ISSN : 0974 - 7435 Volume 10 Issue 16

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(16), 2014 [9071-9075]

Discussion on environmental and water quality protection combining old town's current situation of stony desertification

Weirui Chu*, Sensen Li, Yafeng Li
College of Architecture and Civil Engineering, Nanyang Institute of Technology, (CHINA)
E-mail address:fbdb.happy@163.com.

ABSTRACT

Water quality of Middle Route Project of S - N water diversion Head works conforms to national related standard in general, while if developing of stony desertification in Xichuan town is ignored, the ecological environment will become worse, which will influence requirement on water quality of South-to-North Water Diversion Project and safety of Danjiangkou Reservoir. This article uses the old town in Nanyang-Xichuan as the object of investigation and study, research and analyze factors that influence environment around Middle Route Project of S - N water diversion water source such as water, plant, microorganism, soil content, etc aiming at present situation of Xichuan Town's stony desertification. The result shows that the widely distributed carbonate is the geological background of forming stony desertification, population growth and unreasonable human behavior is the main reason of stony desertification, and comes up with principle of adjusting measures to local conditions and scientific prevention, making specific controlling measures such ad improving prevention consciousness, avoiding human-caused cutting, converting cultivated land into forests and choosing plants and afforested methods according to different landforms, etc, so as to guarantee water quality of water source in Middle Route Project of S - N water diversion and smooth water delivery to Beijing, etc.

KEYWORDS

Stony desertification; South-to North water diversion; Old town; Control suggestion.

© Trade Science Inc.

INTRODUCTION

Introduction of middle route project of s - n water diversion background

South-to North water diversion is the largest inter-basin water diversion in the world up to now. The middle route is an important part in the whole Project of S - N water diversion, and bearing the mission of supplying water for industry and life to more than 20 big and middle cities including Beijing, Tianjin, Shijianzhuang and more than 100 towns[1].

Total length of main pipe for Middle Route Project of S - N water diversion is 1273km, annual water diversion amount is 13 billion cubic meters, total drainage area is 6361.94k㎡, which is an important water source and location of Qushou.

Current situation of middle route project of s - n water diversion projects xichuan nanyang

District of stony desertification in Xichuan is 2 million mu at present, which is 50% of total area of the town. Among them, severe stony desertification area is 0.484 million mu, middle grade is 0.689 million mu and slight grade is 0.827 million mu[2].

Grim situation of stony desertification prevention and treatment

Mountain rock around Middle Route Project of S - N water diversion is mainly carbonate, which has the features of easy eluviation and slow soil forming. According to statistics of the third national remote sensing data, water and soil loss area in water source of Nanyang is 53% of the whole area, and the annual soil erosion amount is 9.9 million tons[3]。 The cultivated area is decreasing gradually, safety of drinking water in the village is threatened and the ecological environment is deteriorated extremely.

Hazard of stony desertification

As for carrying out of South-to North water diversion project, to protect water quality is the most important precondition and key water[4]. Stony desertification will lead to severe water and soil loss, and a large amount of ditas and soil is flowing into Danjiang Reservoir, which on one hand will cause water in the reservoir become turbid, on the other hand, it will cause sedimentation and threaten safety.

Stony desertification makes plant cover become less, weakens water conservation capacity, makes the probability of flood, dry environment and district disaster increase.

Stony desertification can cause land's bearing capacity decrease significantly and even lose the capacity.

SITUATION OF FACTORS THAT INFLUENCE WATER QUALITY REQUIREMENT OF MIDDLE ROUTE PROJECT OF S - N WATER DIVERSION PROJECTS IN XICHUN

Land

Xichuan has a population of 0.68 million, among which farm population is 87%. The town has an area of 4.23 million mu, forestry land is 2.3 million mu, cultivated area is 9.723 million mu, water area is 0.6 million mu and the rest land area is 0,3577 million mu.

