

AN INTRODUCTION TO LAND RECLAMATION PRACTICES IN CHINA¹

Defu Peng² and Boheng Li²

Abstract: Land reclamation is a brand new field in China. The first part of this paper introduces the concept and the history of land reclamation there. The types of destroyed lands to be reclaimed, the extent of damage, and recent land reclamation practices are also introduced. The second part of this paper concentrates on the administration of reclamation policies and regulations. The third part provides some information about potential land reserves in China, then introduces academic aspects of land reclamation in China.

Additional key words: land use policies, reclamation regulations, derelict land

Introduction

According to the statistical data offered by the United Nations in 1986, the mean of cultivatable and permanent farmland per person in China is about one-third that of the average global value, ranking China 67th in the world. Among the lands to be developed in China, the cultivatable land is only 34 million hectares. Thus, the cultivatable land shortage is very serious in China. Furthermore, China loses a large amount of land every year during its modernization construction. With this development, 2 million hectares of cultivatable land has been lost as a result of mining and industrial activities. During the last several years, the land loss was 20,000 to 30,000 hectares per year. An average land loss of 40,000 hectares in the year 2000 is predicted. The loss caused by mining is important. In some Chinese mining areas, it is reported that 0.4 hectares of cultivatable land will be damaged when 10,000 tons of coal is mined. This situation leads to severe land shortage and environmental pollution. Therefore, mine land reclamation has become an urgent task in China.

Perspective of Land Reclamation Practice in China

Concept of Land Reclamation in China

During the 1950's, "land reclamation" was called "restoring farmland" in China, which means "restoring the lands destroyed by mining to farmland." With the development of land reclamation in China, the purpose has become the "reutilization of all kinds of destroyed lands" in order to preserve land resources and improve the ecoenvironment. Thus, the principle of land reclamation in China is that the reutilization of destroyed lands should coincide with local conditions and requirements. Restoring farmland has the highest priority; reclaimed lands can also be used as forest, pasture, fishery, construction, etc.

The reclamation objectives in our country include the following types of destroyed lands:

- (1) Abandoned lands destroyed by mining and industrial processes and other human activities;
- (2) Abandoned roads, old buildings, and building sites, and the lands used for disposal of garbage and other wastes;
- (3) Abandoned pits, pools, low-lying areas in the processes of building drainage systems and other farmlands' capital construction, and the abandoned odd pieces of land;
- (4) Abandoned polluted lands;
- (5) Lands destroyed due to natural calamity or other reasons.

¹Paper presented at the International Land Reclamation and Mine Drainage Conference and the Third International Conference on the Abatement of Acidic Drainage, Pittsburgh, PA, April 24-29, 1994.

²Defu Peng, Executive Secretary, and Boheng Li, President, China Land Reclamation Society, State Land Administration, Beijing, People's Republic of China.

The Nature of Land Damage

Underground mining can damage land by causing (1) ground fractures and subsidence, (2) changes of hydrogeological conditions, such as the ground water level and waterflow, which may result in the accumulation of water on the land or land drought, and sometimes may produce swamp or salinized soils, or (3) accumulations of mining wastes, which pollutes lands. In China, thousands of mines produce more than 1.2 billion tons of ores per year. Of the mined ores, the coal output is more than 1.0 billion tons. The lands destroyed by mining will soon exceed 30,000 hectares per year.

Underground mining does not directly destroy the land surface. Some production processes such as surface mining, production of bricks, etc., need direct excavation of the lands, which may lead to (1) change of original soil structures, (2) spoil piles, which are subject to runoff and soil erosion, or (3) land pollution due to poisonous elements existing in the spoil piles. China's 100,000 brickyards destroy 70,000-100,000 hectares of lands each year. The total amount of fly ash produced from coal-fired powerplants was 70 million tons until 1990; 230 million tons will be produced in the year 2000. The fly ash does not occupy much land, but can pollute the lands. Finally, it is estimated in the year 2000 that 5,000 hectares of lands will be destroyed during the surface mining of 200 million tons of coal. Lands disturbed by mining and excavation now total 2 million hectares. Including the abandoned lands in the countryside and lands destroyed by mines or factories, the lands to be reclaimed may reach 8 million hectares. Therefore, land reclamation is an urgent task in China and is related to many industries, such as coal mining, oil, industry, urban development, chemical industry, etc. Also contributing to the problem is land damage or degradation caused by irrational production distribution or irrational land use structure and soil erosion due to denudation, inadequate reclamation, or herding. In China, the amount of land damaged by runoff, mud-rock flow, and other natural calamities total about 140,000 hectares per year.

Land Reclamation Practices in China

Two thousand years ago, there was a large quarry near Shao-hsing city, Chekiang province. The excavated rocks were used for building houses, roads, and bridges. After 400 years of excavation, the quarry produced many sheer precipices and overhanging rocks and deep pools. At the end of the 19th century, Juinyi Tao built a bank for water accumulation and made some sceneries, which became the famous "East Lake" (in Chekiang Province). This is the first example of reclamation practice for tourism in our country. In modern times, land reclamation started in the 1950's. Some mines did some reclamation on their own initiative. For example, the Hengren lead-zinc mine (Liaoning province) reclaimed the abandoned tailings pool in 1957 and Xiaoguan Bauxite constructed 70-80 hectares of lands on mine spoil sites. Bantan Tin Mine used the overburden to fill in the mined area during or as part of the mining process.

