

## A Comprehensive Renovating Eco-agricultural Model in Mountainous Area

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**Abstract:** At present, in Three Gorge Area of Chongqing, cultivated lands are being reduced and natural resources are short of supply while population increasing rapidly. Furthermore, Ecosystem is fragile and environmental pollution is severe. According to this condition, a series of advanced and practically agricultural techniques were applied at Qixing small watershed in Wushan county, such as improving soil fertility by combining the chemical and biological methods, planting and breeding excellent variety, etc. Based on these techniques, a comprehensive renovating Eco-agricultural model was established. The result showed that the Eco-agriculture in mountain area can providing a new approach for social and economical sustainable development in Three Gorge Area.

**Keywords:** eco-agriculture in mountain area; comprehensive renovation; model

### 1 Introduction

Poverty is a economic problem, also the social and environmental one. The existence of poverty does not only threaten the regional sustainable development but also influence the whole social stability and healthy development. If poverty is not eliminated, it will be difficult to develop sustainable and improve the ecological environment and explore and utilize resource rationally. Even more, it can influence the progress of migration work in the whole reservoir area. Therefore, shaking off poverty, ecological environment and migration are related closely. The more fragile the environment is, the higher the poverty degree is, the high the degree of difficulty is. In connection with the reality of specific natural conditions and ecological environment, migration and heavy task of shaking off poverty in Three Gorges Reservoir Area of Chongqing, to construct new type sustainable eco-agriculture model in mountain area is the inexorable choice of pushing forward the economic sustainable development of Three Gorges Reservoir Area and even whole Chongqing city.

### 2 The concept of eco-agriculture in mountain area

The new type of sustainable Eco-agriculture model contains combination of traditional agriculture and modern science and technologies. It lies in advanced ecological situation and harmonious. It is combines with the characteristics of the reservoir area. It mainly contains forest and grass. Farming, animal husbandry, bird, fishery, fruit, flower, mulberry, algae, mushroom, insect and wild vegetable, fruit, fruit, birds are combined. The practicable technologies are adopted. The measures are suited to local conditions. A diversified economy is developed comprehensively. The facility agriculture is developed in large area. The big sheds, greenhouse vegetable project, green food, cultivation without soil and miniature Eco-agriculture in town are popularized to alleviate the stress about supply and demand contradiction by conditions of many people, not enough cropland and resource in Three Gorges Reservoir Area.

### 3 Structure of comprehensive renovating Eco-agricultural model

#### 3.1 Characteristics of natural resources

The model was set up in Qixing small watershed where the elevation is 480 meters-640 meters, 15 kilometers east to Wushan County. In the region, the water and heat resources are plentiful. Annual

temperature is 15°C—19°C. Accumulating temperature of more than 10°C can be up to 6 000°C. Annual rainfall is 1 000 mm or so. However, the soil in this area is very meager. The most compositions are granite. Besides this, the soil and water losses are severe so that the ability to resist natural disaster is very feeble. Although the annual rainfall can up to 1 000 mm, the water for living is not enough due to lacking of infrastructure.

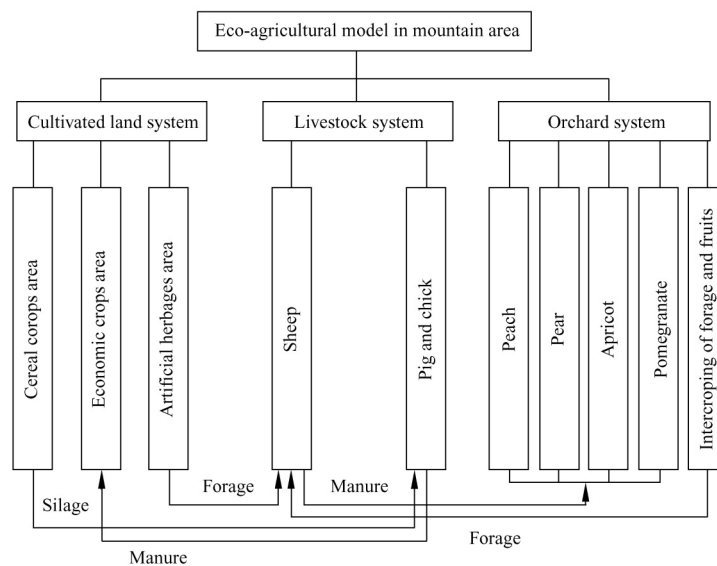
### 3.2 Structure of the model

According to the local situation, we designed this Eco-agricultural model in mountain area demonstrated as follows(Figure 1).

