Eco-economic Constructions of Agricultural Region: A case study on Fujian province, China

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Abstract

The agro-eco-economy is the best mode for agriculture development. The core of the agro-eco-economy requires a harmony between economic development and eco-environment in agriculture. According to the current situation of agriculture development in Fujian province, some viewpoints of agro-eco-economic constructions including transferring the regional superiority to market superiority, implementing the strategy of saving agricultural resources, establishing the mechanism of ecological compensation are confirmed. The integration of economic development and ecological protection should be made in a rural area.

Keywords: eco-economics; regional construction; agriculture development; rural area; Fujian province of China

1. Introduction

Eco-economic system in the agriculture is a complex system combining agro-economic system with agro-ecological system. This is not only related to the harmony between human and nature, but also to the economic social development [1]. According to the theory of the Daly’s steady-state economics, the change in an economic structure would be applicable only when the dependence of such a change on scarce resources become less and less. From this point of view, the utilization of natural resources can be optimized if the invested level of economy is well matched with the devoted level of natural resources [2]. The eco-economic system has the features of enhancing the utilization ratio of resources and of protecting the environment. In such a way, the nature resources give full play their values and can be

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efficiently used, the maximum benefits from the economic development can be achieved with the possibly minimum consumption of natural resources. Consequently, the economic system would be mutually harmonious with ecosystem, which promotes sustainable development. The sustainable development, therefore, is closely related to constructing eco-economic system. It is just to bring economic system into line with ecological system for social development [3]. By the 1960's many countries, especially the developed ones, sensing the gravity of this problem, set out to explore ways of continuously developing economic. This became an issue after the UN Human Environment Conference in 1972. The report entitled "Our Common Future" submitted to the 42nd UN General Assembly by the 1987 World Environment and Development Committee gives the definition for sustainable development [4]. Sustainable development was made a strategy for global economic development in the "Agenda 21", which put forward by the 1992 UN Conference of Environment and Development. Making full use of the latest achievements of agro-eco-economic system will help rural economy advance along the road toward sustainable agriculture.

2. Evaluating agro-environment from view of eco-economic in study area

Taking Fujian province as an example, the eco-economic constructions of agricultural region are studied. Fujian is located in the southeast of China (Fig.1); it faces the sea with the mountains and hills for a background. It belongs to subtropical zone with plenty sunshine, abundant heat and precipitation. Such conditions are favourable to most plants, the subtropical evergreen broad-leaved forests take a dominant position in the natural vegetation, percentage of forest cover is 63.1%, first of its kind in China. Over 80% of the total area of the region is covered by mountains and hilly land. The topography is complicated and varied, many superior micro-climate caused by landform are emerged within these regions, which is suitable to develop various crops, subtropical fruit trees and forests. It has been developed for over 3000 years. As the effects of human activities on nature are relatively profound, many kinds of agro-eco-systems have formed under the agro-economical activities.

Fig.1 Location of study area (Fujian,China)

Fujian may be the representation of the mountainous regions in China. The experience of development can serve as references for other similar regions. There are lots of successful experiences which are worth expanding. Besides, there are also some morals. In some areas, the agriculture resources are being used unrationally, the limited agricultural resources will face growing pressure. In recent years, along with the quick development of economy and the continuous increasing of population, cultivated land is
impressingly in short supply, its area per capita is 0.034 hectare, or only 44% of the average level of the nation, the contradiction of more people and less land is getting more and more striking. The unreasonable application of chemical fertilizers and pesticides cause a serious threat to the environment. Certain stretches of the rivers are being polluted, there is a gradual lowering of the water quality. For this reason, how to exploit agricultural resources rationally in order to integrate economic benefits with ecological benefits—all this has become an important problem which has to be solved right away at present. Now, building an effective agro-eco-economics systems are summarized as followings.

3. Transferring the regional superiority to market superiority

Due to abundant natural resources, complex terrain and diverse climate in Fujian province, the pressing task is to raise ability to transferring regional resources advantage into economic advantage, which gives the region competitive power and, gradually, market and position. Aimed at differences in natural-social condition between coastal area and mountainous area in Fujian province (Tab.1), we must take good measures suited to local conditions, actively realize the regionalization of characteristic agriculture, transferring the regional superiority effectively to market superiority.

