

# LAND COVER CHANGE IN HEILONGJIANG FARM GROUP COMPANY OF CHINA

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Heilongjiang Farm Group Company is the largest farm group company in China which area (5,400,000ha) and farmland(2,040, 000ha) is about 12 % and 20% of the total Heilongjiang Province. The population is about 1,500,000 which is about 5% of Heilongjiang Province. The production of grain is about 16,000,000 Ton and 30% of Heilongjiang Province. There are 103 Farms in the Heilongjiang Farm Group Company .The fertile and even land made Heilongjiang Farm Group become important grain supplying areas in China.

The Heilongjiang Farm Group Company have 9 Sub-groups and 103 Farms which can be divided into 3 parts according to the geographical distribution. West Part--Jiusan, Bei'an—26 farms, Mid Part--Har'erbin, Qiqihar'er, Suihua—24 farms East Part--Mudanjiang , HongxingLong, Jianshanjiang, Baoqunling—53 Farms.

## 1. GENERAL GEOGRAPHICAL SITUATION IN HEILONGJIANG FARM GROUP COMPANY

Reclamation area of Heilongjiang, locating in Xiaoxing'anling mountains foot, Songnen plain and Sanjiang plain, from 123°40'E to 134°40'E, and from 40°10'N to 50°20'N. The north reach Heilongjiang river, east reach Wusuli river, southeast reach Khanka lake and Russia borderline, west connect with Inner Mongolia Autonomous Region, and south near Jilin Province.

The reclamation area has a large area, with a various topography. There are vast mountain regions, zigzag in the hills and hillock that rise and fall, and most area are the endless wide plain. Its elevation in the north is higher than in the east. The whole reclamation area is distributed in five physiognomy area in Heilongjiang Province, including:

(1) Xiaoxing'anling mountains: North reach Daxing'anling, east to Heilongjiang river, south near Songhua river, and its elevation is about 600-1000 meters. The area include most of Suihua, Jiusan, Bei'an, Baoqun sub-groups farms.

(2) Southeast mountains: Southeast mountains, locating in southeast area with Zhangguangcai mountains, Laoye mountains and Wandashan mountains, is one member of Changbai mountain chain. Its elevation is about 400-1000 meters, and Mudanjiang sub-group farm mainly is included.

(3) Songnen Plain: Songnen Plain, locating in west area, is in a low alluvial plain of Songhua River and Neijiang River. Its elevation is about 150-200 meters, and suihua and Qiqihar sub-group farm are included mostly.

(4) Sanjiang Plain: Sanjiang plain is in a low alluvial plain of Heilongjiang River, Songhua River, and Wusuli River, and its elevation is about 40-90 meters. The climate in this area belongs to the temperate humid or sub-humid continental monsoon climate. Most of the rivers

in the area have the characteristics of the wetland river: the slight gradient and large channel curve coefficient. Most area have been empoldered and reclaimed, and are one base of marketable grain. Most of Baoqun mountains, Hongxing mountains, Mudanjiang sub-group and whole Jianshanjiang sub-group are included.

(5) Muxing low Plain: Muxing low plain is a low alluvial plain of lakes formed during the Quaternary Period, and its elevation is about 60-80 meters. The topography and gradient is smoothout, and the network of waterways is too sparse to drain off water smoothly. Most of farms in Mudanjiang sub-group are included

## **2. SOIL CONDITIONS FOR FARMING IN HEILONGJIANG FARM GROUP COMPANY**

The soil distributions are complex, and there are about 10 types, mainly five types below included:

(1) Brown soil: Distributed in Xiaoxing'an Mountains and eastern mountain region and hills area, take 16.6% of the reclamation area, accounting for 12.2% of the total cultivated land. Its soil quality is light, easy for cultivation, permeability is strong, the soil temperature is high, the nutrient is decomposed soon, but its fertilizer and water retention ability are poor, it is apt to grow the signs of drought.

(2) Lessive: Distributed in three sub-groups area of Jianganjiang, Mudanjiang and Honxinlong, take 28.8% of the reclamation area, accounting for 33.4% of the total cultivated land. Its soil texture is heavy and slimy, and it is very bad of water retention ability and water permeability, so that easy to suffer from waterlogging and drought.

(3) Black soil: Distributed in five sub-groups area of Jiusan, Bei'an, Hongxinglong, Suihua and Qiqihar, take 12.0% of the reclamation area, accounting for 23.2% of the total cultivated land. Black soil is the best one, and its soil body is deep, fertilizer and water retention ability are good with well structure, the soil is temperate, it is appropriate to plant widely, and the most important is that the output is higher and steady.

