**CASE STUDY ON MOUNTAIN ENVIRONMENTAL MANAGEMENT:
NYEMO COUNTY
(Tibet)**

Zhang Rongzu

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Zhang Rongzu
August 1989.

Mountain regions in the world have long been the source of many of the world's great rivers and have provided a wealth of natural resources. The United Nations Environment Programme (UNEP) has been working since 1972 to promote the sustainable development of mountain regions. In 1992, the United Nations Conference on Environment and Development (UNCED) adopted the Agenda 21, which recognized the importance of mountains and mountain regions. The United Nations Environment Programme (UNEP) has been working since 1972 to promote the sustainable development of mountain regions.

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Case Study on Mountain Environmental Management: Nyemo County (Tibet)

Zhang Rongzu

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Foreword

Almost unknown to the outside world until three decades ago, the remote Western part of China has been undergoing important developments. The Xizang (Tibet) Autonomous Region, in its unique setting between the Himalayan Range and the Kun-Lun Mountains, is characterized by its altitude and also by its isolation. It has been, since 1960, the focus of studies to determine the natural resources of the Region. The Academia Sinica fielded a series of expeditions to the Quinghai-Xizang Plateau from 1962 onwards. This first, and most valuable, effort was followed by more specific studies from 1973 to 1979.

It is in the framework of the ICIMOD program on "Mountain Environment" that Professor Zhang Rongzu, member of the Commission for the Integrated Survey of Natural Resources, Academia Sinica, made a survey of one County of the Xizang Autonomous Region. Professor Rongzu's is one of a series of papers prepared for ICIMOD for a seminar on Mountain Environmental Management that was held from 12th April to 16th April 1989. Through this series, ICIMOD hopes to examine the diversity of ecosystems with the purpose of establishing appropriate development strategies.

Nyemo County is part of the district of Lhasa in Central Tibet. Located to the North of the Yarlungzangbu (Brahmaputra) River, it extends up to the summit of the Nyainqentanglha Range. The county is representative of a range of landuse systems practised in the semi-arid regions of Tibet. These vary from agriculture, practised at lower altitudes, to cattle breeding which expands into a system of extensive pastoralism. The County is also a terminal point on the caravan route bringing salt from the High Tibetan Plateau and its salt lakes.

The County of Nyemo, in the rainshadow belt on the Northern slopes of the Himalayas, is an example of the Trans-Himalayan agro-pastoral system that is characterized by altitude, dry climate, and harsh conditions, and needs specific physiological adaptations on the part of the human inhabitants. It has also the advantage of being linked economically with the urban area of Lhasa, the capital city of the Region, the development of which influences the area considerably.

The originality of the methodology followed in this study lies in the active participation and involvement of researchers from the major departments of the Xizang Autonomous Region, the local administration, and the local population. The latter were proud to show their achievements in the agro-pastoral sector and the former, by their stimulating questions, were able to collect precise data and bring more reflection into the planning process. The final product is, thus, more than a case study because, besides providing a series of data which have never been put together before, it presents an analysis, and puts forward suggestions, for the optimum management of a characteristic environment which is found in other parts of Tibet.

Studies of this kind are rare because sufficient attention has not been given until now to research undertaken on the human level. All too often local knowledge has been ignored by planners coming from outside. It is hoped that more case studies of this type will be promoted in order to contribute to the broader comprehension and comparison of such systems. The results of these could then be extended to other semi-arid and arid regions of the World.

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As part of a programme of ICIMOD, the present work was undertaken at ICIMOD, Kathmandu, based on a field study carried out in August, 1987, by a team consisting of associates from ICIMOD and the People's Government of Xizang (Tibet) Autonomous Region. The study was completed at the ICIMOD headquarters in Kathmandu.

