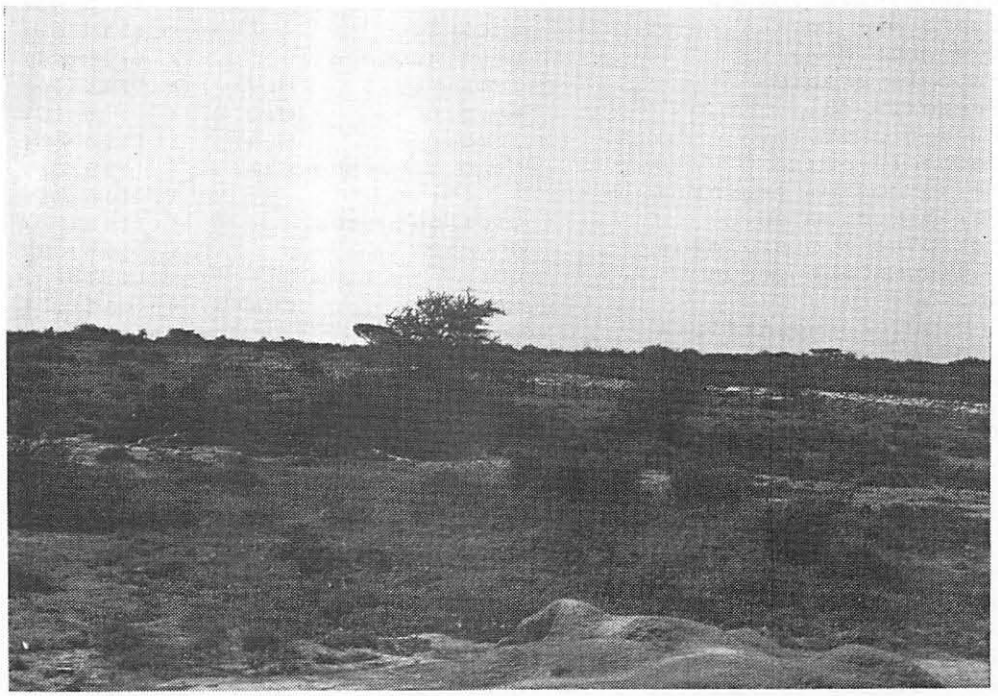


Photo : Juin 1988

Site localisé en bordure de plateau, à 4 km à l'ouest de Kubo.
Sol gravillonnaire-pierreux, calcaire.
Couvert végétal discontinu, nombreuses rigoles de ruissellement.
Herbacées dominantes : Blepharis sp., Dactyloctenium robecchii, Indigofera sp., Neuracanthus sp, Sporobulus ruspolianus.

RELEVE 116 - 19 juin 1988

nom scient	nom vernac	type b	cote abo	re
Acacia bussei	galool	arbus	X (116 39)	
Acacia leucospira	jeerin	arbus	X (116 33)	
Anticharis senegalensis			X (116 09)	
Aristida sp.	tacuug	H.A.	X (116 27)	
Aristida sp.	xarfo	H.A.?	X (116 25)	
Asparagus sp.	cargeeg		X (116 46)	
Asteraceae	burdaad		X (116 35)	
Blepharis ciliaris	yamaruug	cham	1 (116 03)	
Boraginaceae			X (116 13)	
Cadaba glandulosa	higlo	arbus	X (116 49)	
Cassia holosericea	jaleelo	H.V.	X (116 31)	
Cenchrus pennisetiformis	garow	H.A.?	X (116 30)	
Chrysopogon plumulosus	dureeme	H.V.	X (116 38)	
Cleome brachycarpa	dufnood	H.A.?	X (116 08)	
Commiphora sp.	agar	arbus	X (116 53)	
Commiphora sp.	kabog		X (116 28)	
Commiphora sp.	dhirin dhir	arbus	X (116 21)	
Convolvulus rhyniospermus	agagaro		X (116 26)	
Crotalaria sp.	caweer		X (116 54)	
Crotalaria sp.	caweer		X (116 12)	
Crotalaria sp.	kuluco		X (116 11)	
Dactyloctenium robecchii	gubungub	H.V.	4 (116 01)	
Eragrostis cilianensis	caws	H.?	X (116 07)	
Heliotropium rariflorum	daran		X (116 32)	
Heliotropium rugosum	dhurbe		X (116 41)	
Heliotropium sp.	gidi gudusche		X (116 18)	
Hermania paniculata	narsh		X (116 06)	
Hibiscus aponeurus	ubar		X (116 22)	
Indigofera parviflora	dogloho		X (116 45)	
Indigofera spiniflora	xajiin		X (116 10)	
Jatropha parviflora	digloho	cham	X (116 23)	
Jatropha rivae	taraxo	cham	X (116 04)	
Leucas inflata	soone		X (116 52)	
Neuracanthus	reko	cham	X (116 20)	
Pavonia sp.			X (116 44)	
Pulicaria sp.	adaar		X (116 51)	
Rynchosia sp.	murdis		X (116 16)	
Schizachyrium kelleri	duur	H.V.	X (116 37)	
Seetzenia lanata	neylo narsh	H.?	X (116 02)	
Sericocomopsis pallida	geed cad	cham	X (116 17)	
Sporobolus ruspolianus	safaar	H.V.	X (116 15)	
Sporobolus sp.	duxi	H.?	X (116 24)	
Ziziphus hamur	muur canyo	arbus	X (116 36)	
Zygophyllaceae	qod xando		X (116 28)	
zz indéterminé	madoyaa		X (116 19)	

RELEVE 016 - 6 décembre 1988

nom scient	nom vernac	type b	cote abo	re
Acacia bussei		arbus	X (016 13)	
Acacia etbaica		arbus	X (016 16)	
Acacia sp.		arbus	X (016 14)	
Acacia tortilis		arbus	X (016 01)	
Aerva javanica		cham	- (016 20)	
Aristida sp.		H.A.	- (016 26)	
Blepharis linariifolia		H.A.	X (016 05)	
Cadaba cf. mirabilis		arbus	- (016 15)	
Cassia holosericea		H.V.	X (016 09)	
Cenchrus pennisetiformis		H.V.	X (016 21)	
Chascanum sp.		H.V.	- (016 24)	
Cleome brachycarpa		H.V.	1 (016 04)	
Commiphora africana		arbus	- (016 17)	
Corchorus depressus		H.V.	X (016 07)	
Cystostemon somaliensis		H.V.?	X (016 08)	
Dactyloctenium robecchii		H.V.	3 (016 02)	
Echiochilon sp.		H.V.	- (016 27)	
Enneapogon brachystachyus		H.A.	- (016 12)	
Fagonia sp.		H.V.	- (016 06)	
Grewia sp.		arbri	X (016 18)	
Heliotropium sp;		H.V.	- (016 25)	
Indigofera articulata		H.V.	1 (016 03)	
Jatropha robecchii		arbri	X (016 10)	
Neuracanthus		cham	2 (016 11)	
Pulicaria sp.		H.A.	- (016 23)	
Reseda sp.		arbri	- (016 22)	
Sporobolus ruspolianus		H.V.	1 (016 19)	

SITE 17

Lieu-dit : Sarin

Latitude : 9°24'30''

Longitude : 49°17'30''

Altitude : 687 m.