(4) Meadow soil: Distributed in area of flat, low lands and river coast, especially in Baoquan mountains and hongxinlong sub-group, take 12.0% of the reclamation area, accounting for 23.2% of the total cultivated land. Meadow soil is similar with black soil soil nutrient, the ability of supply fertilizer is well, and the output of meadow soil is higher.

(5) Swamp soil: Distributed in area of bottomland, and river coast, especially in Baoquan mountains and hongxinlong sub-group, take 17.1% of the reclamation area, accounting for 3.6% of the total cultivated land. Its soil nutrient is rich, but validity is poor.

## **3. CLIMATE CONDITIONS FOR FARMING IN HEILONGJIANG FARM GROUP COMPANY**

The climate in this area belongs to moderate or cool temperate zone continental monsoon climate. It is influenced by Siberian cold snap in the winter, so that it is long, cold and dryness; It is under control by ocean warm and moisture air current in the summer, so it is

warm, wetness and short; More gale and little rain in the spring; Many rainstorm in the autumn and summer, maybe overcast and rainy in a long time, and there are always great temperature changes in the spring and autumn.

Amount of precipitation: The reclamation area has abundant rainwater, and the average is about 540 mm. There are great differences between years, some have 800 mm above, and some only have no more than 300 mm. There are also different between months in one year, summer (from June to August) accounts for 60-70% of one year, and crops have plenty of water, only wheat is influenced in the harvest. It accounts for 10-15% in the May and June, and crops lack water, especially wheat. Annual depreciation is 900-1400 mm, and relative humidity is 66-74%.

Air temperature: The climate of the reclamation area, across 6 latitudes, is different obviously. The average air temperature per year is about  $-0.9—0.4$  , and the average maximum temperature of July is about  $20--22$  , topmost temperature is about  $36.0--40$  , the average minimum temperature of January is  $-19--22$  , and about  $-36.0 -- -40$  .

The first frost time is about the last ten-day of September in the east, and the middle ten-day of September. The latest frost time is about the middle ten-day of May in the east, and the end of May in the north. The frost-free period is about 120-140 days, and 100-120 days in the north. The freezing period is about 150-200 days, and the deepness of freezing layer is about 1.5-2.5 meters.

Sunlight: It has a long sunlight time during growth season, and the illumination is big. The sunlight time of the whole year is about 2400--2900 hours.

#### **4. THE LAND USE AND LAND COVER CHANGE IN HEILONGJIANG FARM GROUP COMPANY**

The total area is about  $5.39 \times 10^6$  ha. If classified by topography and physiognomy: Mountains region is about  $0.63 \times 10^6$  ha., accounting for 11.7% of the total area; Hill area is about  $1.42 \times 10^6$  ha., accounting for 26.3%; Terrace area is about  $1.32 \times 10^6$  ha., accounting for 24.5% of the total area; Flat area is about  $0.89 \times 10^6$  ha., accounting for 16.5% of the total area; Marsh area is about  $1.13 \times 10^6$  ha., accounting for 21.0% of the total area. If classified by current land use types: Plantation is about  $2.04 \times 10^6$  ha., woodland is about  $0.78 \times 10^6$  ha., rangeland and grassland is about  $0.34 \times 10^6$  ha., water area is about  $0.28 \times 10^6$  ha., reed pond is about  $0.04 \times 10^6$  ha., and available uncultivated land is about  $0.6 \times 10^6$  ha., which are low wetland mostly in Sanjiang Plain area. The reclamation area of Heilongjiang is the important high-quality soybean commodity grain base of China. In Heilongjiang Farm Group Company accounting for 1/3 annual output soybeans of the whole province, 1/10 of China (Figure 1).

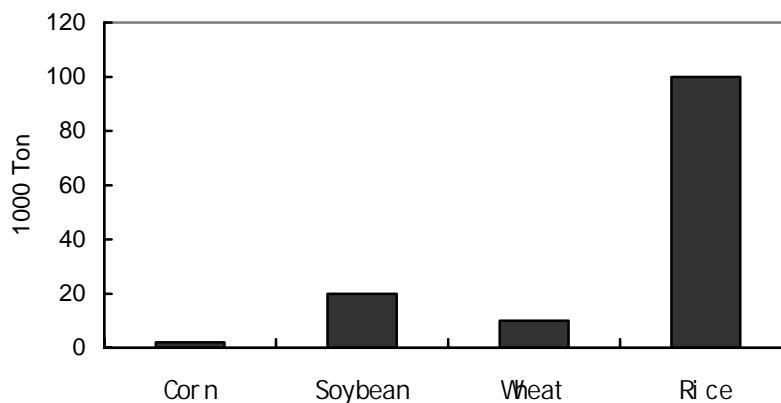


Figure 1 The major crops production in Heilongjiang Farm Group (2000)

