TAXONOMY OF TANZANIA'S RHINOS

Paper for Presentation at the Tanzanian Rhino Workshop, Arusha, 3-5 May 1993

E. Severre, Department of Wildlife, PO Box 1994, Dar es Salaam, Tanzania.

INTRODUCTION

The black rhino, *Diceros bicornis*, has a long ancestry, stretching back some 4 to 5 million years. Until the mid-1980s, the most widely accepted classification of the black rhino defined seven sub-species on the basis of measurments of a small sample of skulls (Groves 1967). Two of these subspecies are of interest to Tanzania, namely *Db michaeli*, the East African subspecies, and *Db minor*, the Central African subspecies.

Since this early work , further skulls have been measured, and a reduction to fewer taxonomic units has been suggested (du Toit 1987). Again, two taxonomic units are suggested for Tanzania, namely the eastern populations in Kenya and northern Tanzania, and the south-central populations extending up from Natal through to Zimbabwe, Zambia and southern Tanzania (Cumming, du Toit and Stuart 1990). The situation is further complicated by recent genetic work, which shows that there is little variation in mitochrondrial DNA (mDNA) between rhinos from Kenya and South Africa, thereby posing the question of whether there is any validity to the subspecific classifications of black rhinos (Ashley, Melnick and Western 1991). This is in part recognised by the new terminology of "taxonomic units" (Cumming et al 1990), as opposed to "sub-species".

Despite these difficulties, the present position of African Elephant and Rhino Specialist Group (AERSG) in their most recent Action Plan is that the four taxonomic units should be recognised until there is further knowledge of the ecological and genetic differences within the species (Cumming et al 1990). This paper aims to summarise what little is known of the taxonomy of Tanzania's rhinos, to suggest the need for further taxonomic studies and to discuss various options for dividing the taxonomic unit in northern Tanzania from that in southern Tanzania. If there are indeed different taxonomic units of black rhinos, Tanzania is one of two countries in Africa required by the Action Plan to conserve two naturally occurring taxonomic units (the other being South Africa). Clearly, there are two options upon which it is necessary to achieve consensus among experts with respect to Tanzania's rhino conservation requirements. The first option makes the assumption that Tanzania needs to conserve the taxonomic units separately, as specified in the Action Plan (Cumming et al 1990). In this case, the location of the dividing line, and which rhino populations still surviving are of which taxonomic unit, must be agreed upon. The second option begs the question of whether there is actually a need to conserve the taxonomic units separately. In this case, it must be agreed that the requirements presently laid out in the Action Plan can be waived, for example because there are so few rhinos in Tanzania that there is a need to proceed with conservation actions that require the mixing of rhinos from different source localities.

KNOWLEDGE OF TAXONOMY OF RHINOS IN TANZANIA

Very little taxonomic work has been undertaken in Tanzania. Some measurements of skulls have been undertaken, and early studies suggested that a dividing line between the sub-species of *Db michaeli* and *Db minor* occurred around the Serengeti (Groves 1967). The type specimen of *Db michaeli* was described from the area between Enguruka and Serengeti (see Figure 1). This area was considered as the intergrade zone between the two sub-species and *Db minor* was considered to occur in the Serengeti (Groves 1967). As noted already, this conclusion was based on very small samples.

More recent studies have shown that there are indeed some differences between rhinos occurring in Manyara and Ngorongoro, two sub-populations that lie either side of the Rift Valley in the supposed intergrade zone (see Figure 1). However, these differences were not enough to seperate these sub-populations as sub-species, using a standard taxonomic yardstick (see Figure 2). Therefore both sub-populations were considered to be of the sub-species *Db michaeli* (Prins 1990).

No further work on skull taxonomy has been undertaken in Tanzania that permits the dividing line between sub-species or taxonimic units to be determined with any further precision. Nor indeed is any genetic work known to have been undertaken on Tanzanian rhinos.

