



CHINA

Reed Fires in Zhalong Nature Wetland Reserve in Heilongjiang Province

In recent years, the serious reed fires occur in Zhalong Nature Reserve in Heilongjiang Province. From 19 to 28 March 2005, 12 fires occurred in Zhalong nature reserve near Qiqihaer, Duerbebe, Lindian and Daqing. The burned area was about 18,666 hectares (ha). Zhalong Nature Reserve is characterized by a particular fire environment determined by the local climate. As a consequence of a pronounced dry season the reeds become withered, yellow and dry. In addition the moisture content of the litter and humus are reduced greatly. This dry-season fuels are forming the fire environment. Fast-spreading surface fires are followed by ground fires in the organic layers that are often long lasting. Since it is difficult to move people and equipment on the wetlands it is very difficult to put out a fire. People's understanding of the wetland and fire are limited. Rapid detection of and response to fires are difficult, making fire suppression and saving life and property very difficult. Wetland fires are constantly burning in China and need to receive appropriate attention.

Introduction

Zhalong Nature Reserve is located in Heilongjiang Province, the border area of Qiqihaer city, Fuyu County, Lindian County, and Tailai County. The area of the nature reserve is 210,000 ha, is our country primary wetland nature reserve and for important for the protection of Red-crowned cranes (*Grus japonensis*). When most, here red-crowned crane population quantity achieves 300. Zhalong Nature Reserve is situated at Songnen Plain, the Wuyuer River downriver, is our country biggest nature reserve that aims to protect cranes and the wetland ecology. In the world there are only 15 crane species, nine of which are found in China, and six species are living in the Zhalong wetland – all of them endangered (near-extinct) species. Out of a total of 1000 Red-crowned occurring worldwide about 300 cranes in Zhalong wetland, moreover also there are other 35 species of key protected birds to perch here.

The reed meadow (*Phragmites communis* Trin.) in the wetland has an important function of self-regulating the wetland ecosystem, e.g., for purification of water and the formation of wetland peat and vegetation, as well as the overall wetland climate. The value of wetland ecology function value is considered to be higher than the economic value of reed, grass, and fish that the wetland is producing. In 2005 the long-lasting drought did not only create conditions for large forest fires. The drought also caused the rapid and complete withering and yellowing of the reed and reduced the water content of the litter and peat layers greatly (Wang et al. 2003a, b).

1. The forest fire situation in Heilongjiang Province in March 2005

From 19 to 28 March 2005, the fire broke out and was driven by the wind to Qiqihaer city, Duerberte Mongolian national minority Autonomous County, and Lindian County. Large areas of wetland became charred within several days.

On 19 March, the reed agriculture farmers sheared the reed. Careless fire use caused the wildfire. Hasten by the gale several spotfires developed and spread rapidly. The highest speed of fire recorded was 20 km/hour, the fire intensity was extremely strong, and the flame heights at the fire head were between 3 to 4 m high. On 21 March, the fire burned into the part of Nature Reserve that belongs to Qiqihaer city. Since the organic wetland terrain is soft and the litter accumulation very thick, the access and movement for fire fighting was very difficult. After the flaming fires were extinguished, the smouldering ground fires continued. Fanned by wind, these smouldering fires re-ignited many surface fires.

On 28 March, after fighting the fires with all the available resources, including the participation of 10,000 people, and eased in the end by rain and snowfall, the fires in Zhalong Nature Reserve were finally suppressed. A total of 12 fires affected the Nature Reserve and Qiqihaer city, the DuerBerte Mongolian National Minority Autonomous County, Lindian County and Daqing. According to the analysis of a satellite image, the burnt area of Dumeng County, Lindian County and Qiqihaer city was 10,000 ha, causing significant economic losses.

2. Forest Fire Environment in Zhalong, Heilongjiang Province

The drought in the entire Zhalong Nature Reserve, which was lasting since 1999, resulted in a reduced decomposition rate of organic matter and in the accumulation of litter and grass fuels. Due to continuous aridity, the fuels were extremely dry, and the reed agriculture farmers carelessly used the fire. Many of these fires got out of control and the reed fires spread very quickly, fanned by strong winds.

2.1 Fuels

Most of the fuel is reed and grass in the Zhalong Nature Reserve where the fires occurred. With the tendency along with the climate warm, the load of reed and the grass accumulates year by year, the load of litter and peat increased significantly, and the fire danger increased accordingly. Because the continuing drought and high temperatures, the surface fuel is extremely dry. The rate of decomposition of reed grass, reed roots, branches and leaves was reduced and the fuel loads accumulated significantly. The thickness of the dry reed layer reached 0.6~0.7m, and the fuel loading reached 12~15kg/m². Because of this high accumulation of organic matter there is a risk of large and intense fires in the Nature Reserve in the future.

2.2 Weather

Since 1999 Heilongjiang Province is suffering a continuous drought period. As a consequence the reed moisture content is down to 40~50% of the moisture in normal years.

Since 2004 summer, the average temperature of Heilongjiang Province continued to be high. As compared to the long-term averages the average temperature of 2004 exceeded 0.5~1°C. The precipitation was 30% to 70% less as compared to the same period of all previous years. The drought is extremely significant in Qiqihaer. The surface fuels dehydrated very seriously and can be easily ignited.