Land development and use can be divided into four phases from 1947 to 2000 in Heilongjiang Farm Group Company: The first phase is from 1947 to 1959 in which the index of both reclamation and plantation are low. In the beginning, single agriculture management and exploitation of cultivated lands lead to the low degree phase of land use. Smooth upland were mainly exploited, and lands had no boundary, wastelands were enclosed and lands were occupied, high-quality lands were preferentially exploited by the “eating center of vegetable” mode. Because of stressing reclamation and despising establishing, establishing after reclamation and disjunction between reclamation and establishing, the index of both reclamation and plantation are low, and lots of resources were wasted. The second balance phase is from 1960 to 1966 in which the reclamation region was again planned and land use were emphasized in 1963. At the same time, some measures were taken, including stressing farmland, improvement of soil by harness of water, fertilization and cultivation, tree planting and afforestation, so, land use began to develop with well-ordered circulation. In the phase, the reclamation index increased from 16.6% to 19-25%, and the plantation index slightly decreased from 86% to 83-84%, which indicated land use began to tend to balance. The third is unplanned phase(1967-1979)in which because of impact of “culture revolution” and policy of “regarding grain as outline”, forests and grassland were orderly destroyed in order to exploit waste land, so ecosystem was again ruined. In the phase, drought occurred in successive years, mire land began to dry, and large-area waste land was blindly developed. The index of reclamation sharply increased to as high as 42.5%. The regulating and planning phase is after 1980 in which all-degree executive offices on regional agriculture planning came into existence from 1980, which comprehensively surveyed on agriculture resources including land use and gave concise reports of regional planning. In 1983, use of land resources were again surveyed, and planning of land and irrigation was again set down based on farm being a basal unit. In May of 1982, super bureau issued 《temporary land management law of national farm》, each bureau and farm constitute office of land management which surveyed on land resources, propagandized for land policy and decree, set down land use planning, cooperated with each local government to draw the borderline, and confirm

boundary of farm and management scope. According to statistic of 103 national farms, the index of reclamation declined to 33.9%,and basically, the index of plantation was always 85-90% by the end of 1985(Figure 2).

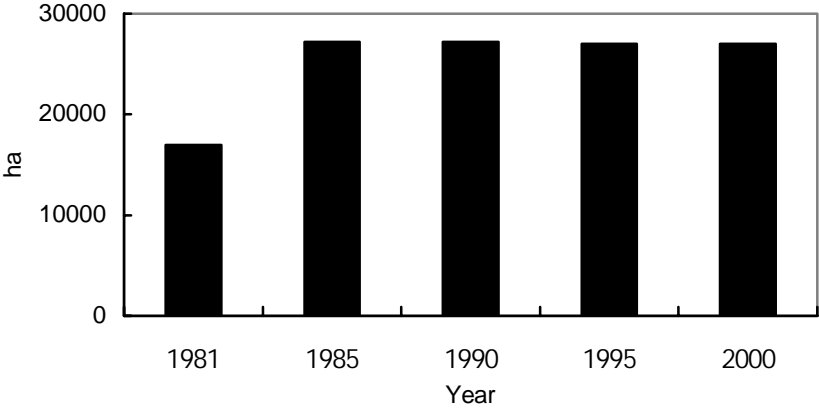


Figure 2 The reclaiming rate change in Heilongjiang Farm Group

### 5. CONCLUSION

According to the historical data, 3,000,000 ha wild lands were reclaimed into the farmland from 1947 to 1985 by Heilongjiang Farm Group,annual average lands is 76000 ha. Some of them are occupied by farmland, irrigation works, road, capital construction and so on, some were free transferred, some cultivated lands reclaimed were converted into forestlands and grasslands, but most lands ,which were again changed into wastelands after they were reclaimed. In regard to the cultivated lands,2-3% of them were given to staffers as garden soil, some were used in collectivity production and establishing schools, and some become fallow. Annual plantation index was about 90%. The fertile and even land made Heilongjiang Farm Group become important grain supplying areas in China.

The soybean and rice is the major crops in Heilongjiang Farm Group. The 50 years' reclaiming history also is the history of producing and planting soybeans in farm group . Into middle of 1990's the paddy field become the primary landscape in the area of Heilongjiang Farm Group. From the data ,after 1990 the farmland area is stable.

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