In absence of any further evidence it is necessary to suggest a possible division as a working hypothesis in Tanzania, in order to define strategies for rhino conservation, for example which rhinos can be put together in the same sanctuary and which should be kept separate. Given that Prins (1990) has shown that the dividing line is not where Groves (1967) suggested, possibly the most important reasons for keeping various populations of black rhinos separate are ecological factors that may result in different feeding adaptations. In terms of its biogeography, Tanzania is separated into two fairly distinct zones. On the one hand, there are the semi-arid areas with long rains/short rains in the north of Tanzania and the wetter areas with single rainy season in the south. These climatic differences result in different growing seasons (Figure 3). These two climatic zones also clearly influence the division between the major habitat types, but these do not overlap exactly with the climatic zones. There is, however, a fairly clear division between the *Acacia-Commiphora* habitat occurring in the semi-arid areas of East Africa to the north, and the wetter miombo-dominated woodlands of Central Africa to the south (Figure 4). Such major differences in habitat are likely to result in different feeding and other ecological adaptations which may have important consequences for successful translocations and other activities related to the setting up of sanctuaries. It is known, for example, that black rhinos have very sensitive enzyme systems and are particularly prone to problems associated with changes in diet. On balance, whether or not there is any validity to the concept of different sub-species or taxonomic units, it may well be equally as important to recognise that founder rhinos coming from markedly different habitat types may have specific feeding adaptations. Therefore, it appears advisable wherever possible to conserve rhinos from different habitat types separately, on the basis of Figure 4.

FIGURE LEGENDS

Figure 1. Location of study areas of both Groves (1967) and Prins (1990), from Prins (1990).

Figure 2. Differences in the size of rhino skulls from Manyara and Ngorongoro are not sufficient to indicate different subspecies (from Prins 1990).

Figure 3. Approximate division between bi-modal (hatched area) and uni-modal growing season regimes in Tanzania (derived from AVHRR NDVI temporal data, and kindly produced by Dr RH Lamprey), shown with the major protected areas.

Figure 4. Semi-arid to sub-humid *Acacia-Commiphora*zone in Tanzania (derived from AHVRR NDVI data, with the hatched zone with an integrated NDVI less than 0.26, and kindly produced by Dr RH Lamprey). The unhatched area corresponds to woodlands dominated by miombo, and both zones are shown with the major protected areas.

CONCLUSIONS

Given the lack of present knowledge of the taxonomy of Tanzania's rhinos, the following measures are proposed:

a) that the division between habitats (Figure 4) should form an immediate basis for separating taxonomic units within Tanzania and that sub-populations from either side of this division should be conserved separately until further knowledge indicates otherwise;

b) furthermore, that if there are indeed a sufficient number of rhinos in a particular locality, say for example Selous, that such sub-populations should be conserved *in situ*, without mixing of founder stock from other localities.

c) an urgent priority for Tanzania is the collection of genetic samples from any immobilised rhinos, and the study of any rhino skulls either from museums or from individual protected areas in Tanzania. In the latter case, it is important to achieve a representative sample of skulls from southern Tanzania for comparison with those measured in northern Tanzania.

REFERENCES

Ashley, MV, Melnick, DJ and Western, D. (1991). Conservation genetics of the black rhinoceros (*Diceros bicornis*), I: evidence form the mitochrondrial DNA of three populations. Conservation Biology, 4, 71-77.

Cumming, DHM, du Toit, RF and Stuart, SN. (1990). African Elephants and Rhinos: status survey and conservation action plan. IUCN: Gland.

du Toit, RF. (1987). The existing basis for subspecies classification of black and white rhinos. Pachyderm, 9, 3-5.

Groves, CP. (1967). Geographic variation in the black rhinoceros *Diceros bicornis* (L. 1758). Zeitschrift fur Saugetierkunde, 32, 267-276.

Prins, HHT. (1990). Geographic variation in skulls of the nearly extinct small black rhinoceros *Diceros bicornis michaeli* in northern Tanzania. Zeitschrift fur Saugetierkunde, 55, 260-269.