Tab.1 Regional resources superiority in Fujian province

<table>
<thead>
<tr>
<th>Regions</th>
<th>Climate</th>
<th>Ratios in the Province</th>
<th>Regional resources superiority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GDP</td>
<td>Population</td>
</tr>
<tr>
<td>Southeast coastal</td>
<td>South subtropic</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Northwest mountain</td>
<td>Middle subtropic</td>
<td>1/3</td>
<td>1/3</td>
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</tbody>
</table>

We should give full play to the superiority of marine resources developing fishery, aquatic product process and leisure fishery, and also making the industries of subtropical fruit, edible bacteria, vegetable, tobacco and flower as characteristic agriculture in southeast Fujian. Many products of this place are famous at home and abroad, and have high competitive power in international markets, citrus, longan, litchi, pineapple, banana and loquat are the six most famous fruits, not only having different varieties, but also being of superior quality. In the northwest Fujian, the forstrys, tea industries and commodity grains are developed as characteristic agriculture. In developing characteristic agriculture, we must pay full attention to the characteristics of regionalism. There are some beneficial measures for southeast Fujian coastal region, if they are used in the northwest Fujian, they might not be always beneficial. A region not only has its superiority, but also has its inferiority. Only by making the best use of the advantages and bypassing the disadvantages, can we establish the representative characteristic agriculture demonstration regions to promote the regulation and optimization of rural economic structure, the ratio between economic crops and grain crops will gradually change. We should build up agricultural information system quickly and serve the farmers with most efficient market information, so that can prevent the poor sales of agricultural products and increase the agricultural production and income of farmers.

4. Ecological benefits integrated with economical benefits in mountain areas

As soil erosion is closely related to human economic activity, the most serious erosion areas are not occurred in forest well protected mountains, nor in the plains, but in the high developmental hilly lands in Fujian. In the hilly areas at altitudes below 500 m, where the forest ecosystem has been severely destroyed and ground surface has lost natural vegetation after reclaimation. Thus soil erosion may easily
take place, especially in the slope cultivated land. It is reported soil erosion is quite serious in 5-25 °slope hilly areas (mainly tea plantation and orchard), the erosion rate can be up to 28.8%. Therefore, it is imperative to prevent the soil erosion as soon as possible in mountain areas. But without a high developing capability, ecological systems can't guarantee protection. As China is a developing country, the prerequisite to sustainable development is development. Traditional agricultural areas in Fujian mainly focus on the valley and basin, which is so-called "basin agriculture". The agricultural lands are very scarce. Along with the population grows and people's living standards increase, it will be required the agricultural lands from the basin extends to the hilly lands. So developing the hilly lands become inevitable. Farmers in mountain areas first concern their livelihood, that is economic benefits, especially the recent income, or else, farmers’ enthusiasm will be vanish. In this case, only emphasized the aspect of protecting the ecological systems, but not to exploit hill land, it doesn’t meet the main requirements for farmers. Therefore, strategy for exploitation of mountainous regions is: "long-term cultivation should be combined with short-term cultivation". It is necessary to seek the best patterns of combination, such as forestry combining with farming, or with stock-breeding, or with pomiculture. When developing the mountain areas, farmers are more focus on the current production efficiency, few care to maintenance of the ecosystem. It is necessary to establish the viewpoint of "if ecosystems is not protecting, economy is difficult to developing". Since mountain regions possess the traits of vertical differentiation, the arrangements of planting from top to foot of a mountain in many regions should be: forest—tea garden—fruit trees—grass or green manures—paddy fields. Such arrangements reflect the ecological benefits integrated with economical benefits.

5. Implementing the strategy of saving agricultural resources

The obstacle factors for the economy development of regional agriculture was analysed [5]. It was found that the factor of resource-reduced amount was 56.6%, listed on the top, the factor of resource circulation was 18.73%, the factor of resource safety was 18.16%, and the economic and social factor was 6.51% (Fig.2). These results clearly indicate that the factor of resource-reduced amount has been a main obstacle on the development of agriculture economy in Fujian.

![Fig.2 obstacle factors for the development of agriculture economy in Fujian](image)

Note: F1-economic and social factors. F2-factor of resource-reduced. F3-factor of resource circulation. F4-factor of resource safety