Personally, as a staff member of ICIMOD, I wish to express my thanks for the kind help and encouragement shown by the Director of ICIMOD, Dr. Colin Rosser, Director Mr. Chu Yushan of the Lhasa Land Management Bureau, the entire ICIMOD staff, and my Chinese colleagues Mr. Bian Jue (Bureau of Agricultural Regionalization in Lhasa) and Mr. Lin Chenfeng (Chengdu Institute of Geography) who accompanied me in the field study. The professional staff of the Centre and the programme consultants, Dr. C. Jest and Dr. J.R. Dunsmore, all paid a lot of attention and made helpful comments on an early preliminary report of the field study and the draft of this paper.

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CONVERSION OF COMMONLY USED CHINESE UNITS IN THE PAPER.

1 <i>Mu</i>	= 1/6 acre = 1/15 hectare
15 <i>Mu</i>	= 1 hectare
1500 <i>Mu</i>	= 640 acres = 1 square kilometer
1 <i>Jin</i> (catty)	= 10 taels = 1.33 pound = 0.5 kilogram
1 <i>Tan</i>	= 50 kilograms

GLOSSARY

Jingke	Highland barley
Zhangba	Tibetan food, Jingke flour, and peas mixed with "butter tea"
Yarsa	Warm season range
Gunsa	Cold season range

Summary

Nyemo county, situated in the middle reaches of the Yarlungzangbu River Basin (Fig. 1), is representative of the highland agro-pastoral system of the arid and semi-arid zone which runs along the shadow belt of the northern flanks of the Greater Himalayas. The inhabitants of Nyemo county are of Tibetan stock and have lived for generations at high altitude. They are physiologically adapted to a way of life in a harsh environment. They practise agriculture and a small percentage of the population look after livestock (pastoralism).

The farmers' houses, in clusters of 10 to 20, are built on the edge of terraced fields along main rivers, and the herdsmen's houses are scattered throughout the highland basins. Both areas are served by roads and jeepable tracks. Additionally, the pastoralists also spend the summer period under tents at higher altitude. Two local roads in the county are now linked to Lhasa, the capital of the Xizang (Tibet) Autonomous Region (XAR).

Distinct land use patterns have been identified. They consist of three vertical agro-ecological zones (Fig.14).

- Agricultural Zone.
- Transitional Zone.
- Pastoral Zone.

In the Agricultural Zone, which is confined to the valleys along the main rivers, farmlands have been established only on the alluvial fans and river terraces, and they occupy 1.3 % of the total land of the county. More than 85% of the local people are farmers and they cultivate the land with relative intensification. Historically, Nyemo is an important grain-providing area in the middle reaches of the Yarlungzangbu river basin.

The Transitional Zone is comprised of the sloping land surrounding the agricultural villages. The land suffers from overgrazing and fuelwood collection. In spite of economic reforms, this community remains poorly

managed and thus has become an area of serious environmental degradation.

The Pastoral Zone, comprised of the alpine and the sub-alpine meadows, covers 80% of the total area of the county. The herdsmen constitute only 12% of the total population of the county. A traditional simple pasture system of two seasons (summer -"yarsa" and winter -"gunsa") with rough uncontrolled grazing is still practised. Relative to the numbers of livestock, the area for summer grazing is excessive and the winter grazing is inadequate thus leading to an induced imbalance in ranging, a result of the climatic limitations as well as of imperfect management. The excessive numbers of livestock affect the current range system negatively by overgrazing the "gunsa" and its surrounding areas.

With the change in socioeconomic conditions, caused by the establishment of the XAR, the policies implemented by the Central Government during each particular period have considerably influenced the land use and its management in the Region. Three major periods can be distinguished:

- A period of "Democratic Reforms" (1959-1965);
- A period of "Cultural Revolution" (1966-1976); and
- A period of "Readjustment and Reforms" (1976-1986).

Each of them was characterized by different consequences on agro-husbandry development which were influenced by different policies. Now China as a whole has entered a new epoch with the Seventh Five Year Plan (1986-1990). The on-going nation-wide economic reforms, with their policies and relative strategies, are implemented locally in Nyemo County.