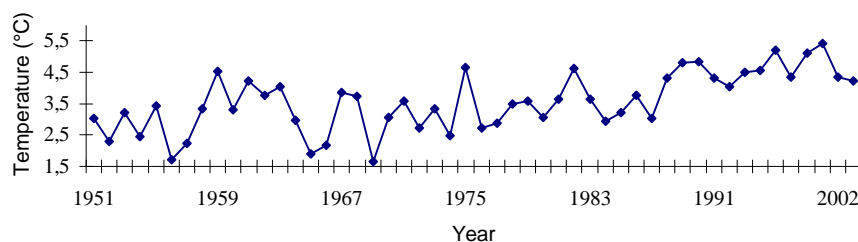


Figure 1. Annual average temperatures in Heilongjiang Province in the period 1951-2004

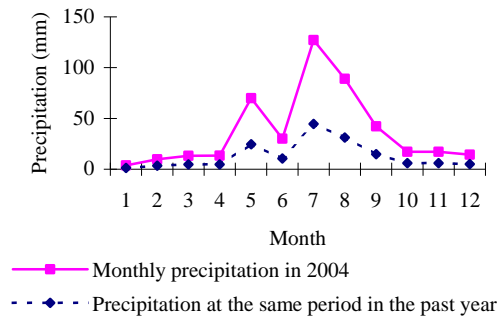


Figure 2. Monthly precipitation in Heilongjiang Province in 2004 compared with average precipitation during the period 1951-2003

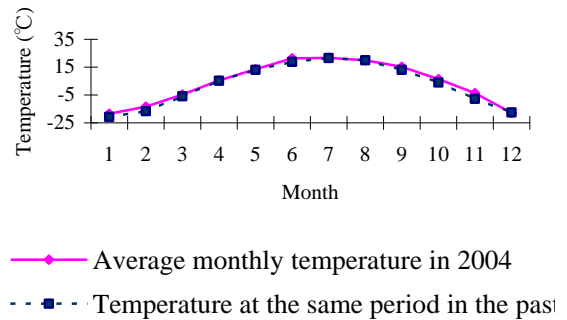


Figure 3. Monthly temperature in Heilongjiang Province in 2004 compared with average temperature during the period 1951-2003

2.3 Hydrology

The Zhalong wetlands have been formed upstream of Wuyuer river. In the recent years this upstream river is often waterless. As a consequence of a hydraulic engineering project the river was intercepted. In addition, local farmers pumped massive amounts of wetland water to irrigate agricultural lands. Although the wetland was supplied with water after the fires of 2002 the drying had serious effects. Fires occurred in the Zhalong wetland from 2001 onwards.

3. Flammability of the reed meadows and fires effects

3.1 Flammability of reed meadow

In the shoals and bogs of the wetland, reed and grass is growing abundant. The reed has a straight, high pole crop with long fibres. Dry reed is extremely inflammable. Moreover the calorific value of the reed poles and the grass poles are high. Once ignited, the fire spread is extremely rapid (up to 20 km per hour) and may result in large areas burned and sometimes can burn for very long time. Since the access to the reed meadow wetland is rather difficult, the response to fire is very slow.

Most of the fires in the Zhalong wetland are high intensity surface fires with flame lengths of 3~4m, followed by ground fires. Reed meadow fires mainly occur at a time when reed sprouts become withered and yellow and ready for harvest – a time of the year characterized by low humidity and strong winds.



Figure 4. The withered and yellow reed is extremely easy to burn in spring



Figure 5. Post-fire view of the reed

3.2 The effect of reed fires

While the reed resources are destroyed by fire the fire-affected wetland sites can recover after low-intensity fire already in the same year. After moderate-intensity fires the recovery time is two to three years. However, if ground fires of high severity are killing the reed roots, the area affected will degrade to grass land or wasteland. It is very difficult that these degraded lands will recover within short time. Such fire-degraded areas cannot provide sufficient grass and reed materials for the red-crowned crane and other aquatic birds. After the fire, fish and shrimp resources are also immediately reduced.

4. Conclusions and discussion

On 19 March 2005 reed agriculture farmers shearing the reed in Zhalong Nature Reserve carelessly used fire and caused 12 wildfires, which were responded by more than 10,000 people. The onset of rain and snow weather conditions enabled the fire fighters to control the fires on 28 March 2005. The fires affected Qiqihaer city, the DuerBerte Mongolian National Minority Autonomous County, Lindian County and Daqing. The burnt area of Dumeng County, Lindian County and Qiqihaer city was 10,000 ha and caused significant economic losses.

Because of the long-lasting drought in the Zhalong Nature Reserve in 2005, the fuel moisture content was very low, the fuel accumulation was high. Most of the fires in the Zhalong wetland were high-intensity surface fires followed by ground fires. Reed meadow fires mainly occur at a time when reed sprouts become withered and yellow and ready for harvest – a time of the year characterized by low humidity and strong winds.

People's understanding of the ecology and vulnerability of the wetlands and the threats to these ecosystems and also to human life and property by fire are scarce. Timely detection and response are limited due to lacking infrastructure. The increasing threats of wetlands by fire need to be addressed properly.

References

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