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Vegetation Monitoring Dataset from 31 Plots in Qinghai Lake Watershed (2018)

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Abstract: The Qinghai Lake watershed (97°50′E–101°20′E, 36°15′N–38°20′N) is an important natural geographical region in the northeastern Qinghai–Tibetan Plateau. It is an important part of the ecological security of the Two Screens and Three Districts region in Qinghai province. The basin has a rich biodiversity and is a gene pool for Qinghai–Tibetan Plateau species, in addition to having a typical plateau ecosystem. Vegetation was monitored at 31 sample sites in the basin during 2018 and a vegetation monitoring dataset was obtained for the Qinghai Lake watershed. The dataset includes: (1) a profile of the sampling sites and location data; (2) the type of vegetation (temperate grassland, temperate desert grassland, alpine grassland, temperate desert, mountain meadow, lowland meadow and alpine meadow); (3) statistics for the main plant families, genera and species of the seven zonal vegetation types; (4) statistics for the biomass and available biomass of vegetation in the Qinghai Lake Nature Reserve, the various bird habitats and the active area for Przewalski's gazelle; and (5) an annual comparison of the plant structure and biomass of the temperate steppe, temperate desert steppe, alpine steppe and temperate desert.

Keywords: Qinghai Lake watershed; Qinghai–Tibetan Plateau; vegetation monitoring; sample plots

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Dataset Availability Statement:

The dataset supporting this paper was published and is accessible through the *Digital Journal of Global Change Data Repository* at: https://doi.org/10.3974/geodb.2021.09.09.V1 or https://cstr.escience.org.cn/CSTR:20146.11.2021.09.09.V1.

1 Introduction

Extreme cold, a lack of oxygen and the harsh climate of the Qinghai–Tibetan Plateau have

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resulted in a sensitive and vulnerable ecological environment. Monitoring the biodiversity of this region is important in evaluating the effectiveness of conservation projects and in wider studies of global climate change[1]. Vegetation is the basis of ecosystems and plays an important part in their operation and structure[2]. Changes in vegetation in the alpine region of the Qinghai–Tibetan Plateau are important in studies of the region's climate and ecology[3]. Grassland is the main type of vegetation in the Qinghai Lake watershed[4], with 2.08×10^6 ha of grassland accounting for 70.26% of the total area.

There are seven types of grassland in the Qinghai Lake watershed, among which the largest is alpine meadow, accounting for 68.95% of the total area of grassland. Temperate steppe vegetation is distributed in the lake basin and river valleys and has adapted to the cold, dry climate, showing a trend from east to west[5–7]. The yield of fresh grass from the natural grasslands is 2.56×10^3 kg/ha, with the highest yield in the lowland meadow grasslands, followed by mountain meadows; the lowest yield is in the alpine desert areas[8]. A total of 91.22% of the grassland area in the watershed receives grassland compensation (government subsidy). There are different degrees of degradation of the grassland, with 1.88×10^5 ha of lightly degraded grassland, accounting for 9.00% of the total grassland area, and 8.58×10^5 ha of moderately degraded grassland area, accounting for 41.19% of the total grassland area. There is also 2.15×10^5 ha of seriously degraded grassland, accounting for 10.34% of the total grassland area.

The Qinghai Lake watershed lies in the northeast of the Qinghai–Tibetan Plateau and is an independent and integrated natural geographical unit[9,10]. This dataset is based on vegetation monitoring samples taken by the National Nature Reserve Authority of Qinghai Lake[11] from 7 to 14 August 2018 and consists of 31 vegetation samples from Egg Island, Cormorant Island, Haixinshan Island, the Buha estuary, Xianggong village, Quanwan, the Heimahe river, Zhengquhu, Hadatan, the Quanji estuary, the Nanren wetland, the Ganzi river, Sand island, Ketu, Xiaobaohu lake, the Shantung river wetland, the Jiangxi ditch rural community summer pasture, the Buha river, the upper reaches of the Shaliu river, Kotō sheep farm, the Shantung river, Zhenyuan, Qinghai Lake farm, Halgai, Kuerma and Shengge.

2 Metadata of the Dataset

Table 1 summarizes the metadata of the Monitoring vegetation dataset from 31 sample sites in Qinghai Lake basin (2018)[12]. It includes the dataset full name, short name, authors, year of the dataset, spatial resolution, data format, data size, data files, data publisher, and data sharing policy, etc.