The continuous increase in pollution by pesticides and overuses of chemical fertilizers have caused the decline of both environment and agricultural product quality. The improper treatment of agriculture film and the discharge of animal manure have been becoming the main pollution sources in Fujian's rural area. All these indicate that the over-amount per unit area of these agricultural resources puts a very heavy
burden on the agro-eco-economic systems. As a result, the system would be running under an unhealthy state. Such a pattern of agricultural development characterized by high consumption and low effect, not only uses up large amount of raw material but also leads to devastation of environment, these problems become the main issues for the research, the study of this topic will inevitably make fast progress in many respects[6]. Accordingly, it is necessary to implementing the strategy of saving agricultural resources, the advanced techniques and the scientific methods should be introduced to prepare the applied amount of chemical fertilizers and pesticides with proper proportions. The pesticides, which are high efficiency, low toxicity and low residual, and the biological pesticides should be more intensively utilised. The application of chemical fertilizer recipes is implemented in order to increase the effective utilization coefficient. The efforts are made to increase the recovery rate of agricultural film. The development of methane can be established to form an agro-technique system of energy-saving. The necessary measures should be immediately taken to deal with the problem of using trees as fuels in the rural area. The production mode of stockbreeding—methane—planting as a unity would not only produce the economic benefits but also protect natural resources. We should build up a water-saving agro-technique system adopting new techniques such as spray and drip-irrigation, reducing water lose or waste in the agricultural production process. In addition, the high-effective utilization of water resources would be implemented in agro-industries. The economic benefits per unit water consumption can be improved through the structural adjustment and optimal allocation of water resources. In conclusion, the government needs to vigorously promoting the production and consumption modes for saving agricultural resources.

6. Ecological compensation pattern matched with the agro-eco-economics systems

Ecological compensation is an important approach for agro-eco-economic construction and related to sustainable development. On implementing the strategy of sustainable development, the regions are being besetted by some inharmonious problems. For instance, people who live in the upper reaches of river often dump sanitary waste into river, to the detriment to the water quality in the lower reaches. If the resources at the upper reaches of river are developed unreasonably, this will cause soil erosion severely, and may lead to the increasing of sediment deposit at the river mouth, eventually decreasing harbor superiority. Anyhow, between the two regions there still exist a lot of reciprocal possibilities, which will promote mutual benefits and joint development. Therefore, ecological compensation is becoming one of key of resources and environmental management. Ecological compensation mechanism is not only the connection of economic development and ecological conservation, but also the key to achieve scientific and rational resources allocation and to maximize the resources efficiency. Most ecological objects are public resources, which have no direct profit in a short time. The effective ecological compensation mechanism will be established gradually. Taking returning farm to forestland in slope land over 25 ° as an example, the beneficiaries from forestland have responsibility and obligation to pay appropriate compensation to the cultivators who have lost their cultivating land, on which they have depended existence for a long time. Similarly, downstream-region should pay appropriate compensation to upstream-region’s contribution to superior water quality. Only by this way can fairness and justice principle be showed, can people be encouraged to work together to contribute to protecting environment. The calculation methods for ecological compensation should be varied according to local economy and society. At present, the ecological compensation system suit different levels and types has not yet been founded in Fujian province, which leads to absence of better standard and evaluation method of ecological value. Publics generally agree that environmental protection needs to invest and maintain, but "who pays the bill" is not yet in consensus. The government's public financial investment must be important input in ecological construction, so financial transfer-payment to ecological compensation from Government need to strengthening. According to "who invests, benefits" principle, social capital is
encouraged to participating ecological construction. The multi-channel and multi-form ecological compensation approach should be taken to actively guide by the community participation, hence commercialized and socialized ecological compensation way will be broadened. The ecological compensation pattern should be well matched with the agro-eco-economic systems, by which to guarantee the best effects. Some core theoretical issues, such as the mechanism, pattern and quantitative method for evaluation of natural resources and ecological systems must be explored actively to provide scientific basis for establishing sound ecological compensation. Setting up and improving the ecological compensation system and introducing eco-compensation tax to raise ecological compensation ability will gradually realize institutionalization and standardization of ecological compensation.

7. Conclusion

Establishing sound agro-eco-economic system is the orientation of agricultural modernization. Sustainable agriculture requires a harmony among economic development, natural resources and environment. The agro-eco-economic system plays a role as a supportive point which provides essentially social and environmental conditions for the sustainable agriculture. Fujian province may be the representation of the mountainous regions in China. Taking Fujian province as an example, the eco-economic constructions of agricultural region are studied. There are lots of successful experiences which are worth expanding. It points out that agro-eco-economic construction is an important mechanism to improve the development of agriculture. Building an effective agro-eco-economics systems are summarized as followings: transferring the regional superiority to market superiority, ecological benefits integrated with economical benefits, in mountain areas, implementing the strategy of saving agricultural resources, compensation pattern matched with the agro-eco-economics systems. The experiences can serve as references for other similar regions.

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References