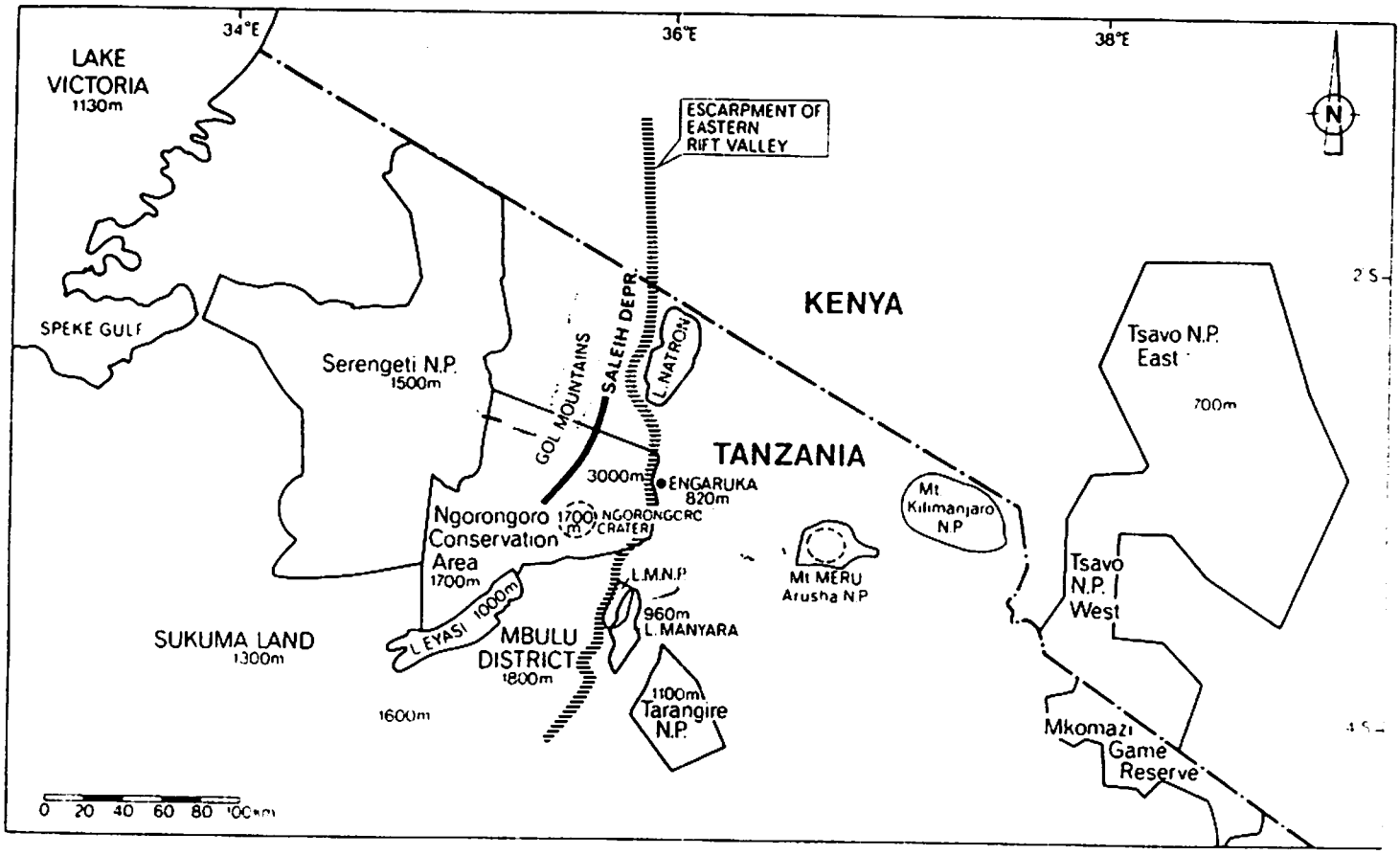

Fig 1

Adapted from Prins H. 1990.

