

Part 3 The Current Situation and the Preservation of Biological Diversity on the Qinghai-Tibetan Plateau

1. *Significance of the Qinghai-Tibetan Plateau in the Preservation of Biological Diversity*

There have already been a great many studies and scientific examinations of the direct and indirect values of and the significance of preserving biological diversity. As for the Qinghai-Tibetan Plateau, the preservation of its biological diversity is of special significance.

Firstly, the Plateau is, up to now, one of the few unprobed storehouses of mountain biological resources, containing unknown or already known but not yet fully explored resources .

The following are a few examples: the medical herb, *Picrorhiza scrophulariiflora*, the medicinal oil plant, *viburnum cylindricum*, the aromatic plant, *Zanthoxylum tibetanum* the amyllum plants, *Quercus aquifolioides* and *Prunus mira* the fibre plant, *Edgeworthis gardneri*, a plant used for industrial chemicals, *Quercus semecarpicolia* ,and the decorative plant, *Magnolia*

rostrata. In addition the following animals have useful attributes: for medicine, *Moschus berezouskii*, for fur, *Panthera uncia*, for meat, *Cervus albirostris*, and for its ornamental value, *Tragopon satyra*.

With regard to domestic animals and cultivated plants also, the Plateau is a rich source of species. For example, *Pophagus mutus*, a savage species and the ancestor of the domesticated *Bos grunniens*, is still living on the Plateau and is of great significance for improving the quality of the domestic *Bos grunniens* because the progenies born of the male *Pophagus mutus* and the female *Bos grunniens* are of greater stature and strength than purebred stock. A similar example is the *Hordeum vulgare*, a cereal crop originating in China. On the Plateau, people have discovered its ancestral species, such as *Hordeum lagunculiforme*, *Hordeum spontaneum*, *Hordeum agriocrithon*, and its near relatives--the perennial *Hordeum brevisubulatum*, *Hordeum violaceum*, *Hordeum bulbosum*, and *Hordeum bogdanni*, all of which are of inestimable value for improving the quality of *Hordeum vulgare*.

The Plateau has become a diversified hereditary gene pool of varieties of domestic animals and cultivated plants, since livestock, pets, and crops for human cultivation have evolved in the special conditions of the Qinghai-Tibetan Plateau and generated many new species with special hereditary and ecological characteristics. To illustrate, examples of livestock include the endemic *Bos grunniens* on the Plateau, having many species like the white bossin, the endemic Plateau ox of Tibet and the *Zhong-dian* horse, sheep, and pig of Tibet. Among domesticated animals are the Tibetan *Ao* (a kind of huge and ferocious dog), the Tibetan toady, and so on and, among the cultivated plants, *Hordeum vulgare* has five sub-species and 260 variants on the Plateau; and 83 variants have been found of *Triticum aestivum* in Tibet.

The development of modern biotechnology has opened a wide vista for the exploration and use of the rich biological hereditary diversity on the Qinghai-Tibetan Plateau. Under the varied adverse conditions of the Plateau, the longstanding living beings from this area have developed particular adversity-resistant genes, especially those for anti-frigidity, anti-drought, and anti-short wave radiation. In addition, many living beings on the Plateau have grown special resistant genes against abrupt changes in the environment. When the sun rises on the plateau, the temperature can rise from below zero to 10-20 C, and in a short time a dark cloud may bring sudden snow and the temperature drops steeply to below 0°C again; adversity-resistant genes are of critical importance in cultivating cold-resistant crops.

From a broader perspective, as the Plateau is the source of many of the big rivers of Asia, like the Yangtze River, the Yellow River, the Lancang River, the Nujiang River, the Bulanaputela River, the Ganges, the Indus River, and the Talimu River, when these rivers flow across the edges of the Plateau, they cause serious erosion because of the steep terraces. This makes the protection of the primitive ecosystem of the Plateau extremely important, especially for the eastern and southern fringes which have abundant rainfall. If the forest ecosystem on the fringes of the Plateau were to be destroyed, the soil erosion in the upper reaches of the above rivers would inevitably increase and heavy rain would bring massive floods. The lower reaches and various water conservancy facilities on the mainstreams would be affected, reservoirs silted up, and dams destroyed because of sudden downpours. History has taught us this.