3 Methods

Vegetation was monitored in 31 sample plots around Qinghai Lake to determine the vegetation structure, plant frequency and ground biomass at 16 sites of *Procapra przewalskii* (Przewalski's gazelle) and bird habitat. Site-specific monitoring was carried out and representative plots selected for vegetation monitoring in each region, starting with detailed records of the basic characteristics of the plots, including the administrative region, vegetation type, altitude, geographical location, general geomorphological features, general soil features, the hydrological and hydrogeological conditions, utilization mode and status. One vegetation structure quadrate of 1 m^2, ten vegetation frequency quadrates of 1 m^2 and one vegetation structure quadrate of 25 m^2 for shrub or tall herbage (*Achnatherum splendens* only) were measured at the same time. The above-ground biomass of the vegetation was measured in the active area, the key bird habitat and the bird breeding areas. Two to three

biomass samples were taken from each plot and all samples were fixed and monitored over a number of years.

Table 1 Metadata summary of the Monitoring vegetation dataset from 31 sample sites in Qinghai Lake basin (2018)

Items	Description
Dataset full name	Monitoring vegetation dataset from 31 sample sites in Qinghai Lake basin (2018)
Dataset short name	Vegetation_QinghaiLakeBasin2018
Authors	Chen, Z. R., Qinghai Normal University, 424142312@qq.com Hou, Y. S., Qinghai Lake National Natural Reserve, Forestry Administration of Qinghai Province, 823996451 @qq.com Chen, K. L., Qinghai Normal University, ckl7813@163.com Ma, Y. X., Qinghai Normal University, 346404980@qq.com Wang, X. Y., Qinghai Normal University, 245003744@qq.com
Geographical region	Qinghai Lake watershed
Year	2018
Data format	.shp, .xlsx
Data size	85 KB
Data files	9 (compressed to 2 files)
Foundations	Ministry of Science and Technology of P. R. China (2019QZKK0405); National Natural Science Foundation of China (41661023); Qinghai province (2020-ZJ-Y06)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	***Data*** from the Global Change Research Data Publishing & Repository includes metadata, datasets (in the *Digital Journal of Global Change Data Repository*), and publications (in the *Journal of Global Change Data & Discovery*). ***Data*** sharing policy includes: (1) ***Data*** are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use ***Data*** subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute ***Data*** subject to written permission from the GCdataPR Editorial Office and the issuance of a ***Data*** redistribution license; and (4) If ***Data*** are used to compile new datasets, the 'ten per cent principal' should be followed such that ***Data*** records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[13]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

Vegetation coverage and biomass of shrub or tall herbaceous plots were calculated as follows:

Vegetation coverage = herb sample square coverage × (1 − total coverage of shrubs or tall herbs) + total coverage of shrubs or tall herbs

The total coverage of shrubs or tall herbs was equal to:

Σ(standard plant length × standard plant width × π/4 × standard plant number) / sample area

The total vegetation biomass of each sample plot was equal to:

total biomass of various shrubs or tall herbs shrubs or tall herbs area + average biomass of sample square × (1 − total coverage of shrubs or tall herbs)

4 Data Results

4.1 Data Composition

The dataset includes: (1) the profile of the sample site monitored and location data; (2) the structure of the vegetation type in temperate grasslands, temperate desert grasslands, alpine grasslands, temperate deserts, mountain meadows, lowland meadows and alpine meadows; (3) statistics for the main plant families, including the genera and species of the seven vegetation zones; (4) statistics for the total and available biomass of vegetation in Qinghai

Lake Nature Reserve, the bird habitat and the area in which Przewalski's gazelle is active; (5) an annual comparison of plant structure and biomass of the temperate steppe, temperate desert steppe, alpine steppe and temperate desert. The data are stored in .shp and .xlsx formats and the dataset consists of nine data files with a data size of 85 KB (compressed to two files to give 73.6 KB).