The State Council of the People's Republic of China enacted the "Stipulation of Land Reclamation" on November 8, 1988, which formally established a land reclamation system in China. This stipulation has:

- (1) Established 12 experimental reclamation sites in 8 provinces, which have different land damage characteristics and use different reclamation methods. This has produced reclamationists with experience in such areas as reclamation organization and management, reclamation funding, reclamation planning, and reclamation techniques.
- (2) Spread information on the importance of land reclamation by television, newspapers, and other publicity means. Now land reclamation receives great attention and support from the Chinese people and its government.

- (3) Improved reclamation policies and regulations. After the enactment of the state reclamation stipulation, some provinces and departments have made detailed regulations for carrying out the state reclamation stipulation, for example, the "Stipulation of Land Reclamation Planning in Metallurgical Mines," the "Stipulation of Land Reclamation in Gulch-Gold Mines," and "Standards of Land Reclamation."
- (4) Established a reclamation management network. In China, land reclamation management works in two ways: (a) state - Province - local - county - country, or (h) state council - industry ministries of state council - mines or factories.

Policies and Regulations of Land Reclamation in China

The shortage and damage of cultivatable lands have recently received great attention by the Chinese people and government. "Highly valuing and reasonably utilizing every centimeter of land" has been stipulated as one of China's basic national policies. In addition to the "Stipulation of Land Reclamation," some related laws have also been enacted. In 1986, the government of China enacted the "Law of Land Administration of the People's Republic of China," which provides that the land utilized for industrial purposes must be limited and the destroyed land must be reclaimed. In 1989, the "Law of Environmental Protection of the People's Republic of China" was put into effect, which provides protection of land from erosion and damage to protect the Chinese environment. In 1986, "The Law of Mineral Resource Protection" was enacted.

The "Stipulation of Land Reclamation" has 26 articles, the main contents of which state that:

- (1) The purpose of land reclamation is for rationally using lands and improving the ecoenvironment.
- (2) Land reclamation means the activity of reclaiming the destroyed lands into a reusable state.
- (3) The principle of land reclamation is "the destroyed land must be reclaimed by the one who destroyed the land." All the mines (or businesses) or people who destroy lands have the duty of reclaiming the destroyed lands.
- (4) The land administration department of local governments manage and control their local reclamation work. The industry ministries of state councils, such as coal, oil, geology, metallurgy, etc., manage and control the reclamation planning and practice in their industries.
- (5) Land reclamation planning should coincide with the master land use plan.
- (6) The stipulation is overseen by a State Land Administration.

Land Reserves Suitable for Farming

Taking account of the state's economic development and land use capability, underused land prospects include the following:

- (1) The beachy land along the coast of China should be developed. The land near the mouths of the Yangtze, Yellow, and Zhujang Rivers and around embayments such as Bohai Bay total over 16 thousand hectares, have temperate climate, abundant rainfall, and rich soils. Analysis of the unused land along the middle and lower reaches of the Yangtze River indicates that 34% is easily developed, arable lands.
- (2) 6.7 million hectares of unused lands adjoining roadsides and around villages and housing areas can become rich farming land if leveled enough.
- (3) Derelict land totals 3.4 million hectares and is increasing at a rate of 33.3 thousands hectares each year. Much of this was once cultivatable land. Mining in eastern China has especially led to the loss of a great deal of cultivated land, much of which has subsided as much as 5 m. To further advance Chinese land reclamation, the "Stipulation of Land Reclamation" by the State Council should be enforced.

- (4) Over 50% of China's land reserves lie in three remote provinces: Xinjiang Autonomous region, Inner Mongolia Autonomous region, and Yunnan province. This land is relatively sparsely populated but is subject to drought. Potential development requires tapping of its water resources. Analysis indicates that 27.3% of these reserves consist of superior arable land, while the rest is rated moderate or inferior.

Education and Research on Land Reclamation in China

Education of Land Reclamation

Some universities such as China University of Mining and Technology (CUMT), Shansi Agricultural University (SAU), and Tang-shan Institute of Technology have had land reclamation classes and short courses. In addition, some books on land reclamation have been published.

Land Reclamation Research

Many research institutes and universities such as Tang-shan Branch of Central Coal Mining Research Institute, CUMT, SAU, Geography Institute of Academia Sinica, and Beijing General Research Institute of Mining & Metallurgy have done research projects on land reclamation. Some of the research results have been used in reclamation practice. The focuses of land reclamation practice are now on mining subsidence, coal waste piles, abandoned mined sites, tailings pool, fly ash, brickyards, abandoned roads, and abandoned village sites. So far, about 2 million hectares of lands has been reclaimed. The reclamation rate is about 6%. The Beijing General Research Institute of Mining & Metallurgy is doing an international project on mine waste reclamation with Australian experts.

Academic Activities

The China Land Reclamation Society was set up in 1985 as a branch of the China Land Association. It has four technical divisions: surface mining reclamation, underground mining reclamation, policies and regulation of land reclamation, and land reclamation management. This society has an annual meeting to discuss problems and new techniques in land reclamation practice. It produced a book entitled "Selected Papers Related to Land Reclamation, Vol. 1" (the selected papers are from the first through the fourth national reclamation conferences: 1985-1991). The society has more than 300 members and 93 group members. Some members have visited foreign countries, such as the United States, Poland, Germany, and Australia to exchange land reclamation technology.