Vallée

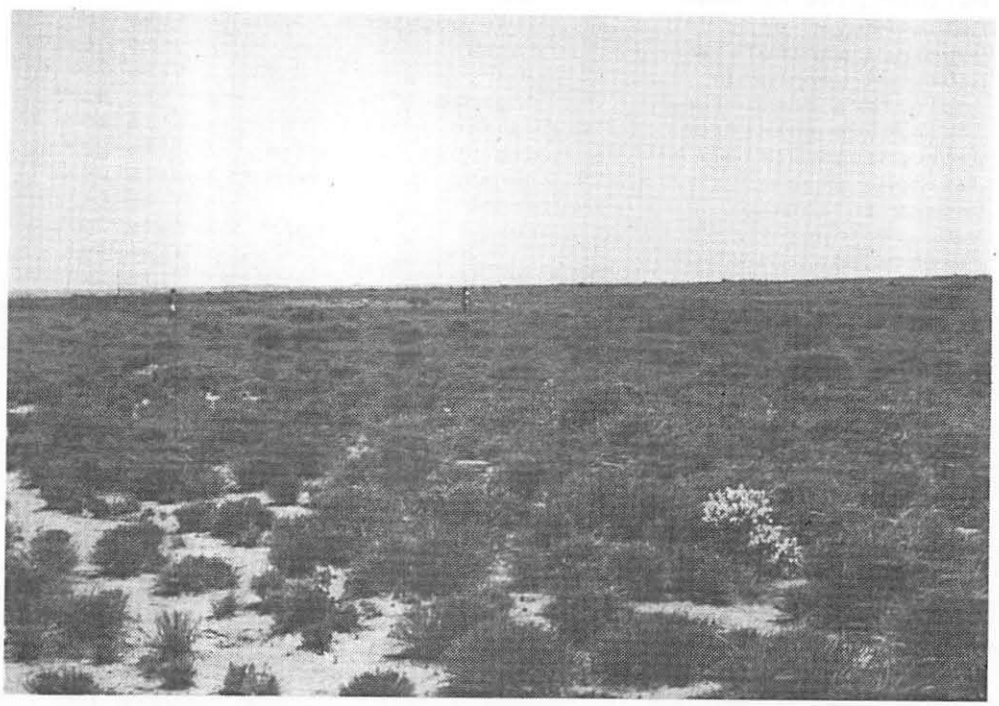


Photo : juin 1988

Site localisé au confluent de 2 vallées du Dhaxan Sarin, à 6,1 km au Sud-Est du 8.
Sol limono-sableux, végétation dense et régulière, avec très peu de ligneux.
Herbacées dominantes : Chrysopogon plumulosus, Dactyloctenium robecchii, Panicum coloratum, Schizachyrium kelleri, Sporobulus ruspolianus.

RELEVE 117 - 20 juin 1988

nom scient	nom vernac	type b	cote abo	re
Acacia tortilis	qurac	arbus	X (117 16)	
Aristida sp.	xarfo	H.A.?	X (117 05)	
Aristida sp.	gocoso	H.A.?	X (117 03)	
Boscia minimifolia	jiiq	arbus	X (117 30)	
Cadaba sp.	galangal	arbus	X (117 24)	
Cassia holosericea	jaleelo	H.V.	X (117 08)	
Chrysopogon plumulosus	duureeme	H.V.	3 (117 13)	
Crotalaria sp.	caweer		X (117 12)	
Dactyloctenium robecchii	gubungub	H.V.	2 (117 01)	
Erlangea centauroides			X (117 23)	
Euphorbia aegyptiaca	neylo narsh		X (117 07)	
euphorbiaceae	bagox geed		X (117 27)	
Farsetia stylosa	ibogor	H.A.	X (117 29)	
Hibiscus aponeurus	ubak		X (117 10)	
Jatropha rivae	taraxo	arbris	X (117 25)	
Neuracanthus	reko	cham	X (117 14)	
Panicum coloratum	gargalo	H.V.	1 (117 19)	
Schizachyrium kelleri	duur	H.V.	2 (117 04)	
Sericocomopsis pallida	geed cad	cham	X (117 20)	
Solanum forskalii	geed shimbrod	H.V.?	X (117 21)	
Sporobolus ruspolianus	safaar	H.V.	1 (117 02)	
Sporobolus sp.	sodexo		X (117 06)	
Thamnosma hirschii	waniiq	H.A.	X (117 26)	
Ziziphus hamur	mur canyo	arbus	X (117 18)	
zz indéterminé	urxaad		X (117 09)	

RELEVE 017 - 5 décembre 1988

nom scient	nom vernac	type b	cote abo	re
Acacia tortilis	qurac	arbus	- (017 12)	
Cadaba sp. (gdes feuil)		arbus	- (017 11)	
Chrysopogon plumulosus	dureeme	H.V.	3 (017 07)	
Cissus sp.		crass	- (017 16)	
Commiphora sp.	dhirindhir	arbus	- (017 13)	
Commiphora sp.	kabug	arbris	- (017 04)	
Dactyloctenium robecchii		H.V.	X (017 02)	
Euphorbia cf. triaculeata		crass	- (017 10)	
Euphorbia inaequilatera	naylonarch	H.A.	X (017 06)	
Grewia tenax	murhayo	arbris	- (017 15)	
Jatropha robecchii	tarraxo	arbris	- (017 03)	
Mollugo sp.	narsh	H.A.	X (017 08)	
Panicum coloratum		H.V.	X (017 09)	
Schizachyrium kelleri		H.V.	X (017 01)	
Sericocomopsis pallida		H.V.	- (017 14)	
Sporobolus ruspolianus		H.V.	X (017 05)	
Ziziphus hamur		arbus	- (017 17)	

SITE 18

Lieu-dit :

Latitude : 9°23'30''

Longitude : 49°4'40''

Altitude : 750 m.

Vallée

Photo : Juin 1988

Site localisé à 13 km au Sud de Gardho, à l'est de la route de Garoe, à proximité de la bordure de la vallée. Sol limono-sableux à surface parsemée de petites plages gravilonnaires. Végétation discontinue avec d'assez nombreux ligneux.
Herbacées dominantes : Dactyloctenium robecchii, Indigofera spp., Neuracanthus sp., Schizachyrium kelleri, Sericocomopsis pallida.
Ligneux assez nombreux, des genres : Acacia, Boscia, Cadaba, Jatropha, Ziziphus.

RELEVE 118 - 20 juin 1988

nom scient	nom vernac	type b	cote abo re
Acacia bussei	galool	arbus	1 (118 16)
Acacia tortilis	qurac	arbus	2 (118 05)
acanthaceae	cayo		X (118 34)
Aristida sp.	xarfo	H.A.?	X (118 09)
Barleria parviflora	jafre	cham	X (118 23)
Barleria sp.	dacle	cham	X (118 25)
Blepharis ciliaris	yamaruug		X (118 36)
Boscia minimifolia	jiiq	arbus	X (118 18)
Cassia holosericea	jaleelo	H.V.	X (118 03)
Cenchrus pennisetiformis	garow	H.A.?	X (118 28)
Chrysopogon plumulosus	dureeme	H.V.	X (118 06)
Convolvulus rhyniospermum	agagaro		X (118 07)
Crotalaria sp.	caweer		1 (118 31)
Dactyloctenium robecchii	gubungub	H.V.	2 (118 01)
Eragrostis cilianensis	caws	H.V.?	X (118 13)
Euphorbia inaequilatera	neylo narsh		1 (118 20)
fabaceae			X (118 26)
Fagonia arabica	irma rijii		X (118 38)
Farsetia sp.	weys		X (118 08)
Hibiscus aponeurus	ubac		X (118 35)
Indigofera sp.	murdis		1 (118 14)
Indigofera spiniflora	xajiin		X (118 24)
Jatropha rivae	taraxo	cham	X (118 37)
Leucas inflata	soone	H.V.	X (118 27)
Momordica sp.	gasangas		X (118 17)
Neuracanthus	reko	cham	2 (118 04)
Polycarpaea pulvinata	doomaar		X (118 32)
Schizachyrium kelleri	duur	H.V.	1 (118 22)
Sericocomopsis pallida	geed cad	cham	2 (118 10)
Sporobolus ruspolianus	safaar	H.V.	X (118 12)
Thamnosma hirschii	waniiq	H.A.	X (118 40)
Vernonia cinerascens			X (118 11)
Ziziphus hamur	xamur	arbus	X (118 19)