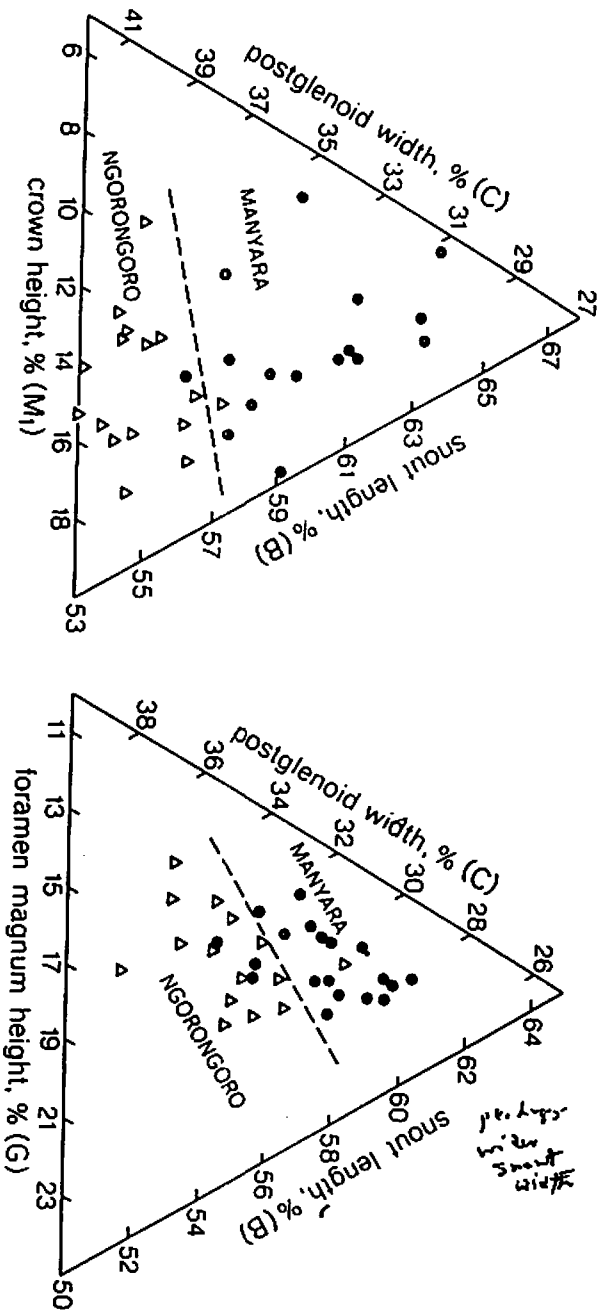

Fig 2

Adapted from. Prins, H. 1990

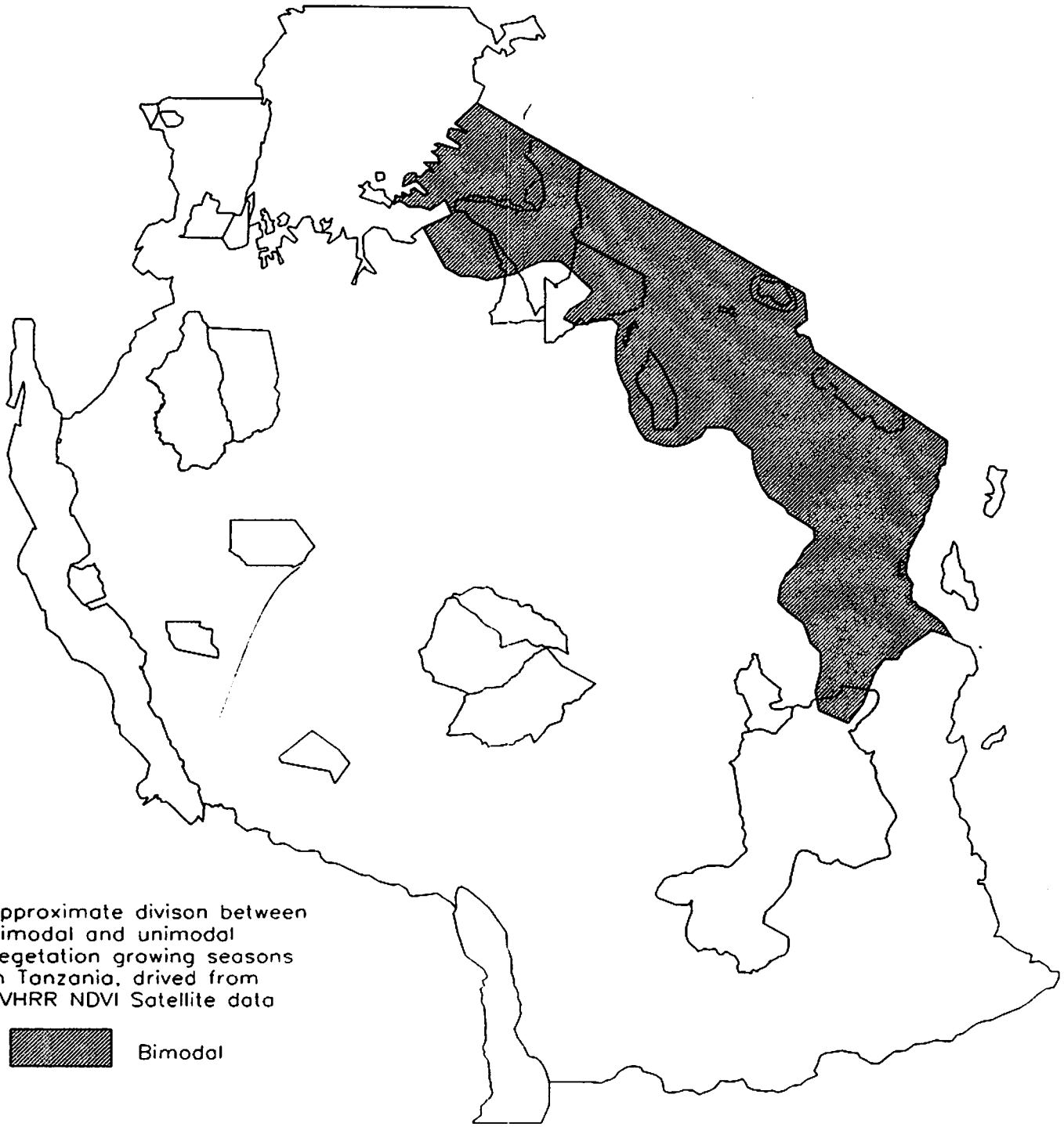
Approximate divison between bimodal and unimodal vegetation growing seasons in Tanzania, drived from AVHRR NDVI Satellite data
Bimodal