Nutrient element content of Xichuan soil sample has similar normal distribution. After comparison and analysis, content of ammonia nitrogen in cultivated soil is high and difference of ammonia nitrogen content in the rest land is small.

Rivers and water resource

There are Qi River, Tao River, Danjiang, Guan River and Diao River in Xichuan, and the surface runoff on average is half a billion and six hundred million cubic meters. There are 467 rivers in this town, and the river whose drainage area is over 100 km2 is Danjiang, which is 905 of the total drainage area.

Xichuan has many rivers, the river channel is deep, rainfall is sufficient, and average precipitation each year is 800m, but the precipitation in different area is uneven. Besides, grade on the earth steep, which causes large amount of wasting water in flood season and lack of water in other seasons. A result, although this area has rich water resource, the amount usable is little.

Present situation of plant cover

Xichuan belongs to subtropical evergreen broad-leaved forest and northern subtropical evergreen broad-leaved forest zone, the forestry land covers an area of 54% of the total area. Nowadays, with the development of forest industry, the ecological construction has achieved obvious effect. Total output of economic forest in 2012 is 88 million kg, output value of forest reaches almost 1 billion yuan, and forest industry has become a pillar of country's economic development[5].

However, there's still a large gap with nation requirement on Middle Route Project of S - N water diversion water source's greening requirement, and there also exist problem of insufficient finance, great difficulty in afforested area, low survival rate of plants every year, etc.

Mineral resources

Minerals developed in this town are about more than ten kinds such as gold, lead, zinc, etc. Mineral development has played important role in promoting economy, however, it also gives rise to serious mining geology environmental problem such as surface collapse, landslide and damage of aquifer, etc.

CAUSE OF STONY DESERTIFICATION CAUSE

Natural factor

(A) The topography speeds up forming and developing of stony desertification from two aspects[6]:on one hand, the fast dissolution rate not only dissolute all the soluble organic fraction of mother rock, it also takes away a large amount of insoluble matter, decrease carbonate's soil-forming function; on the other hand, the severe topography process is very good for crack development of underground karst's crack development, but not good for the conservation of water and soil, which accelerates forming and developing of stony desertification.

Normally, chemical composition of limestone is as following:

Chart 3-1 Limestone's chemical composition content (%)

Name of rock	Sio	Cao	Feo	AL2O3	Mgo	Mno	So3	Phosphoric anhydride
Limestone	1.01	56.27	0.27	0.27	0.057	0.0065	0.009	trace amount

We collect rocks in 22 locations at seven towns of Xichuan, and the average Cao content of the collected rocks is above60%. Most of the rocks in Xichuan are carbonate rocks. The pure carbonate rock's soil-forming condition is very bad, and the main content is calcium magnesium carbonate. AS calcium magnesium carbonate. As easily taken away by water in the effect of corrosion, the other insoluble residues form soil.

(B) Xichuan has many rolling mountains, which is about 6588 big and small mountains and 9214 ravines. The rock is bare, water retention is poor, vegetation coverage is low and loss of water and soil is severe.

(C) Climate of this area is good for the process of strong topography process, while concentrated rain and intermittent drought make the cultivated soil distorted, porosity become worse, soil hardening and structure changed after climate's drying and watering recycle, which affect soils's retention character, cause soil degradation eventually and lead to stony desertification further more.

Human factors

In a certain sense, unreasonable human factors are the main reason of Xichuan's stony desertification[6]. Human density of this area is large, farmer's ecological awareness is shallow, the traditional life style, all kinds of improper land resource development activities make relation between human and earth become worse, which make environment of this area deteriorating day by day and area of stony desertification enlarge.

(A) Xichuan area is underdeveloped, types of energy are limited, and people live on fuel wood. Excessive wood cutting make trees and shrub wood destroyed, the plant species at bottom part such as moss, lichen, etc. which adapts to living under shelter die quickly in lack of living condition, rattan decrease for the loss of climbing conditions, which will all lead to stony desertification.