RELEVE 018 - 7 decembre 1988

nom scient	nom vernac	type b	cote abo re
Acacia bussei		arbus	2 (018 06)
Acacia cf. etbaica		arbus	2 (018 07)
Acacia cf. mellifera		arbris	- (018 22)
acanthaceae		cham	X (018 20)
Blepharis ciliaris		cham	X (018 05)
Boscia minimifolia		arbus	- (018 15)
Cadaba glandulosa		arbus	X (018 10)
Cassia holosericea		H.V.	X (018 13)
Cissus sp.		liane	- (018 11)
Corchorus depressus		H.V.	X (018 09)
Dactyloctenium robecchii		H.V.	X (018 01)
Indigofera sp.		cham	X (018 18)
Jatropha sp.		arbris	X (018 16)
Neuracanthus sp		cham	X (018 21)
Pavonia sp.		cham	- (018 19)
Pleuropteranthera		cham	- (018 17)
Schizachyrium kelleri		H.V.	X (018 02)
Sericocomopsis pallida		cham	X (018 04)
Solanum sp.		H.V.?	- (018 12)
Sporobolus ruspolianus		H.V.	1 (018 14)
Vernonia sp.		cham	x (018 03)
Ziziphus hamur		arbus	X (018 08)

A N N E X E N° 4

Enumération des plantes collectées

pour vérification des déterminations

(Récoltes de G.Forgiarini 001 à 260)
(Récoltes de L.Letenneur 1 à 20)
(Récoltes de B.Peyre de Fabrègues B. 4630 à 4860)

4642				OUAMA	EUPHORBIACEAE
4669					AMARANTHACEAE
4680					ACANTHACEAE
4682					ACANTHACEAE
4705					ACANTHACEAE
4736					
4745					BORAGINACEAE
4756					ASTERACEAE
4762				XAGAR	BURSERACEAE
4768					BURSERACEAE
4772					
4776					BORAGINACEAE
4777					CAPPARIDACEAE
4779					BORAGINACEAE
4786					ACANTHACEAE
4798					CHENOPODIACEAE
4814					
4819					
4838					
4840					BRASSICACEAE
007					RUBIACEAE
015					ACANTHACEAE
024				BURDAD	ASTERACEAE
031				ILCA	ASTERACEAE
051				QOD XANDO	ZYGOPHYLLACEAE
059				DABRO	CONVOLVULACEAE
078				XARIG	CONVOLVULACEAE
089				QAROON	BURSERACEAE
090					ASTERACEAE
093					ASCLEPIADACEAE
113					RUBIACEAE
130					MALVACEAE
132					POACEAE
138					ACANTHACEAE
147				CAANO NUUX	ASCLEPIADACEAE
155				CAYO	ACANTHACEAE
159					ACANTHACEAE
176					ASTERACEAE
178				MURDIS	ACANTHACEAE
199				HARAC	CONVOLVULACEAE
202					ASTERACEAE
204				AL MAGADO	ACANTHACEAE
231				BAGO XUJEEDI	EUPHORBIACEAE
237				CARGO	ACANTHACEAE
247					BURSERACEAE
4708	?				
4724	?				
4659	? ? ?			GEED MADOW	
222	ABUTILON				MALVACEAE
4832	ACACIA				
235	ACACIA			XANAN	MIMOSACEAE
215	ACACIA	SP.	N.C.	DEERO LIIGAD	MIMOSACEAE
4675	ACACIA	BUSSEI	HARMS EX SJOSTED		
4718	ACACIA	BUSSEI	HARMS EX SJOSTED		
192	ACACIA	BUSSEI	HARMS EX SJOSTEDT	GALOOL	MIMOSACEAE
4761	ACACIA	ETBAICA	SCHWEINF.	QANSAX	
4836	ACACIA	HAMULOSA	BENTH.		
131	ACACIA	HAMULOSA	BENTH.	SARMAAN	MIMOSACEAE
4683	ACACIA	HAMULOSA	BENTH.		MIMOSACEAE
134	ACACIA	LEUCOSPIRA	BRENAN	JEERIN	MIMOSACEAE
4747	ACACIA	LEUCOSPIRA	BRENAN		MIMOSACEAE
4748	ACACIA	LEUCOSPIRA	BRENAN		
4787	ACACIA	LEUCOSPIRA	BRENAN		
139	ACACIA	LEUCOSPIRA	BRENAN		MIMOSACEAE
4771	ACACIA	MELLIFERA	(VAHL) BENTH.		
4676	ACACIA	OERFOTA	(FORSK.) SCHUM.	GUMAR	MIMOSACEAE
4678	ACACIA	OERFOTA	(FORSK.) SCHUM.		
088	ACACIA	OERFOTA	(FORSK.) SCHUM.	GUMAR	MIMOSACEAE
4716	ACACIA	SP.		SARMAAN	MIMOSACEAE
216	ACALYPHA	CRENATA	HOCHST. EX A. RICH.		EUPHORBIACEAE

