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# The Eco-industry Development Strategy and Demonstrating-district Construction in Sanjiangyuan

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**Abstract** Sanjiangyuan, which is the most important influence-able ecologic-adjusting area but also the most fragility in China. It plays an un-substituted pivotal role in China water-resource safety, Eco-safety, nationality solidarity and country safety. However, it is also the lowest in China economic development. The paper analyzes Sanjiangyuan strategic infection on Western area. The Qing-Zang Plateau and Qinghai based on the double aims of protection and construction. The authors think that the fragility, cold-low-efficiency, extensive laggard economy, the single Agriculture-pasturage economy, the typical input and overfull-out industry-structure, the overloading of population and livestock and close headstream economy are the basic characters of Sanjiangyuan economic and social development. In succession, the authors bring forward idea and the keystone of Eco-industry development, such as Eco-Forest-pasturage, Eco-industry, Eco-tourism, Eco-city in Sanjiangyuan area, and put forward the collective conceive of five kinds of Eco-industry demonstration region. At last, put forward the ensuring-measures of the Eco-industry of Sanjiangyuan, including policy-ensure, infrastructure, item ensure, spatial management, outlay support, dynamic evaluation, tracing-detect caution, and so on.

**Key words** Sanjiangyuan; eco-industry; eco-tourism; eco-forest and stock-raising; eco-city; eco-industry demonstrating region

Sanjiangyuan natural reserve area locates in The Qing-Zang Plateau, the headstream of Changjiang River, Yellow River, and LAN Cangjiang River, between  $E89^{\circ}24' \sim 102^{\circ}23'$  and  $N31^{\circ}39' \sim 36^{\circ}16'$ , at an altitude of 3 450~6 621meters. The natural reserve area owns the highest altitude and largest area in China. The current administration includes Yushu, Gulu autonomous region, four county (Zeku, Henan, Xinghai, Tongde) and Tanggula within western Mongolia people autonomous region, 16 counties, 127 village and towns together,  $36.3 \times 10^4 \text{ km}^2$ , accounting for 50.4 percent of Qinghai Province. In 2003, the population

is  $60.95 \times 10^4$ , accounting for 11.42 percent of Qing-Hai Province. GDP arrives at  $26.01 \times 10^8 \text{ RMB}$ , occupied with 6.67% in Qinghai Province. First industry increased  $14.4 \times 10^8 \text{ RMB}$ , accounting for 31.2%; Second Industry increased  $4.01 \times 10^8 \text{ RMB}$ , accounting for 2.18%; Tertiary Industry increased  $7.6 \times 10^8 \text{ RMB}$ , accounting for 4.76%; Local Government Revenue was  $7.19 \times 10^8 \text{ RMB}$ , accounting for 5.13%. The local economy is behind, low income people accounts main part. Zang-people live in with concentricity and religion is popular. Although its economic level is low, it is the ecological function zone that exerts the most in-

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fluence in China and significant impact on world climate. It plays a strategic role in safety of country water rescues, ecological system and people unity and social stabilization. Its changing trend connects the ecological safety in middle-down region and economic and social sustainability. How to deal with the relation of regional economic development and ecological protection and insure to implement a total economic and ecological aim? Author tries to answer this question by means of developing ecological industry and building ecological industry demonstrating district.

## 1 The strategically influence of ecological industry and ecological environmental construction in Sanjiangyuan

### 1.1 The strategically in paction on western eco-industry and ecological environmental construction in China

West of China is the main headstream of many big rivers and crucial ecological barrier; the quality of ecological environment impacts country's ecological economical safety and social sustainable development. However, because of natural and historical reason, man-made destroy has converted from structural destroy toward functional destroy. Combining regional characters, discussing and researching western ecology and economy are important for regional economic, social, environmental sustainable development ways<sup>[1]</sup>. Although the Eco-system is complicated and weak, the region concentrates the most varieties of species in word, which have been destroyed easily. With more and more man-made activities, especially over-herd, abuse picks, the environment is becoming worsened. Population, resources, environment and development meet conflict and become serious. In the new century, government in China implicates "Western explore" policy and its main context is ecological and environmental construction, especially for rivers and its headstream's ecological construction, and it impacts China's survival and development. Furthermore, in Jan. 2003, the State Council accredited (State Council office send [2003] for the 5th) that Sanjiangyuan was the national-level nature reserve area and was regarded as the key

project of the national development of western regions in Sanjiangyuan reserves area. ecological protection and construction is one of investment heavy cycle bng, which is an arduousness and complexity system engineering. it is also an ighty project that benefits three rivers basin and even national people too. it not only merely concerns the interests of the people of source district but also concerns the sustainable development of the economic society of west of our country even more and realized the overall situation of the grand goal of well-to-do society in an all-round way in the first 20 years of this century. So, protection and development of Sanjiangyuan are influencing the ecological and environmental safety and build's strategy. It is also pivotal fore ecological industry development of west of our country.