(B) Arable land in Xichuan is very limited, to solve the problem of clothing and food, the local people expand cultivated land and increase grain output by destroying forests and grass. These newly cultivated land have severe loss of soil because of lack of water retention measures, and it eventually causes disappearance of vegetation and deterioration of stony desertification.

(C) People in Xichuan feed animals eating grass and leaves such as horse, cow and sheep in a cage-free way. If the quantity is large enough which exceeds its bearing ability, the vegetation will degenerate quickly, running water's corrosion effect will be strengthened fast and sever loss of water and soil will lead to stony desertification in no time.

(D) Xichuan has very rich mineral resources. To promote economy, Xichuan develop mineral resources vigorously. Mineral development make large amount of soil being stripped, vegetation being destroyed and stony desertification being accelerated.

According to statistics, among human factors of forming stony desertification, excessive cutting takes 31%, excessive reclamation 15%, excessive deforestation 14% and overgrazing 8%. Besides, over-exploitation on minerals and unreasonable project construction takes 32% among the human factors of forming stony desertification.

CONVENTION FOR STONY DESERTIFICATION

Adjusting measures to local conditions and scientific management is the principle of convention for stony desertification. Plant public welfare forest in the place of bad, steep slope condition and of high grade of hidden danger for loss of water and soil' plant ecological economic forest, ecological timber forest, ecological medicine or ecological firewood forest in hilly land of good condition and flat terrain[7].

Both recovery of stony desertification area's vegetation and solving of water supply issue are related to biology, geology, hydrology, economics and environmental medicine, etc.

Convention for stony desertification is imperative, and it should be based on local natural condition, recovery of vegetation as the key, scientific research force as the support to restore native vegetation types which adapt to local soil[8].

First of all, to control stony desertification, people should strengthen their awareness of handling desertification.

The existing native vegetation is very good for the conservation of water and soil. If they are damaged, it is very hard to be recovered and not easy to find other plants as replacement. Therefore, Xichuan shall protect the existing vegetation in the mountain and forbid human deforestation.

For cultivated land that is exploited unreasonably, grain for green shall be made under the instruct of government. Meanwhile. Develop grass and plants that adapt to local terrain and soil condition to ensure covering of vegetation suitable for ecological environment by strengthening cooperation with related technology department.

Climate in Xichuan is nice, and by planting proper types of plant, vegetation can be recovered, soil and water be maintained, and air be purified. At the same time, benefits brought by planting economic forests and flowers can improve people's life.

One of the important reason of cutting in the area is in lack of resources, so we should develop biogas digester and solar energy, etc rapidly. In this way, a large amount of firewood consumption can be saved, vegetation in the mountain can be protected effectively and corn straw and excreta of human and animal can be turned into high quality organic fertilizer for agricultural production.

CONCRETE SUGGESTIONS FOR CONVENTION OF STONY DESERTIFICATION IN XICHUAN OLD TOWN

General situation of old town

Old town is the location of Xichuan old country. It is in the upstream of Middle Route Project of S - N water diversion's water source-Danjiangkou Reservoir north shore, and is 23km away form the town. It has a population of 36000, and covers an area of 117km2, among which cultivated land is 24000mu, water-level-fluctuating zone is 60000 mu, barren mountain and slope is 80000mu and is Xichuan's large immigration town. The existing stony desertification area is 30000mu.

5-1 stony desertification of old town 7 miles stone

5-2 stony desertification of old town Mount Guanfu

Suggestion for old town's stony desertification

The old town should edit and revise controlling project of stony desertification positively, strengthen combination of convention for stony desertification with supporting the poor, make grassing's agricultural overall development and plant grass in the jungle, straighten out natural ecological protection and management system of agricultural ecological construction completely, strengthen cooperation of all the departments and make good preparation for ecological recovery of stony desertification area.