One great concern for mankind is the change in the global environment. Many of the Plateau biological communities and individuals are distributed throughout the transitional areas between the horizontal life belt of the Plateau proper and the vertical life belt on the mountain fringes. These are exceptionally sensitive to changes in the environment. Therefore, dynamic observation of the biological diversity of the Qinghai-Tibetan Plateau might serve as a good monitoring system for global environmental changes.

2. The Current Situation of the Natural Protection Zones on the Qinghai-Tibetan Plateau

The establishment of Natural Protection Zones to achieve effective biological protection within a zone is the primary approach for preserving biological diversity.

Since the founding of the first batch of natural protection zones in Wolong and at Qinghai Lake on the east skirst and in the heart of Qinghai-Tibetan Plateau respectively on the first of January 1975, the number of zones has risen to 58, nine of which are of national level and the rest of provincial or municipal levels (see Annex 2).

In terms of the types of ecosystem, the Qinghai-Tibetan Plateau Natural Protection Zone(QTPNPZ) can be divided into two major categories: the arid or semi-arid prairie and desert ecosystem on the Plateau proper and the moist or the semi-moist mountain forest ecosystem on its eastern and southern fringes. Among the protection zones belonging to the first type ecosystem,

Mt. Alking in Xinjiang and Qiangtang in Tibet take the lead, followed by wildlife protection zones such as the protection zone for *Grus nigricollis* in Shenzha, Birds' Isle at Qinghai Lake, the protection zone for *Grus nigricollis* in Longbao; the Marshland of Migrating Birds in the Big and Little Suga Lakes, Saiba, Banggu, Longxi, Dangka, Jieji Temple, Laruo Temple and Gasan of Akesai county; Sekang, Kuanzhong, and Zhaxilawu Temple of Chengduo county; Gejia Temple, Gongya Temple, Zhangda Temple, Juela Temple, Bami Temple, and Jue Temple of Nagqian county; and Salt Bay of Subei county in Gansu province. The overall number may well be limited, yet with Qiangtang and Mt. Alking as the first and second largest national protection zones, the whole area covers 29,000,000 hectares, or 10 per cent of the Qinghai-Tibetan Plateau.

Annex Two reveals that the moist or semi-moist mountain-forest ecosystem has the largest number of protection zones, i.e., 32 all told, and 12 of them are protection zones for *Ailuropoda melanoleuca*.

In addition to the above mentioned, the site on the southern edge of the Qinghai-Tibetan Plateau bordering China and Nepal, the third largest national natural protection zone-- is the Mt Everest (Mount Qomolangma) protection zone, which covers the transitional area between the moist or semi-moist mountain forest ecosystem on the southern fringe and the arid or semi-arid arctic prairie and desert ecosystem in the interiors of the Qinghai-Tibetan Plateau, and it thus integrates the characteristics of both ecosystems.

From Annex Two we perceive that a fairly large number of natural protection zones have been established in the Qinghai-Tibetan Plateau, and the area covered by them constitutes 10 per cent of the whole Plateau, far larger than the average in East Asia. Nevertheless, it is also important for us to bear in mind that this is due to the presence of the three largest protection zones (i.e., Qiangtang, Mt. Alking, and Mt. Everest) in the hinterland of the Qinghai-Tibetan Plateau. When taking sole consideration of the eastern and western fringes of the Plateau, which abound in biological varieties, then the number of protection zones and their areas are far less than could be desired. There is still a long way to go.

The biggest problem is the background economy, the shortage of talented personnel, and lack of funds and materials, which seriously cripple the smooth running, effective functioning, and management of the already established natural protection zones. Apart from the protection zones for *Ailuropoda melanoleuca*, which can expect more investment in the long run, the economic

situation in other zones is not optimistic. In view of this position, the development strategy for the protection zones on this plateau is to concentrate on essential points and make the best use of the limited, existing human, material, and financial resources to achieve the best protection possible. Concomitantly, we should publicise, both at home and abroad, the key position this area occupies in natural protection and another strategy is to bring about international cooperation to raise more funds for the construction and upkeep of the protection zones.

The vital issue is the building up of a comprehensive natural protection zone for various types of ecosystem in order to preserve the diversity of the plateau. In line with this we suggest that a network of protection zones be established so as to promote the development of natural protection areas around the Qinghai-Tibetan Plateau (see Annex 3).