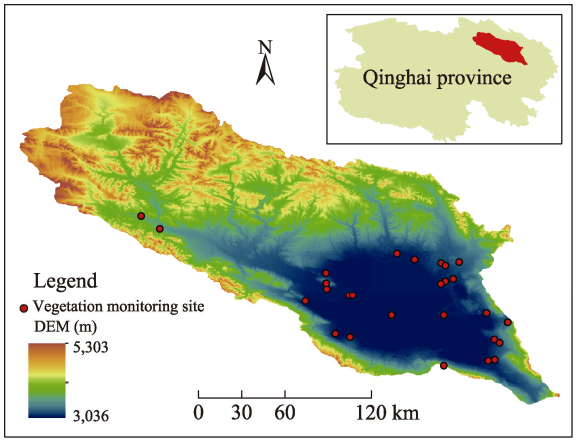

Figure 1 Monitoring sites for vegetation in the Qinghai Lake watershed in 2018

4.2 Data Products

Thirty-one plots were set up in 30 areas, including Egg Island, Cormorant Island and Haixinshan Island (Figure 1), among which seven plots were temperate grassland and one plot was temperate desert grassland. There were two alpine grassland plots, two temperate desert plots, two mountain meadow plots, one lowland meadow plot, 15 alpine meadow plots and one weed plot.

The results of vegetation monitoring in Qinghai Lake valley in 2018 showed that the average heights of the vegetative and reproductive shoots were 11.50 and 22.90 cm, respectively. The mean heights of the vegetative and reproductive shoots of the dominant species were 16.10 and 27.70 cm, respectively. Vegetation covered 72% of the total area and the dominant species covered 38% of the total area. The average biomass of vegetation was 3,196.22 kg/ha, with 59.67% of the total biomass consisting of sedge and Gramineae species. These monitoring data indicate that the ecological environment of vegetation growth in Qinghai Lake Nature Reserve is in a good condition.

The carrying capacity of the vegetation in the active area of pronghorn was 91,378 sheep units, 20,214 more than in 2016. The carrying capacity for Przewalski's gazelle was highest in the East Lake area, with 33,486 sheep units, an increase of 4,426 from 2016, and the lowest was in the Shengge area, with 4,221 sheep units, an increase of 292 from 2016. Compared with the average values in previous years, the biomass of the five vegetation types showed an increasing trend in the temperate desert steppe, whereas the biomass of the other vegetation types showed a decreasing trend. There was more precipitation and lower temperatures in 2018 than in previous years, resulting in stunted plant growth and a lower biomass. Measurements of the above-ground biomass of ten vegetation types in Qinghai Lake Nature Reserve showed that the average total above-ground biomass was 2,759.20 kg/ha, of which gramineae was 1,208.50 kg/ha, accounting for 43.80% of the total biomass, cyperaceae was 78.67 kg/ha, accounting for 2.85%, leguminosae was 353.47 kg/ha, accounting for 12.81%, and other families were 1,118.56 kg/ha, accounting for 26.24%.

5 Discussion and Conclusion

This dataset is based on vegetation monitoring samples collected by the Qinghai Lake National Nature Reserve Authority over a number of years. Thirty-one sample plots were set up for eight days from 7 to 14 August 2018 in 30 areas, including Egg Island, Cormorant Island and Sea Heart Hill Island. The sample plots included seven plots with temperate steppe vegetation, one sample plot with temperate desert steppe vegetation, two sample plots with alpine steppe vegetation, two sample plots with temperate desert vegetation, two sample

plots with mountain meadow vegetation and one sample plot with lowland meadow vegetation. There were 15 sample plots and one sample plot of weeds in the alpine meadow region.

Vegetation monitoring in the fragile and sensitive ecological areas of the Qinghai Lake watershed provides an important basis for maintaining the good ecological environment of Qinghai Lake and expanding Qinghai Lake National Park. It also provides data for the protection and restoration of the Qinghai–Tibetan Plateau ecosystem. The Qinghai provincial party committee and provincial government are determined to "Contribute Ecology to the Country", to implement "One Excellent and Two High", take the lead in building a national park demonstration province and speed up ecological protection and high-quality development in the Yellow watershed. This will allow them to take the lead in turning the Qinghai–Tibetan Plateau into an ecologically important region, both domestically and internationally. Ecological protection has been given a high priority and vegetation monitoring has been used to protect the ecological environment of the Qinghai Lake watershed to ensure a "Big, Beautiful, Clean and Good" background for Qinghai Lake.

Author Contributions

Chen, Z. R. and Chen, K. L. designed the algorithms for the dataset. Hou, Y. S., Ma, Y. X. and Wang, X. Y. contributed to data processing and analysis and Chen, Z. R. wrote the paper.

Conflicts of Interest

The authors declare no conflicts of interest.

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