SECOND CARNEGIE INQUIRY INTO POVERTY

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Energy conservation in Transkei rural communities

by

Roy Siegfried

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ENERGY CONSERVATION IN TRANSKEI RURAL COMMUNITIES

Studies conducted in the Transkei show that in certain areas inhabitants of rural villages are able to conserve or optimise what energy resources they have. Often what social anthropologists have identified as cultural prerequisites are, at least partly, the result of a process of selection for survival. Through a process comparable to natural selection certain social behaviour patterns that have proved to be most effective in energy utilisation have, in time, come to predominate. In this paper examples of this phenomenon are discussed in terms of the adaptive energy savings accruing to Transkeians living in these areas.

Abode-type huts in the Transkei highlands where the climate is more extreme are found to consistently face in a direction of 60 degrees E of N, and to have a particular pattern of ornamentation. As a result, it was found, the temperature conditions in the huts match the optimum temperature requirements established by a computer-based model. In other words the huts were built in such a way as to behave optimately in terms of energy conservation.

Transkeians also utilise and maximise their renewable natural resources by exploiting the marine environment available to them. Their increased protein supply from eating mussels and other collected seafood has resulted in a significantly lower incidence of Kwashiorkor in a 2km stretch along the coast compared to inland.

Darker coloured cattle are found to predominate in the Transkei highlands. Although this has often been attributed to cultural preferences on the part of the pastoralists, it is argued that, as darker cattle are found to be more likely to survive the winter months, natural selection acts, at least as one force, in influencing the colours of cattle.

Introduction

Studies carried out in the Transkei show that in certain areas inhabitants of rural villages are able to conserve or optimise what energy resources they have. Although statistics show that energy utilisation is negatively skewed (i.e. more energy is expended on collecting resources than what is obtained through using them), in certain areas villagers have developed social behaviour patterns that result in significantly more effective energy utilisation.

It is suggested in this paper that what social anthropologists have identified as social preferences or cultural prerequisites for such behaviour are, at least partly, the result of a process of selection for survival. Through a process comparable to natural selection those social behaviour patterns that have proved to be most effective have, in time, come to predominate. Cultural evolution has been superimposed on the natural selection template, and through cultural transmissions over the generations certain cultural dictates have become the established social behaviour pattern. In this paper examples of this phenomenon will be discussed in terms of the adaptive energy savings accruing to Transkeians living in these areas.

Indigenous Hut Architecture in the Transkei

Nine categories of abode-type huts have been differentiated in two areas in the Transkei according to ornamentation of the hut exterior and the orientation or direction in which the doorways face. These categories range from huts that are completely unpainted, to those with an 180 degree segment painted, to those that are painted completely white. A remarkable consistency was found in the dimensions of the huts over both areas, but it was found that in the lowland region where a more moderate climate prevails, the ornamentation and orientation of the huts in

the sample were random. In the highland areas, where more extreme temperatures are found, the average orientation of the hut entrance was approximately 60 degrees East of North, and a particular pattern of ornamentation prevailed.

A computer-based model which was built to identify the optimum temperature requirements within the huts given fixed environmental conditions and average family size was found to closely match that of the existing highland huts - only a small difference in size of dwelling was recorded due to a larger family size than that of the model. Temperatures within the huts varied only three degrees each side of the 18 degrees stipulated by the model as the optimum temperature for effective working conditions. This was in spite of a variation in the temperature outside the huts of between 0 and 40 degrees. In other words the huts were built in such a way as to behave optimally in terms of energy conservation of the inhabitants.

The huts are ornamented in such a way that during the hottest part of the day when the sun is at its strongest it strikes the white or painted part of the hut - that part that is more effective in reflecting solar energy. As the sun moves round through the course of the day it strikes the dark, unpainted section of the hut so that maximum solar energy can be absorbed. Taking into account other factors, such as the thickness of the walls and the thatch of the roof, the effect is to neutralise the differing conditions outside and create the desirable relatively stable optimal conditions within each hut.

The Contribution of the Marine Environment

It is not only in their method of hut building that Transkeians display a tendency to utilise and maximise what renewable natural resources that they have available to them. In the coastal villages by their exploitation of the marine environment, villagers are able to supplement their

protein intake to an extent that significantly improves their health and effectivity.

While activity budget studies, conducted by filming villages at work collecting food from the marine environment, show that far more energy is spent in gathering food than is gained from consuming those resources, it has been found that their increased protein supply from eating mussels and other collected seafood is significantly high. In fact in a belt of land along the coast the incidence of Kwashiorkor is significantly lower than inland.

In an area with a density of one hut per 1,4 ha, or one person for every 0,7 ha, a total of 265 550kg of fresh mussels are removed each year from a 2km-long stretch of the coast. This means that at a rate of each person collecting 4 or 5 days a month, 8kg per person is harvested. Not only does this mean increased protein intake for each consumer, but in addition mussel shells are returned to the kraals and fields and used as fertiliser.

Cattle Colours of the Transkei

In a separate study conducted in 1976, the coat colours of all adult cattle encountered while travelling along 500km of minor rural roads in an area of about 10 000km^2 between the coast and a boundary about 1000m inland were surveyed. Considerable variation in the colour composition of herds of cattle belonging to subsistence pastoralists were found and classified according to seven categories: Uniform black, uniform "re" (brown), pied black (a greater or lesser degree of white on black), pied "red" (a greater or lesser degree of white on brown), uniform white, uniform grey, and uniform fawn or light brown (honey). Red cattle predominated, followed in order by blacks, pied "reds", pied blacks. White, grey and "honey-coloured" cattle accounted for only about two percent of the total number of cattle recorded. The area studied was divided into six sectors of varying distance inland. The proportion of uniformly dark animals

increased with increasing altitude and distance from the coast. The statistics show a trend of darker coat colour with higher altitude.

Anthropologists have tended to explain colour variations in the herds of subsistence pastoralists by referring to the social preference of the peasants. Although the increase in the proportion of dark cattle with altitude in the Transkei was observed across a range of cultural conditions, this does not negate the likelihood that particular colours are consistently selected for their cultural significance. However, mortality caused by disease, as a consequence of nutritional stress and heavy infestations of parasites, is high in Transkei cattle. Hence, it can be assumed that natural selection acts, at least as one force, in influencing the colours of cattle. Adaptive colours in coat colour according to altitude are known to occur in wild animals, and also apparently in cattle.

It would seem that because Transkei highlands get much colder at night in the winter, and can get very dry during the winter months, the main selective factor operating on coat colour of cattle is possibly cold stress coupled with nutritional stress. This militates selectivity against survival of light coloured cattle in the highlands. The dark cattle probably offset the loss of heat energy at night by relatively rapid absorption of radiant energy when the sun rises and the ambient temperature is low.

In conclusion it is important to note that any savings in energy by cattle herds during winter in the Transkei could have important implications for the economic production of livestock in a region where rapid, large-scale changes are affecting traditional subsistence economies. Natural selection and culture may interact in influencing both the composition of cattle herds and the productivity of the natural rangeland in the Transkei.

There is a need for properly integrated ecological studies of the existing agro-economies before they are replaced, sometimes merely because they are indigenous. More particularly, more comprehensive socio-biological knowledge should form a prerequisite in planning for the introduction of new cattle breeds and methods of husbandry in the Transkei.

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