4681	ACANTHOSTELMA	THYMIFOLIUM	(CHIOV.) BIDGOOD ET BRUMM.		ACANTHACEAE
018	ACANTHOSTELMA	THYMIFOLIUM	(CHIOV.) BIDGOOD ET BRUMM		ACANTHACEAE
4651	ACHYRANTHES	ASPERA	L.		AMARANTHACEAE
4825	ADIANTUM	CAPILLUS-VENERIS	L.		ADIANTACEAE
4714	AERVA	JAVANICA	(BURM. F.) JUSS. ex SCHULT.		AMARANTHACEAE
036	ALYSICARPUS	GLUMACEUS	(VAHL) DC.		FABACEAE
038	AMARANTHUS	GRAECIZANS	L.	DABAASEEYE	AMARANTHACEAE
233	ANTICHARIS	SENEGALENSIS	(WALP.) BHANDARI		SCROPHULARIACEAE
4744	ARISTIDA	SP.		GOCOSO	POACEAE
041	ARISTIDA	SP.		XARFO	POACEAE
086	ARISTIDA	SP.		TAACUG	POACEAE
097	ARISTIDA	SP.		GOCOSO	POACEAE
4750	ARISTIDA	ADSCENSIONIS	KL.		POACEAE
2	ARISTIDA	FUNICULATA	TRIN. ET RUPR.		POACEAE
4679	ARISTIDA	KELLERI	HACK.		POACEAE
6	ARISTIDA	KELLERI	HACK.		POACEAE
4711	ARISTIDA	MUTABILIS	TRIN. ET RUPR.	LAAC	POACEAE
098	ARISTIDA	SIEBERANA	TRIN.	MAXAANSUGA	POACEAE
4839	ARISTOLOCHIA	RIGIDA	DUCH.		ARISTOLOCHIACEAE
210	ASPARAGUS	SP.		CARGEEG	TILIACEAE
4820	AZIMA	TETRACANTHA	LAM.		SALVADORACEAE
4834	BALANITES	AEGYPTIACA	(L.) DEL.		BALANITACEAE
4654	BARLERIA	SP.			ACANTHACEAE
092	BARLERIA	SP.		DACLE	ACANTHACEAE
17	BARLERIA	ERANTHEMOIDES	R.BR. ex C.B. CL.		ACANTHACEAE
014	BARLERIA	ERANTHEMOIDES	R. BR. ex C. B. CL.		ACANTHACEAE
118	BARLERIA	ERANTHEMOIDES	R. BR. ex C. B. CL.		ACANTHACEAE
4695	BARLERIA	PARVIFLORA	R.BR. ex T.ANDERS.		ACANTHACEAE
4	BARLERIA	PARVIFLORA	R.BR. ex T.ANDERS		ACANTHACEAE
164	BARLERIA	PARVIFLORA	R.BR. ex T.ANDERS.	NAGAAR	ACANTHACEAE
173	BARLERIA	PARVIFLORA	R.BR ex T.ANDERS.	JAFRE	ACANTHACEAE
4699	BARLERIA	PROXIMA	LINDAU		ACANTHACEAE
124	BLEPHARIS	SP.			ACANTHACEAE
4693	BLEPHARIS	CILIARIS	(L.) B.L. BURTT		ACANTHACEAE
047	BLEPHARIS	CILIARIS	(L.) B.L. BURTT	YAMAARUG	ACANTHACEAE
4845	BLYTTIA	FRUTICULOSUM	(DECNE.) FIELD		ASCLEPIADACEAE
4841	BOERHAVIA	RUBICUNDA	STEUD.		NYCTAGINACEAE
4715	BOSCIA	MINIMIFOLIA	CHIOV.		CAPPARIDACEAE
136	BOSCIA	MINIMIFOLIA	CHIOV.		CAPPARIDACEAE
220	BOSCIA	MINIMIFOLIA	CHIOV.	JIIE	CAPPARIDACEAE
212	BOSWELLIA	SP.		MOXOR	BURSERACEAE
4767	BOSWELLIA	BORANENSIS	ENGL.	MOXOR	BURSERACEAE
4803	BOSWELLIA	FREREANA	BIRDW.		BURSERACEAE
172	CADABA	GLANDULOSA	FORSK.	HIGLO	CAPPARIDACEAE
4746	CADABA	HETEROTRICHA	HOOK.		CAPPARIDACEAE
4689	CADABA	HETEROTRICHA		HIGLO	CAPPARIDACEAE
4641	CADABA	INDET.		QUALANQAL	CAPPARIDACEAE
4648	CADABA	MIRABILIS	GILG		CAPPARIDACEAE
4737	CADABA	MIRABILIS	GILG		CAPPARIDACEAE
4831	CAESALPINIA	ERIANTHERA	CHIOV.		CAESALPINIACEAE
4849	CAESALPINIA	ERIANTHERA	CHIOV.		CAESALPINIACEAE
4795	CAPPARIS	CARTILAGINEA	DECNE.		CAPPARIDACEAE
4730	CARALUMA	SP.		GARAWACATO	ASCLEPIADACEAE
4710	CASSIA	HOLOSERICEA	FRES.	SALEELOL	CAESALPINIACEAE
18	CASSIA	HOLOSERICEA	FRES.		CAESALPINIACEAE
050	CASSIA	HOLOSERICEA	FRES.	JALEELO	CAESALPINIACEAE
4677	CENCHRUS	cf.CILIARIS	L.		POACEAE
4751	CENCHRUS	CILIARIS	L.		POACEAE
11b	CENCHRUS	CILIARIS	L.		POACEAE
003	CENCHRUS	CILIARIS	L.		POACEAE
4644	CENCHRUS	PENNISETIFORMIS	HOCHST. ET STEUD.	GAROW	POACEAE
4852	CENCHRUS	PENNISETIFORMIS	HOCHST. ET STEUD.		POACEAE
037	CENCHRUS	PENNISETIFORMIS	STEUD.	GAROW	POACEAE
4739	CHASCANUM	SP.			VERBENACEAE
4671	CHROZOPHORA	OBLONGIFOLIA	(DEL.) A. JUSS.	GEED BICIID	EUPHORBIACEAE
057	CHROZOPHORA	OBLONGIFOLIA	(DEL.) A. JUSS.	GEES BIEIID	EUPHORBIACEAE
13t	CHRYSOPOGON	PLUMULOSUS	HOCHST.		POACEAE
8	CHRYSOPOGON	PLUMULOSUS	HOCHST.		POACEAE
049	CHRYSOPOGON	PLUMULOSUS	HOCHST.	DUREEME	POACEAE
4717	CISSUS ? OU	CYPHOSTEMMA ?		ARMO	VITACEAE
4815	CLEOME	SP.			CAPPARIDACEAE
4740	CLEOME	BRACHYCARPA	DC.		CAPPARIDACEAE

082	CLEOME	BRACHYCARPA	VAHL EX DC.	CEED XAMAR	CAPPARIDACEAE
129	CLEOME	BRACHYCARPA	VAHL EX DC.		CAPPARIDACEAE
4843	CLERODENDRUM	SP.			VERBENACEAEE
075	COMMELINA	ALBESCENS	HASSK.	RAXAAS	COMMELINACEAE
211	COMMICARPUS	SP.		GARAS	NYCTAGINACEAE
234	COMMICARPUS	SP.		UGAABDAYS	NYCTAGINACEAE
4780	COMMICARPUS	SQUARROSUS	(HEIMERL) STANDL.		NYCTAGINACEAE
4706	COMMIPHORA	SP.		SOWLALO	BURSERACEAE
4719	COMMIPHORA	SP.			BURSERACEAE
4722	COMMIPHORA	SP.			BURSERACEAE
106	COMMIPHORA	SP.			BURSERACEAE
117	COMMIPHORA	SP.		GABRARO	BURSERACEAE
187	COMMIPHORA	SP.		XAGAR	BURSERACEAE
197	COMMIPHORA	SP.		XAM XAMAA	BURSERACEAE
203	COMMIPHORA	SP.		GOWLALOW	BURSERACEAE
209	COMMIPHORA	SP.		XAGAR	BURSERACEAE
149	COMMIPHORA	SP.		XARN XAMAA	BURSERACEAE
4765	COMMIPHORA	SP.		GOWLALO	BURSERACEAE
4794	CONOCARPUS	LANCIFOLIUS	ENGL.	DAMAR	COMBRETACEAE
4758	CONVOLVULUS	HYSTRIX			CONVOLVULACEAE
4760	CONVOLVULUS	HYSTRIX			CONVOLVULACEAE
4713	CONVOLVULUS	RHYNIOSPERMUM	CHOISY		CONVOLVULACEAE
023	CONVOLVULUS	RHYNIOSPERMUM	HOCHST. EX CHOISY	AGAGARO	CONVOLVULACEAE
4666	CONVOLVULUS	RHYNIOSPERMUS	HOCHST. EX CHOISY	ILCAS	CONVOLVULACEAE
4646	CONVOLVULUS	RUSPOLII	HALL. F.		CONVOLVULACEAE
080	CORCHORUS	DEPRESSUS	(L.) STOCKS	NEYLO NAXSH	TILIACEAE
169	CORCHORUS	DEPRESSUS	(L.) STOCKS	NARSH	TILIACEAE
095	CROTALARIA	SP.		CAWEER	FABACEAE
100	CROTALARIA	SP.		WEELO	FABACEAE
208	CROTALARIA	SP.		LIILAN	FABACEAE
239	CROTALARIA	SP.		XULUCO	FABACEAE
4763	CROTALARIA	EMARGINELLA	VATKE		FABACEAE
009	CROTALARIA	EMARGINELLA	VATKE		FABACEAE
012	CROTALARIA	EMARGINELLA	VATKE		FABACEAE
163	CROTALARIA	EMARGINELLA	VATKE	ILCAC	FABACEAE
145	CUCUMIS	PROPHETARUM	L.	SADKAX	CUCURBITACEAE
4645	CULLEN	CORYLIFOLIA	(L.) MEDIK.		FABACEAE
4673	CULLEN	CORYLIFOLIA	(L.) MEDIK.		FABACEAE
227	CYCLOCHEILON	SOMALIENSE	OLIV.	SHAN BOGSI	CYCLOCHEILACEAE
6 b	CYMBOPOGON	SCHOENANTHUS	(L.) SPRENG.		POACEAE
12	CYMBOPOGON	SCHOENANTHUS	(L.) SPRENG.		POACEAE
039	CYPERUS	AMAUROPUS	STEUD.	GARGOOR	CYPERACEAE
4743	CYSTOSTEMON	SOMALIENSIS	MILLER ET RIEDL		BORAGINACEAE
240	CYSTOSTEMON	SOMALIENSIS	MILLER ET RIEDL		BORAGINACEAE
14B	DACTYLOCTENIUM	ROBECCHII	(CHIOV.) CHIOV.		POACEAE
15	DACTYLOCTENIUM	ROBECCHII	(CHIOV.) CHIOV.		POACEAE
055	DACTYLOCTENIUM	ROBECCHII	(CHIOV.) CHIOV.	GUBUNGUB	POACEAE
084	DACTYLOCTENIUM	ROBECCHII	(CHIOV.) CHIOV.	GUBUNGUB	POACEAE
4854	DESMIDORCHIS	ACUTANGULA	DES. (ex. Caralluma retrospciens)		ASCLEPIADACEAE
4791	DICERATELLA	INCANA	BALF.F.		BRASSICACEAE
185	DICERATELLA	INCANA	BALF.F.		BRASSICACEAE
229	DICERATELLA	INCANA	BALF.F.		BRASSICACEAE
10b	DICHANTHIUM	ANNULATUM	(FORSK.) STAPF		POACEAE
010	DICHANTHIUM	ANNULATUM	(FORSK.) STAPF		POACEAE
044	DICHANTHIUM	FOVEOLATUM	(DEL.) ROBERTY	UURWEYN	POACEAE
4782	DIGITARIA	PENNATA	(HOCHST.) COSKE		POACEAE
198	DIGITARIA	PENNATA	(HOCHST.) COSKE		POACEAE
4639	DUOSPERMA	EREMOPHILUM	(MILNE-REDH.) BRUMM.	SARIIN	ACANTHACEAE
4655	DUOSPERMA	EREMOPHILUM	(MILNE-REDH.) BRUMM.		ACANTHACEAE
142	DUOSPERMA	EREMOPHILUM	(MILNE-REDH.) BRUMM.	SARIN	ACANTHACEAE
4636	DYSCHORISTE	SP.		DHACLE	ACANTHACEAE
4696	DYSCHORISTE	cf.LYCIOIDES	CHIOV.		ACANTHACEAE
4783	DYSCHORISTE	cf.LYCIOIDES	CHIOV.		ACANTHACEAE
180	ECHINOPS	LONGIFOLIUS	A.RICH.	NIRIQ	ASTERACEAE
111	ECHIOCHILON	LONGIFOLIUM	BENTH.	TOROJO	BORAGINACEAE
4853	ELEOCHARIS	GENICULATA	(L.) R. ET S.		CYPERACEAE
13	ENNEAPOGON	CENCHRIODES	(ROEM. ET SCHULT.) HUBB.		POACEAE
4749	ENNEAPOGON	DESVAUXII	P. DE B.		POACEAE
048	ENNEAPOGON	DESVAUXII	P. DE B.	URHAAD	POACEAE
121	ENNEAPOGON	SCHIMPERANUS	(HOCHST.EX A.RICH.)RENV.		POACEAE
4727	ENTEROPOGON	RUPESTRIS	(J.A. SCHMIDT) A.CHEV.	AYAHMAKAREY	POACEAE