Of historical importance in rural economic development was the change of basic production units from the communal system to the "Household Responsibility" system. Nevertheless, the administrative institution is still an important focal point in adapting the

"economic reforms" in agricultural management to the county and subcounty level. To encourage and guarantee the households' activities, a "Tri-collaborating Contract System" has been initiated in Tibet which has successfully spread this new technology throughout the whole of the XAR as well as Nyemo county.

Although the area of cultivated land has not been expanded, and the landholding per person has decreased considerably throughout the previous decades, the total grain yield has met the food demand of the growing population because the yield per unit area has increased due to intensification (Fig. 13). The quantitative increase in livestock did not alter the low level of cash income, since the output value of livestock production accounted for only 20 to 25% of the total income of the county. Apparently, the self contained character of the traditional subsistence farming system persisted and hindered rural economic development.

This author is not aware of any concrete management plans for the county. However, helpful discussions during the field study provided a general orientation for further management based on integrated considerations. The major problems from the medium as well as from the long term point of view, for each of the major land use patterns, can be summarized as follows:

Agricultural Land:

- One of the prerequisites for maintaining fertility of the soil must be an increase in compost use, rather than the application of chemical fertilizer. Therefore, stall-feeding must be promoted.
- Realistic measures to improve irrigation management, which will fully affect the efficiency of existing irrigation systems, based on cooperation of community and households, must be implemented.

Transitional Land:

- Measures must be taken to prevent the overgrazing of land, by allocating the responsibility for the land to the villages or to the subcounty. Concrete, effective legislation to improve the natural vegetation must be introduced.

Pastoral Land:

- Establish a marketing system, with accompanying transportation facilities, in order to improve the herd composition.
- Research into the carrying-capacity of pasture and classification of ranges for rational rotation-ranging.
- Protect the shrub Sabina. Legislation at district level is needed for this.

Two common problems of environmental management, that are facing the local people, can be solved only at county level:

- Community and management: The wasteland, rangeland, irrigation, and water supply system, which remain under the county and sub-county or are village-owned, are not yet properly managed. Appropriate legislation must be made to ensure effective coordination between the two complementary systems of "household responsibility" and "community".
- Fuel shortage and bio-resource protection: The targets for fuel resources have been focussed on Sabina, other shrubs, and the peat (sod) of the meadows which are so important in natural conservation. Sabina vegetation in the county could disappear within 10 years. In addition to encouraging the use of fuel saving stoves, a systematic study of the fuel problem must be carried out as a part of the integrated management of rural energy development.

In order to implement management, a scheme of "Management Regions", based on administrative units, has been suggested by the authors. In each region, besides the common problems, top priority has been given as follows:

1. Northern Region: Pastoralism:

The current trade system must focus on the marketing, rather than on the transportation system, to regulate the ecological health of the herd composition.

2. Central Region: Pastoralism Dominant:

The conversion of the marginal cultivated land to fodder land must be organized, in relation to the amelioration of pasture and intensification of farming.

3. Southern Region: Agriculturalism Dominant:

Fertilization of farm land and stall-feeding of animals based on effective use of farming production and rotational cropping systems.

There are several gaps in the knowledge needed for optimum management. These gaps should be filled by using empirical knowledge as well as the results of specific studies to be undertaken, as given below:

- How can stall-feeding meet fertilizer needs while, at the same time, corresponding to the existing intensification system ?

- How should surplus animals, owned by farmers, be eliminated or sent to pasture land without over loading the pasture ?
- How to calculate the carrying-capacity of natural pasture and the criteria for range classification of different types of ranging ?
- How can one achieve a healthy herd composition through the process of management, including education in animal husbandry ?
- How can the collection of Sabina, and the extraction of peat, be restricted, when other energy resources have not yet been identified?
- How can modern transportation facilitate rural trade and encourage improvements in traditional pastoralism ?
- How to develop the TCC system for pastoralism based on two contrasting patterns of household herd ownership and community ranges ?

FIGURE 1
THE GEOGRAPHICAL LOCATION OF
LHASA DISTRICT AND NYEMO COUNTY

LEGEND

- District Boundary - - - - -
- County Boundary - - - - -
- Motorable road ———
- River ———
- Lake ———