Fig. 3

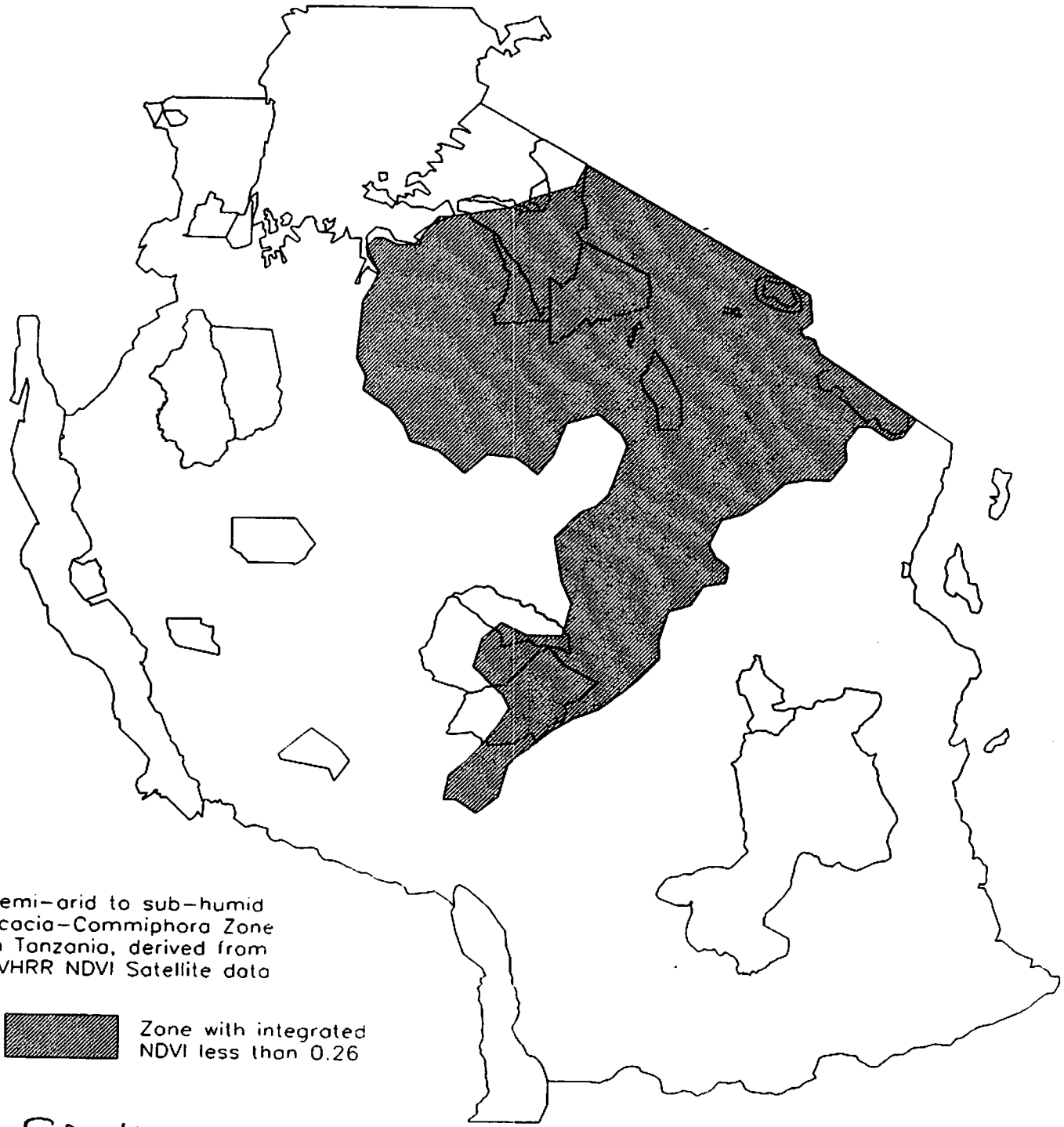

Fig 4

NDVI ≡ Normalized Difference Vegetation Index