029	ERAGROSTIS	AETHIOPICA	CHIOV.	IAAC	POACEAE
058	ERAGROSTIS	CILIANENSIS	(ALL.)F.T.HUBB.	XULE	POACEAE
061	ERAGROSTIS	CILIANENSIS	(ALL.)F.T.HUBB.	CAWS	POACEAE
4823	ERAGROSTIS	CILIARIS	(L.) R.BR.		POACEAE
4823b	ERAGROSTIS	TENELLA	(L.) P. BEAUV. ex R.ET S.		POACEAE
044	EREMOPOGON	FOVEOLATUS	(DEL.) STAPF		POACEAE
027	ERIOCHLOA	FATMENSIS	(HOCHST. ET STEUD.) CLAYTON	GAASO	POACEAE
4667	ERLANGEA	CENTAUROIDES	(S.MOORE) S.MOORE		ASTERACEAE
004	ERLANGEA	CENTAUROIDES	(S. MOORE) S. MOORE		ASTERACEAE
006	ERLANGEA	CENTAUROIDES	(S.MOORE) S.MOORE		ASTERACEAE
250	ERLANGEA	CENTAUROIDES	(S.MOORE) S.MOORE		ASTERACEAE
4789	ERYTHRINA	MELANACANTHA	HARMS	YOKOO	FABACEAE
4833	EUPHORBIA	SP.			EUPHORBIACEAE
4640	EUPHORBIA	SP.		BACAROOR	EUPHORBIACEAE
4733	EUPHORBIA	SP.			EUPHORBIACEAE
4790	EUPHORBIA	SP.			EUPHORBIACEAE
4816	EUPHORBIA	SP.			EUPHORBIACEAE
034	EUPHORBIA	SP.		BACAROOR	EUPHORBIACEAE
4712	EUPHORBIA	GRANULATA	FORSK.		EUPHORBIACEAE
4720	EUPHORBIA	INAEQUILATERA	SONDER	KABAQOYS	EUPHORBIACEAE
108	EUPHORBIA	INAEQUILATERA	SONDER		EUPHORBIACEAE
141	EUPHORBIA	INAEQUILATERA	SONDER	KABAQOYS	EUPHORBIACEAE
4707	EUPHORBIA	TRIACULEATA	FORSK.		EUPHORBIACEAE
4734	EUPHORBIA	TRIACULEATA	FORSK.		EUPHORBIACEAE
186	EUPHORBIA	TRIACULEATA	FORSK.	TUUR CUSO	EUPHORBIACEAE
091	FAGONIA	ARABICA	L.	IRMAAN RIIJA	ZYGOPHYLLACEAE
4694	FAGONIA	BRUGUIERI	DC.	IRMAAN RIIJA	ZYGOPHYLLACEAE
4851	FAGONIA	ISOTRICHA	MURB.		ZYGOPHYLLACEAE
4778	FAGONIA	SOCOTRANA	(BALF.F.)SCHWEINF.Var.SOMALICA	SPRAGUE	ZYGOPHYLLACEAE
16	FARSETIA	LONGISILIQUA	DECNE.		BRASSICACEAE
224	FARSETIA	SP.		WEYS	BRASSICACEAE
099	FARSETIA	STYLOSA	R.BR.		BRASSICACEAE
160	FARSETIA	STYLOSA	R.BR.	IBOROOR	BRASSICACEAE
4830	FICUS	CORDATA	THUNB. subsp. SALICIFOLIA (VAHL) BERG		MORACEAE
4792	FLAVERIA	TRINERVIA	(SPRENG.) ROHR		ASTERACEAE
4824	FORSKOHLEA	VIRIDIS	EHRENB.		URTICACEAE
046	GEIGERIA	ALATA	(DC.) OLIV. ET HIERN	CAANO QARAARSHE	ASTERACEAE
137	GEIGERIA	ALATA	(DC.) OLIV. ET HIERN	CAANO XARAARIS	ASTERACEAE
073	GLOSSONEMA	REVOILII	FRANCHET	SADKAX	ASCLEPIADACEAE
177	GLOSSONEMA	REVOILII	FRANCHET	ASKAX	ASCLEPIADACEAE
190	GLOSSONEMA	REVOILII	FRANCHET	SADKAX	ASCLEPIADACEAE
4672	GOMPHOCARPUS	INTEGER	(N..E. BR.) BULL.		ASCLEPIADACEAE
4773	GOSSYPIUM	SP.			MALVACEAE
207	GREWIA	TEMBENSIS	FRES.	DHAFARUUR	TILIACEAE
4721	GREWIA	TENAX	(FORSK.) FIORI		TILIACEAE
4764	GREWIA	TENAX	(FORSK.) FIORI	MURAYO	TILIACEAE
019	GREWIA	TENAX	(FORSK.) FIORI		TILIACEAE
019	GREWIA	TENAX	(FORSK.) FIORI		TILIACEAE
213	GREWIA	VILLOSA	WILLD.	GOMOSHE	TILIACEAE
4703	HALOTHAMNUS	BOTTAE	JAUB. ET SPACH		CHENOPODIACEAE
122	HALOTHAMNUS	BOTTAE	JAUB. ET SPACH		CHENOPODIACEAE
200	HALOTHAMNUS	SOMALENSIS	(N.E.BR.) BOTSCH.	AL MADADAANE	CHENOPODIACEAE
165	HELICHRYSUM	GLUMACEUM	DC.	WAXARO WEECIS	ASTERACEAE
170	HELICHRYSUM	GLUMACEUM	DC.	ULUL	ASTERACEAE
4741	HELIOTROPIUM	SP.			BORAGINACEAE
4752	HELIOTROPIUM	SP.		CIDIGUDUUSHE	BORAGINACEAE
094	HELIOTROPIUM	SP.		CIDIGUDUUSHE	BORAGINACEAE
179	HELIOTROPIUM	SP.			BORAGINACEAE
066	HELIOTROPIUM	AEGYPTIACUM	LEHM.		BORAGINACEAE
146	HELIOTROPIUM	AEGYPTIACUM	LEHM.		BORAGINACEAE
4821	HELIOTROPIUM	LONGIFLORUM	(HOCHST ET STEND. EX DC.) JAUB ET SPACH		BORAGINACEAE
243	HELIOTROPIUM	RARIFLORUM	STOCKS	DARAN	BORAGINACEAE
166	HELIOTROPIUM	STRIGOSUM	WILLD.	DHURSE	BORAGINACEAE
144	HERMANIA	PANICULATA	FRANCHET		STERCULIACEAE
128	HERMANNIA	BORANENSIS	K.SCHUM.		STERCULIACEAE
074	HIBISCUS	APONEURUS	SPRAGNE ET HUTCH.		MALVACEAE
110	HIBISCUS	APONEURUS	SPRAGUE ET HUTCH.	UBAX	MALVACEAE
4829	HYPARRHENIA	HIRTA	(L.) STAPF		POACEAE
4754	HYPOESTES	FORSKALEI	(VAHL) SOL. ex R ET S.		ACANTHACEAE
4806	INDET.				
4807	INDET.				
053	INDET.			QALANGAL	CAPPARIDACEAE