### 1.2 The strategically influence of the Eco-industry's development and environment construction of Qinghai-Tibet Plateau

The unique geographical environment and special climatic conditions of Qinghai-Tibet Plateau gestate such a unique Eco-system with the large unique high and cold wetland of area, high and cold desert, high and cold hay in the world of development. Just because the wetland with the large area strengthen some precipitation in Bayankela Mountain and develops 3 heavy river in terrain high and cold, which are far away from ocean semi-arid region. The ecological and environmental changes concern directly the ecology of Qinghai-Tibet Plateau and even country safe and also have important influence on the whole country, global atmosphere, water yield circulation. At the same time, the unique geographical environment of Qinghai-Tibet Plateau pregnant the unique biological district of Sanjiangyuan too, the variety of the biosystem offers enormous ecological public good to mankind. According to studying the ratio of economic worth of the ecosystem products in the plateau and ecological service function value are 1:70, it is obvious that the ecological service value of Qinghai-Tibet Plateau is far higher than its directly use value<sup>[2]</sup> produced. But Qinghai-Tibet Plateau is the assembling area of ethnic minority, because some reasons, such as history, natural environment condi-

tion and social development degree, etc. economy is developed slowly, the animal husbandry as the leading industry of area totally depends on the grassland ecological environment of the plateau. Developing ecological industry in Sanjiangyuan areas can realize the scale, specialized, mercerization and socialization of the production and management are good to protect the fragile ecological environment of Qinghai-Tibet Plateau, furthermore, can liberate and develop the productivity. Insisting ecology is preferential in the dividing area and guide to different types of areas<sup>[3]</sup>, and it can improve the value of service of the Eco-system of Qinghai-Tibet Plateau and promote ecological industry development and ecological environmental protection mutually and then safeguard the balance and stability of the eco-system in bigger range.

1.3 The strategically influence of the ecological industry's development and ecological environment construction of Qinghai Province

Qinghai is located in the headstream of rivers and source, the ecological position is extremely important, especially for the protection and construction of the meadow ecological environment. It not only have important meaning to animal husbandry economic development of the whole province but have positive function to improve the Chang Jiang River, the Yellow River Basin ecological environment and sustainable develop-

ment. It is combined by sustainable development theory and China's reality and that result the building of ecological province, it is great innovation of global sustainable development. It includes ecological culture, ecological environment, and ecological industry. It is basic request about sustainable development strategy platforms and break through points of on the regional level of the sustainable development strategy. The ecology province construction of Qinghai is good to realize the resource, environment and economy to develop in harmony. It is significant to reach ecosystem benign cycle, the regional ecology safely and ensure the sustainable development of the economic and society. its construction should centre on increasing economic efficiency and combine the ecological economic construction, ecological environment construction, social environmental construction of humanity organically, so the development of the ecological industry is meeting the request for building the ecological province of Qinghai, forming of the competitive industrial zone, improving peasants' income level, keeping regional ecological balance, sustainable development<sup>[4]</sup> and promoting ecological economy of local and surrounding area steadily. One ecological province depends on the implementation<sup>[5]</sup> of the ecological industry steeply, such as ecological agriculture, ecological industry, ecological service and trade and sale too in addition.

Table 1 The economic benefit contrastion of total national corporation and scable Non-national Corporation in Sanjiangyuan

Economic benefits Index	Industrial added value rate	Total assets contribution rate	Capital value preserving and added rate	Asset-liability ratio	Rate of expenses rate of the cost	Overall labor productivity (Yuan/capita)	Sales rate of the products
Sanjiangyuan areas	31.49	3.46	112.45	51.67	3.72	28.780	
Qinghai Province	38.41	4.97	115.90	67.10	4.72	40.072	97.20
The whole country	29.01	11.10	113.50	59.10	6.20	66.943	98.10

Source of the materials: State Statistics Bureau compiles "Chinese Statistics Summary-2004", China Statistics Press, 2004; the Statistics Bureau of Qinghai Province compiles "the Statistical Yearbook of Qinghai Province-2004", China Statistics Press, 2004.