### 3.3 Characteristics of the comprehensive renovating Eco-agriculture in mountain area

Changing the monoculture structure. Grain was taken as chief crop and forage was also taken account of. The crop structure was adjusted. The cropland system was divided into grain area, economic crop area and artificial herbage area. These steps changed the past monoculture structure (grain crop) in the region. Diversified crop can not only meet various needs but also can enhanced the systematic ability of fighting natural calamities.

Constructing ecological orchard. Orchards most lie in slope land in the region. So it easily causes loss of soil and water. Ecological orchards construction should satisfy the basic needs of constructing normal and traditional high criterion orchards. In addition, the features of controlling and reducing the soil and water losses, protect and improve ecological environment should be highlighted. So it must adhere to combination of engineering and ecological steps. Building reverse slope terraced orchards and terraced fields with biological hedge are the content. Through fresh grass covering, intercropping and organic substance covering in the orchards, the ground cover rate increased. It can moderate the extreme climate conditions, alleviate the direct cash force to ground from the rainfall on the ground. Consequently control the loss of soil and water.



**Fig.1** The sketch of Eco-agricultural model in mountain area

Planting artificial herbage. In order to enhance the change and utilization rate of the husbandry system's resources, the region open up artificial herbage area. Herbage of high quality were selected, such as *Alfalfa Medicago sativa*, *Trifolium repens L.*, *Rumex K-1*. The experiments indicated that net out put of *Alfalfa Medicago sativa* is 376.8 Yuan per acre. For sheep, the primary and secondary product of

Alfalfa *Medicago sativa* can produce 2 or 3 times economic benefits as rice-cotton.

Developing the economy in suburb. The pattern's of animal husbandry system includes pig, cattle and the main species are sheep. It changed the past grain-consuming structure of agriculture. Sheep obtain high quality forage with high protein from cropland system and orchard system, which can convert crop straw provided by the cropland system in the pattern and prevent the pollution caused by burning straw. The cropland system constructed fourteen sheds and plant 200 acres vegetables. There are 8 breads and 9 866 fruit seedlings. In 4 acres cropland with soil moved in, 15 722 peaches and pear were planted. So, the system can provide the citizens with products such as meat, egg, vegetables, fruit, etc. Thus, this model has a prominent characteristic of suburb economy.

### 3.4 The regulating mechanism of Eco-agriculture model in mountain area

Water regulating. Take such steps as engineering, agriculture and covering technology to realize reducing water irrigating and promote utilization ratio of water. In the model area, the set of equipment for trickle irrigation was imported and the Qixing control center of high efficient Eco-agriculture trickle irrigation was constructed. 5cisterns were build. 4 860 m pipes, 15 000 m tributary pipes and 68 000 m little pipes were equipped so as to efficiently prevent permeating and evaporating. To construct trickle irrigation project, the source of water is the base. After the comprehensive improvement steps for Bayi reservoir, the source of water was found. At the same time, regulating planting structure and planting fashion actively. Reducing appropriately the crops, which need more water while increasing some crops, which need less. Furthermore, we adopted the measures to increase irrigation volumes and to reduce irrigation times. Thus, we not only lowered the cost but also economize on the water.

Fertility regulating. Combining chemical and biological methods to improved the soil fertility. Advocating straw manure can obviously soil organic matter, improve soil physical and chemical structure, regulated soil nutrient and improve soil biological activity. When manuring the fields, the quality and quantity of fruit will be improved altogether. In this model, all the manures from sheep, ship and chickens have been applied into orchard and economic crops area. The straws from cereal crops area have been applied into fields completely.

Management regulating. In order to develop agriculture sustainable, according to variation of market, in the lead of company and replying on science, we adopted a new management mechanism, namely combining the company with the peasants. Finally, a industrial chains were set up. Thus, we can regulate industrial structure by selecting excellent species of plants sand animals before production. During the production, we provide a series of practical technique to peasant. At last, the company answers for the sell.

### References

- [1] Jiao Feng *et al.*, 1999, Resource environment and eco-agriculture of models on Loess Plateau, *Bulletin of Soil and Water Conservation*, **19**(7):37-40.
- [2] Bai Gangshuan *et al.*, 1999, Cultivation state of fruit tree and development countermeasures in eco-agriculture demonstration area in Loess hilly and gully region, *Bulletin of Soil and Water Conservation*, **19**(7):45-49.
- [3] Sun Quan *et al.*, 1997, Approach of ecological agricultural structure model in the Loess hilly region of southern Ningxia, *Journal of Soil Erosion and Soil and Water Conservation*, **3**(1):80-84.
- [4] Yang Jihua *et al.*, 1997, Study on benefits of Alfalfa conservating soil and water, *Journal of Soil Erosion and Soil and Water Conservation*, **3**(2):91-96.