063	INDET.			QALFOON	CUCURBITACEAE
072	INDET.			MADOYAA	
096	INDET.			ANDHURGOLIL	
105	INDET.				CUCURBITACEAE
126	INDET.				
127	INDET.			SADKAX	
140	INDET.			FUGDU	
143	INDET.				
150	INDET.			GEED SAAR	CUCURBITACEAE
154	INDET.			XARIG DHEERE	POACEAE
156	INDET.				
167	INDET.			KULMOLOH	
181	INDET.			LUUG DHEER	
188	INDET.			WARA WEESHE	
196	INDET.			CADUURO	
218	INDET.				
225	INDET.			DHABANGARIS	
226	INDET.				
228	INDET.			DHAY	
236	INDET.				
238	INDET.				
241	INDET.				
246	INDET.				
249	INDET.				
253	INDET.				FABACEAE
056	INDET.			WAME	
104	INDET.				POACEAE
4788T	INDIGOFERA	ARGENTEA	BURM. F.		POACEAE
4817	INDIGOFERA	SP.			FABACEAE
008	INDIGOFERA	SP.			FABACEAE
107	INDIGOFERA	SP.		AL MAGAADO	FABACEAE
109	INDIGOFERA	SP.		MURDIS ou (SARIN)	FABACEAE
161	INDIGOFERA	SP.		CAGAGARO	FABACEAE
4729	INDIGOFERA	ARTICULATA	GONAN		FABACEAE
4857	INDIGOFERA	COERULEA	ROXB.		FABACEAE
4643	INDIGOFERA	HOCHSTETTERI	BAK.		FABACEAE
4704	INDIGOFERA	KARINENSIS	THULIN		FABACEAE
9	INDIGOFERA	SESQUIJUGA	CHIOV.		FABACEAE
087	INDIGOFERA	SPINIFLORA	HOCHST. ET STEUD. EX BOISS.	XAJIIN	FABACEAE
4649	IPHIONOPSIS	ROTUNDIFOLIA	(OLIV. ET HIERN) ANDERB.		ASTERACEAE
11	IPHIONOPSIS	ROTUNDIFOLIA	(OLIV. ET HIERN) ANDERB.		ASTERACEAE
4728	IPOMOEA	SP.			CONVOLVULACEAE
4856	IPOMOEA	SP.			CONVOLVULACEAE
223	IPOMOEA	SP.			CONVOLVULACEAE
4684	IPOMOEA	CICATRICOSA	BAK.		CONVOLVULACEAE
4691	IPOMOEA	CICATRICOSA	BAK.		CONVOLVULACEAE
4700	IPOMOEA	DONALDSONII	RENDLE		CONVOLVULACEAE
4788q	IPOMOEA	DONALDSONII	RENDLE		CONVOLVULACEAE
102	IPOMOEA	DONALDSONII	RENDLE		CONVOLVULACEAE
206	JATROPHA	SP.		DHIGLE	EUPHORBIACEAE
028	JATROPHA	GLAUCA	VAHL		EUPHORBIACEAE
120	JATROPHA	PARVIFOLIA CF.	CHIOV.	DHIGLOHO	EUPHORBIACEAE
103	JATROPHA	RIVAE	PAX	TARAXO	EUPHORBIACEAE
103	JATROPHA	RIVAE	PAX	TARAXO	EUPHORBIACEAE
4702	JATROPHA	ROBECCHII	PAX	DHALLOEL	EUPHORBIACEAE
4769	JATROPHA	ROBECCHII	PAX		EUPHORBIACEAE
4802	JATROPHA	ROBECCHII			EUPHORBIACEAE
115	JATROPHA	ROBECCHII	PAX		EUPHORBIACEAE
4650	JATROPHA ?				EUPHORBIACEAE
4826	JUSTICIA	FLAVA	(VALH) VALH		ACANTHACEAE
4808	KELLERONIA	SP.			ZYGOPHYLLACEAE
017	KELLERONIA	SP.			ZYGOPHYLLACEAE
4668	KICKXIA	SP.			SCROPHULARIACEAE
4685	KLEINIA	SQUARROSA	CUF.		ASTERACEAE
4663	KOHAUTIA	CAESPITOSA	SCHNIZL.		RUBIACEAE
4759	KOHAUTIA	CAESPITOSA	SCHNIZL.		RUBIACEAE
4631	LACTUCA	SP.		ILCAS	ASTERACEAE
125	LEPTOTHRIUM	SENEGALENSE	(KUNTH)CLAYTON		POACEAE
214	LEPTOTHRIUM	SENEGALENSE	(KUNTH) CLAYTON		POACEAE
001	LEUCAS	ABYSSINICA	(BENTH.) BRIQ.	CALEEN	LAMIACEAE
4784	LEUCAS	CUNEIFOLIA	BAK.		LAMIACEAE
205	LEUCAS	CUNEIFOLIA	BAK.	LAMIACEAE	