## 2 The essential features of socio-economic development and industrial structure

### 2.1 The fragile, unique, high-cold, low-efficiency characteristic

Sanjiangyuan locates in Qinghai-Tibet Plateau and the altitude is in above 3 000 m, because of its unique, high and cold dry physiognomy, economic development demonstrates inefficient characteristic; furthermore, harsh natural conditions are restricting the growth and development of the forest vegetation, and regional development depends on the natural resources and conditions strongly. Degradation on the meadow, desertification and mouse's insect pest are serious, grass yield is low; the domestic animal amount is not high in year on the meadow. In addition cold climate, plant growth period shortly, it is very weak to regulate ability and resume ability by oneself once the earth's surface vegetation is destroyed, resuming cycle are longer naturally and costly artificially; moreover, people lack far-reaching understanding to the environmental value of the plateau, so the human behavior has accelerated the deterioration of the fragile ecological environment in the plateau to a certain extent. Sanjiangyuan has become one of the areas with most weak economic strength of our country, with least-profitable economy<sup>[6,7]</sup> (by table 1). In Sanjiangyuan, industrial added value rates, total assets contribution rate, capital value preserving and appreciation rate, expenses profit rate of the cost, overall labor productivity are separately lower by 6.92%, 1.51%, 3.45%, 1.05%, 11 292 RMB per capita than the average level in Qinghai Province. Annual and the total assets contribution rate of Qinghai Province, expenses profit rate of the cost, average labor productivity are separately lower by 6.13%, 1.48%, 3.45%, 1.05%, 26 871 RMB per capita than the average national level.

### 2.2 Extensive and backward economic characteristic of Tibetan

Sanjiangyuan's economy development levels lag behind very much, the principal sector of the economy relies mainly on natural animal husbandry, and the

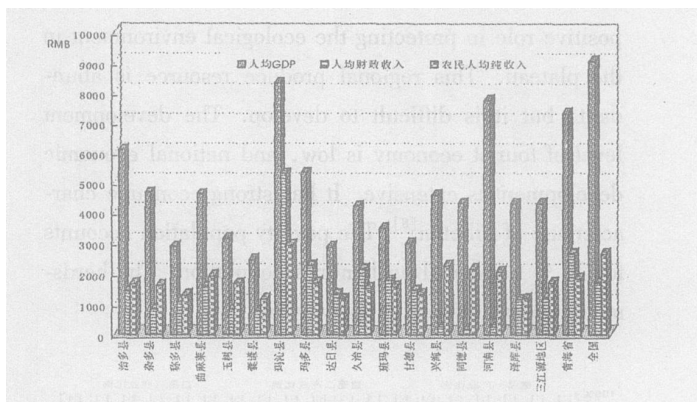


Fig 1 The contact of economic development-level Sanjiangyuan, Qinghai and China

mode of production of the animal husbandry relies mainly on grazing naturally. The whole GDP will add up to 2 601 million RMB in 2003, 4 270 RMB for each person, which is only equivalent to 58.44% of Qinghai Province and only equivalent to 47.08% of the whole country. Per capita local fiscal revenues are 1 180 RMB, which is only equivalent to 44.97% of Qinghai Province and 70.52% of the whole country separately. The per capita net income of peasants is 1 685 RMB, which is only equivalent to 92.73% of Qinghai Province and 64.26% of the whole country separately (Fig 2). Tibetan's population accounts for more than 90% among nearly 600 000 of total people in the whole district. The whole people believe in a religion, so the religion atmosphere is strong. It is the main Buddha cradle in Tibet represented by Qinghai-Tibet area of the roof of the world. Sanjiangyuan is in Tibet Tibetan autonomous region, there is a special strategic position to national unity and social stability is very important. Because people pay attention to the faith world and the integration with natural environment, the amount of production of guaranteeing the green plants of Tibetan area is greater than the consumption forever; wild animal and plant resources have kept variety. Tibetan ecology economic view requires to integrate and harmony between nature and society. Local people obey social organization and social ethic so as to obtain the coordinator relation among society, people and natural. The harmonious nomadic mode of production of plateau that gets along of natural environment plays a

positive role in protecting the ecological environment in the plateau. This regional produce resource is abundant, but it is difficult to develop. The development level of tourist economy is low, and national economic development is extensive. It has strong economic characteristic of Tibet<sup>[8]</sup>. The poverty population accounts for 75% of animal husbandry's population. The herdsmen masses' life quality is very low.