Controlling measures

Different woods have different influence on basin's water yield. In general, coniferous forest, hardwood deciduous forest, shrub wood and herbaceous plant's effect on basin's water yield is in decline trend[9].

Gravel content in stony desertification area is high, soil layer is thin, water evaporation in huge when temperature rises, and direct sowing weeds can be adopted when soil area is within 0.15m2. When soil layer is less than 3cm and gravel content is high, it is good to sow arborvitae seed, and when gravel content id low, it is good to sow oak seed. When soil area is above 0.15m2 and soil layer is more than 10cm, one year nutrition bag arborvitae and pistache seeding can be chosen.

The old town has serious problem in stony desertification, the soil is thin and shrub cutting can't be done before topography. Density of planting oriental arborvitae shall be controlled in 200~300plants per mu, and other plants shall be controlled at 100~200 per mu. Don't use fixed planting space, but adopt method of planting green with space. Oak weed should be sew immediately in October when the seed is collected, Chinese pistache and oriental arborvitae seeds can be planted in December of that year to 104h, March earlier of next year, and planting time can be between 15th, February to 10th, March.

In rocky mountains and half rocky mountains of more serious rocky desertification, the survival rate must be very low if plant directly owing to the severe loss of water and soil and poor land. If condition permitted, some engineering

technology can be adopted such as moving the topsoil to cultivate fertility, etc to weaken strength of loss of water and soil and promote recovery of ecological environment.

CONCLUSION

Stony desertification causes loss of water and soil and deterioration of reservoir's water quality. Compressive treatment on middle route project is a matter of national economy and people's livelihood. Meanwhile, research on spatial pattern of plant-soil-terrain of basin's effect on improvement of water quality and ecological environment within Middle Route Project of S - N water diversion is not enough, and there is no cases to be surveyed about the optimal way and pattern of land utilization that adapt to this basin and related to human activity. Research in these field should be strengthened.

REFERENCES

[1] Li Sy, Zhang Qf; Analysis of the South-to North water diversion to solve the living water problems of the north China [J], The Yellow River people's Publishing House, **27(8)**, 28-29, 43 **(2005)**.

[2] H.Yong, Guo Zs, Yang Cx, etc.; Research of Danjiangkou reservoir area Rocky desertification present situation and control measures---Take Henan Xichuan as example［J］, Hebei agricultural science Publishing House, **16(2)**, 75-77 **(2012)**.

[3] X.Zhao, Zhang Zw, C.Liu, etc.; Environmental evaluation and prediction of the water source area of the Middle Route Project of S - N water diversion project[J], Safety and environmental engineering Publishing House, **10(4)**, 5 – 8 **(2003)**.

[4] Liang Xb, Zhang Zw, Xie Hy, etc.; Analysis of the main environmental problems the water source of south-to-north water diversion project[J], The people of the Yangtze river publishing house, **36(4)**, 53 – 54 **(2005)**.

[5] Yang Cx; The forestry construction and ecological protection of the South to North water diversion project—Take Henan Danjiangkou reservoir area as example [J], Green China publishing House: Theory, **7**, 43 – 45 **(2004)**.

[6] Li LL, Kuang Ms, Jiang Yj; Rocky desertification research of Karst region in southwest of China［J］, Regional research and development publishing house, **22(3)**, 71-74 **(2003)**.

[7] Zhang Zw, Li Xm; The main problems and countermeasures of the water source of south-to-north water diversion project[J], Journal of central China normal university (natural science edition), **38(4)** , 510 – 514 **(2004)**.

[8] Sun Jc, Zhang Yt; Research of topography on rocky desertification hills in Xichuan [J], Topography publishing house,**12**, 39 **(2011)**.

[9] Feng Gy, Hu Jq, Chen Xq, etc.; Water quality condition and control countermeasure of the water source of south-to-north water diversion project[J], China water publishing house, **8** , 48 – 50 **(2005b)**.