4664	LEUCAS	INFLATA	BENTH.		LAMIACEAE
4687	LEUCAS	INFLATA	BENTH.		LAMIACEAE
4731	LEUCAS	INFLATA	BENTH		LAMIACEAE
077	LEUCAS	INFLATA	BENTH.	GARGOW	LAMIACEAE
083	LEUCAS	INFLATA	BENTH.	SOONE	LAMIACEAE
162	LEUCAS	INFLATA	BENTH.	SARAR CADEYEL	LAMIACEAE
4633	LEUCAS	URTICIFOLIA	(VAHL) BENTH.	FOOD CADE	LAMIACEAE
020	LEUCAS	URTICIFOLIA	(VAHL) R. BR.	FOOD CADE	LAMIACEAE
060	LEUCAS	URTICIFOLIA	(VAHL) R. BR.	FOUDCADE	LAMIACEAE
4847	LIMONIUM	SP.			PLUMBAGINACEAE
4809	LIMONIUM	CARINENSE	(CHIOV.) VERDC. ET HEMM.		PLUMBAGINACEAE
081	LITTONIA	REVOILII	FRANCHET	CIDI WAYLOOD	COLCHICACEAE
4810	LIVISTONA	CARINENSIS	(CHIOV.) DRANSF. ET UHL		PALMAE
4735	MAERUA	SESSIFLORA	GILG		CAPPARIDACEAE
184	MELHANIA	STIPULOSA	WOOD	XACIIN	STERCULIACEAE
4793	MIMUSOPS	ANGEL	CHIOV.		SAPOTACEAE
153	MOMORDICA	DISSECTA	BAK.F.		CUCURBITACEAE
4844	MOMORDICA	SESSILIFOLIA	COGN.		CUCURBITACEAE
182	MOMORDICA	SESSILIFOLIA	COGN.	GASANGAS	CUCURBITACEAE
4732	MORINGA	PEREGRINA	(FORSK.) FIORI		MORINGACEAE
4799	MORINGA	PEREGRINA	(FORSK.) FIORI		MORINGACEAE
4705b	NEURACANTHUS	SP.			ACANTHACEAE
030	NEURACANTHUS	SP.		REKO	ACANTHACEAE
4634	NEURACANTHUS	POLYACANTHUS	(LINDAU) C.B. CL.	GUBUNGUB	ACANTHACEAE
4653	OCHRADENUS	BACCATUS	DEL.		RESEDACEAE
4766	OCHRADENUS	RANDONIOIDES	ABDALLAH	ALGEG	RESEDACEAE
002	OCIMUM	HADIENSE	FORSK.		LAMIACEAE
4680b	ORTHOSIPHON	PALLIDUS	BENTH.		LAMIACEAE
076	ORTHOSIPHON	PALLIDUS	ROYLE EX BENTH.		LAMIACEAE
148	ORTHOSIPHON	PALLIDUS	ROYLE EX BENTH.		LAMIACEAE
026	PANICUM	SP.		GARGALO	POACEAE
4635	PANICUM	COLORATUM	L.		POACEAE
4726	PANICUM	COLORATUM	L.	GARGARO	POACEAE
011	PASPALIDIUM	GEMINATUM	(FORSK.) STAPF		POACEAE
013	PASPALIDIUM	GEMINATUM	(FORSK.) STAPF		POACEAE
245	PAVONIA				MALVACEAE
4858	PAVONIA	PROCUMBENS	(W. ET A.) WALP.		MALVACEAE
195	PAVONIA	PROCUMBENS	(W. ET A.) WALP.		MALVACEAE
4788	PAVONIA	SP.			MALVACEAE
183	PAVONIA	ZEYLANICA	CAV.		MALVACEAE
4835	PERGULARIA	DAEMIA	(FORSK.) CHIOV.		ASCLEPIADACEAE
025	PERISTROPHE	PANICULATA	(FORSK.) BRUMM.		ACANTHACEAE
232	PHYLLANTHUS	SP.			EUPHORBIACEAE
4665	PHYLLANTHUS	MADERASPATENSIS	L.		EUPHORBIACEAE
4785	PLEUROPTERANTHA	REVOILII	FRANCHET var.RHODOPTERA CHIOV		AMARANTHACEAE
3	PLEUROPTERANTHA	REVOILII	FRANCHET var. RHODOPTERA CHIOV.		AMARANTHACEAE
4850	PLICOSEPALUS	NUMMULARIIFOLIUS	(FRANCH.) WIENS et POLHILL		LORANTHACEAE
4813	PLULICARIA	SP.			ASTERACEAE
4770	POLYCARPAEA	PULVINATA	M.GILBERT		CARYOPHYLLACEAE
201	POLYCARPAEA	PULVINATA	M.GILBERT		CARYOPHYLLACEAE
254	POLYCARPAEA	PULVINATA	M.GILBERT		CARYOPHYLLACEAE
4757	POLYGALA	SP.			POLYGALACEAE
067	POLYGALA	SP.			POLYGALACEAE
4755	POLYGALA	SENENSIS	KL.		POLYGALACEAE
4738	PORTULACA	SP.			PORTULACACEAE
219	PORTULACA	SP.			PORTULACACEAE
4804	PSILOTRICHUM	VIRGATUM	TOWNS.		AMARANTHACEAE
054	PTERODISCUS	KELLERIANUS	SCHINZ		PEDALIACEAE
139	PTERODISCUS	KELLERIANUS	SCHINZ	BURJUGLE	PEDALIACEAE
4640B	PULICARIA	SP.			ASTERACEAE
4661	PULICARIA	SP.		AANA KARASH	ASTERACEAE
4742	PULICARIA	SP.			ASTERACEAE
043	PULICARIA	SP.		ADAAR	ASTERACEAE
4775	PULICARIA	ARGYROPHYLLA	FRANCH. var.ARGYROPHYLLA		ASTERACEAE
4805	PULICARIA	GLUTINOSA	(BOISS.) JAUB. ET SPACH		ASTERACEAE
4848	PULICARIA	GLUTINOSA	(BOISS.) JAUB. ET SPACH		ASTERACEAE
4701	PUPALIA	cf.ROBECCHII	LOPR.		AMARANTHACEAE
4774	RESEDA	SP.			RESEDACEAE
4828	RESEDA	SP.			RESEDACEAE
4855	RESEDA	AMBLYCARPA	FRES.		RESEDACEAE
4688	RESEDA	cf.KOGALENSIS	CHIOV.		RESEDACEAE
070	RHYNCHOSIA	SP.	N.C.	MURDIS	FABACEAE

033	RHYNCHOSIA	MINIMA	(L.) DC.		FABACEAE
062	RHYNCHOSIA	MINIMA	(L.) DC	RIYO XIRA	FABACEAE
230	RHYNCHOSIA	MINIMA	(L.) DC.		FABACEAE
4788b	RUELLIA	PATULA	JACQ.		ACANTHACEAE
4801	SALSOLA	RUBESCENS	FRANCH.		CHENOPODIACEAE
4652	SALVADORA	PERSICA	L.		SALVADORACEAE
4837	SARCOSTEMMA	SP.			ASCLEPIADACEAE
4686	SATANOCRATER	COCCINEUS	(S.MOORE) LINDAU		ACANTHACEAE
052	SCHIZACHYRIUM	KELLERI	(HACK.) STAPF	DUUR	POACEAE
4842	SCLEROSTEPHANE	ADENOPHORA	(FRANCH.) CHIOV.		ASTERACEAE
085	SEDDERA	SP.			CONVOLVULACEAE
4698	SEDDERA	LATIFOLIA	HOCHST. ET STEUD EX. STEUD.		CONVOLVULACEAE
4846	SEDDERA	VIRGATUS	HOCHST. ET STEUD.		CONVOLVULACEAE
175	SEETZENIA	LANATA	(WILLD.) BULL.	NEYLO NARSH	ZYGOPHYLLACEAE
021	SEHIMA	ISCHAEMOIDES	FORSK.	AYAX MAKARE	POACEAE
4723	SELINOCARPUS	SOMALENSIS	CHIOV.		NYCTAGINACEAE
4632	SENRA	INCANA	CAV.	BALANBAL	MALVACEAE
10	SENRA	INCANA	CAV.		MALVACEAE
15b	SERICOCOMOPSIS	PALLIDA	(S.MOORE) SCHINZ		AMARANTHACEAE
005	SERICOCOMOPSIS	PALLIDA	(S.MOORE) SCHINZ		AMARANTHACEAE
016	SERICOCOMOPSIS	PALLIDA	(S. MOORE) SCHINZ		AMARANTHACEAE
022	SERRA	INCANA	CAV.	BALANBAL	MALVACEAE
068	SIDA	SP.			MALVACEAE
4638	SOLANUM	SP.			SOLANACEAE
032	SOLANUM	SP.		DHAGAWEYN	SOLANACEAE
064	SOLANUM	SP.		KIRIIRI	SOLANACEAE
135	SOLANUM	FORSKALII	DUN.	GEED SHIMBR	SOLANACEAE
4656	SOLANUM	sp.aff.S.PUBESCENS	WILLD.		SOLANACEAE
045	SPOROBOLUS	SP.		DUXI	POACEAE
4637	SPOROBOLUS	RUSPOLIANUS	CHIOV.	SAFAAR	POACEAE
035	SPOROBOLUS	RUSPOLIANUS	CHIOV.	SAFAAR	POACEAE
13b	SPOROBOLUS	SOMALENSIS	CHIOV.		POACEAE
14	SPOROBOLUS	SOMALENSIS	CHIOV.		POACEAE
4859	SPOROBOLUS	HELVOLUS	(TRIN.) DUR. ET SCHINZ		POACEAE
4692	STIPAGROSTIS	UNIPLUMIS	(LICHT.) de WINTER		POACEAE
174	STRIGA	SP.			SCROPHULARIACEAE
157	SVENSONIA	LAETA	(FENZL EX WALP.) MOLD.		VERBENACEAE
4797	TAMARIX	SP.			TAMARICACEAE
4796	TAVERNIERA	SP.		CULA HAS	FABACEAE
4811	TAVERNIERA	SP.			FABACEAE
4660	TEPHROSIA	PURPUREA	(L.) PERS.		FABACEAE
4709	TEPHROSIA	PURPUREA	(L.) PERS.	AGAGARA	FABACEAE
4812	TEPHROSIA	PURPUREA	(L.) PERS.		FABACEAE
4781	TETRAPOGON	CENCHRIFORMIS	(A.RICH.) CLAYTON		POACEAE
4725	TETRAPOGON	TENELLUS	(ROXB.)CHIOV.	MAHANZUGA	POACEAE
4670	THAMNOSMA	HIRSCHII	SCHWEINF.	WANIIQ	RUTACEAE
079	THAMNOSMA	HIRSCHII	SCHWEINF.	WANIIG	RUTACEAE
168	THAMNOSMA	HIRSCHII	SCHWEINF.	WANIIG	RUTACEAE
171	TRAGUS	BERTERONIANUS	SCHULT.	XARFO	POACEAE
071	TRIBULUS	SP.		QOD XANDO	ZYGOPHYLLACEAE
4662	TRIBULUS	TERRESTRIS	L.	IBOQUOR	ZYGOPHYLLACEAE
4827	TRIBULUS	TERRESTRIS	L.		ZYGOPHYLLACEAE
7	TRIBULUS	TERRESTRIS	L.		ZYGOPHYLLACEAE
116	TRIUMFETTA	TRIGONA	SPR. ET HUTCH.	GARAMACAYS	TILIACEAE
4753	VERNONIA	ARABICA	F. G. DAVIES		ASTERACEAE
4697	VERNONIA	CINERASCENS	SCH. - BIP.		ASTERACEAE
101	VERNONIA	CINERASCENS	SCH. - BIP.	MURGIIS	ASTERACEAE
252	VERNONIA	CINERASCENS	SCH. - BIP.		ASTERACEAE
12b	VERNONIA	SPATHULATA	(FORSK.) SCH. BIP.		ASTERACEAE
14t	VERNONIA	SPATHULATA	(FORSK.) SCH. BIP.		ASTERACEAE
133	VERNONIA	SPATULATA	(FORSK.) SCH. BIP.		ASTERACEAE
4657	WITHANIA	SOMNIFERA	(L.) DUNAL		SOLANACEAE
194	WITHANIA	SOMNIFERA	(L.) DUNAL	GEED DHALAAN	SOLANACEAE
4658	WITHANIA	SPHAEROCARPA	HEPPER ET BOULOS		SOLANACEAE
152	WITHANIA	SOMNIFERA	(L.) DUVAL	DHALAAN	SOLANACEAE
4647	ZIZIPHUS	HAMUR			RHAMNACEAE
065	ZIZIPHUS	HAMUR	ENGL.	MUR CANYO	RHAMNACEAE
4818	ZIZIPHUS	SPINA-CHRISTI	(L.) DESF.		RHAMNACEAE
4800	ZYGOPHYLLUM	SP.			ZYGOPHYLLACEAE
4674	ZYGOPHYLLUM	HILDEBRANDTII	ENGL.		ZYGOPHYLLACEAE
4690	ZYGOPHYLLUM	HILDEBRANDTII	ENGLER		ZYGOPHYLLACEAE
4822	ZYGOPHYLLUM	SIMPLEX	L.		ZYGOPHYLLACEAE

ANNEXE 5

EXEMPLE D'IMPRECISION DU NOM SOMALI
pour un usage floristique

Cas de "**XAGAR**" et de **COMMIPHORA sp.**

Dans le lexique " Somali plants names" rédigé par J.M.A. KAZMI, la dénomination locale " XAGAR", répertoriée sous diverses orthographes, désigne de nombreux Commiphora.

XAGAR, orthographe la plus fréquente, se trouve, également, transcrit: AGAG, HAGAR, HAGGAR, HARR. Chacun de ces vocables peut encore être associé à un autre, tel que: CAD (écrit aussi CADE, AD, ADE, AT, AF..), ou, MADOW (MEDOW, MEDU) ce qui donne par ex: XAGAR-CAD, ou HAGAR-MADOW etc...

Ce vocable désigne de nombreux Commiphora, dont:

C. africana (A. Rich.) Engl.
C. agar Chiov.
C. allophylla Sprague
C. benadirensis Mattei
C. crenulata (A.Ten.) Chiov.
C. ellenbeckii Engl.
C. ellisiae Vollesen
C. erythraea (Erhenb.) Engl.
C. flabellifera Chiov.
C. flaviflora Engl.
C. foliacea Sprague
C. hildebrandtii (Engl.) Engl,
C. holtziana Engl.
C. kataf (Forsk) Engl.
C. kua (Royle) Vollesen
C. lughensis Chiov.
C. microcarpa Chiov.
C. ogadensis Chiov.
C. pilosa Engl.
C. pseudopaoli Gillett
C. serrulata Engl.
C. sphaerophylla Chiov.
C. tephrodes Chiov.
C. truncata Engl.
C. velutina Chiov.
et 3 ou 4 Commiphora spp. novae.....

Or, non seulement cette liste n'est probablement pas exhaustive, mais surtout, parmi ces Commiphora, certains sont très dissemblables et se cantonnent dans des milieux notablement différents. L'usage du nom vernaculaire ne peut donc conduire qu'à la confusion.

ANNEXE 6

CARACTERISTIQUES DES SATELLITES

LANDSAT et SPOT

Deux satellites ont été utilisés pour cette étude : le satellite américain du système LANDSAT et le satellite français SPOT. Leur orbite est héliosynchrone et présente les caractères suivants :

	LANDSAT 4 - 5	SPOT 1
Altitude moyenne	687 Km	832 Km
Cycle orbital (intervalle entre deux enregistrements de la même scène).	16 jours	26 jours

L'élément caractéristique du satellite de télédétection est le capteur. Il reçoit et analyse le rayonnement électromagnétique de la surface de la terre. Les performances des capteurs sont exprimés par les paramètres suivants :

	LANDSAT 4-5	SPOT 1
OUVERTURE ANGULAIRE Champ global de l'observation	185 x 185 Km	60 x 60 Km
RESOLUTION SPATIALE Dimension minimum des détails que l'instrument peut séparer : résolution linéaire au sol	57 x 79 m	Mode multispectral : 20 x 20 m Mode panchromatique : 10 x 10 m
RESOLUTION SPECTRALE Largeur des bandes de longueur d'onde captées par chaque canal	1 - 0,45 à 0,52 µm 2 - 0,52 à 0,60 µm 3 - 0,63 à 0,69 µm 4 - 0,76 à 0,90 µm	Mode multispectral : XS_1 - 0,50 à 0,59 µm XS_2 - 0,61 à 0,68 µm XS_3 - 0,79 à 0,89 µm Mode panchromatique : P. 0,51 à 0,73 µm