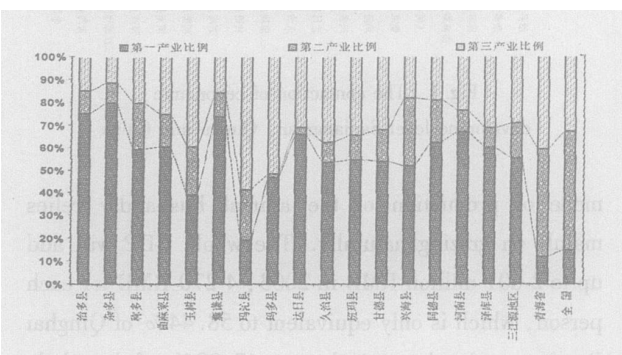


Fig 2 The contrast of Sanjiangyuan industry-structure

### 2.3 Excessively single economic characteristic of agriculture and animal husbandry

Analyzing the output value of industry structure, the output value of The First industry of Sanjiangyuan is 55.36% in 2003, 43.53% higher than Qinghai Province, higher by 40.74% than national first industry. Zhiduo County first industry proportion is up to 74.84%, Zaduo County is up to 79.56%, and Nangqian County is up to 73.55%. It is the typical traditional agriculture's leading economy, oppositely. The Secondary industry proportion is very low, only 15.46% equally, separately lower by 31.76% and 36.89% than Qinghai Province and average national level (see Fig 3). In the agricultural gross output value, the proportion of output value is up to 76.56%. It is obvious that the regional principal sector of the economy relies mainly on natural animal husbandry, and the animal husbandry is leading industry in every county; it is also financial main source in the locality. Sanjiangyuan Grassland accounts for 60.45% of the whole area of land in the whole district, so it is adapted to domestic animal breeding specially of puma and low herb mostly in the grassland—Yak, Tibet sheep, Tibet horse, Tibet goat etc. It is one of animal

husbandry area of three most representative prairies of our country. It is the unique animal husbandry area in the grassland of enormous High Mountain (cold) in the world too. The mode of production of the animal husbandry relies mainly on grazing naturally, and it has formed the single animal husbandry structure specializing in grazing and raising live stocks. However, the industrial structure is highly single, lack diversified industry foundations. Second and Service industries develop slowly, and this has limited the prosperity and development of the industrialization process and animal husbandry economy. The products of raw materials type are in majority, a large amount of agricultural byproducts have not realized processing appreciation, processing system of resource type has not taken shape in resource type<sup>[9]</sup>.

### 2.4 The characteristic of typical input but spills

For First industries relying mainly on animal husbandry and manage extensively, benefit of developing animal husbandry economy is far smaller than the ecological economic benefits caused in ecological environmental disruption. Tourist economy can't offer facility food and other goods that tourists need as the tertiary industry, so some food and beverage must be imported from other areas, for example a lot of goods are imported by foreign country directly. So most incomes that the country obtains in tourists must pay out because of importing these goods. On the other hand, the domestic enterprise and the trans-corporation and foreign enterprise of Middle Eastern parts of China are the main investors and builders of facilities of regional tourism, when the profit outputted in the scenic spot and hotel where they invest in, its profit got back to Middle Eastern part again or abroad and produce export leaking<sup>[10]</sup>.

### 2.5 The characteristic of people and animals overload in long-term

There are units of 22 240 300 sheep of livestock now in Sanjiangyuan areas. Yushu has the unit of 7 488 100 sheep, GuoLuo has the unit of 7 599 000 sheep, HaNan has the unit of 2 915 200 sheep, Huangnan has the unit of 4 090 700 sheep, and west state part of sea has the unit of 147 300 sheep. However,

er the rational amount of the domestic animal is 9 780 000 sheep unit in year; overbad in 12 450 000 sheep unit; about 55.98%. Main reasons of overbad of the domestic animal amount in year are overloading of the population and interest's drive. These aggravate the deterioration of the regional fragile environment.

Analyzing carrying capacity of people and people's environmental capacity system, the carnivorous products that the meadow animal husbandry produced are the main influent factors of environmental capacity of people of Sanjiangyuan. Its output level can be main variable that can be used to calculate the regional people's carrying capacity of amount of land. The statistics show, there are 223 090 people in Sanjiangyuan reserves (namely 43 566 persons in the key district, 54 254 people in the buffering area, 125 270 people in the test block) that should shift out from protection zone through ecological immigrant way. People's environmental capacity of protection zone is 133 731 calcu-

lated with the fairly well-off consumption standard, and it has overloaded 89 358, overbading 40.05% (see table 2).

2.6 Economic characteristic with close headstream

Animal husbandry economy takes the leading factor in first industries of Sanjiangyuan nature reserve, and there is not a good secondary industry of development basically, and the social economic development of area relies on the developing of resource industries, such as the animal husbandry and mining industry etc. It is just the preliminary resources utilization in the great degree definitely. The deep processing and utilizing degree is low. Every industry chain is single short and small. Consequent industry and side direction industry lagged behind. These make them midstream and downstream of industry develop weakly and the industry development demonstrates close, headstreaming extensive characteristic.

Table 2 The statistic of overloading population and transmigrated in Sanjiangyuan natural reserve area

Region	Population	Family number	Carrying population	Carrying family	Overloading population	Overbading family
total	223 090	40 562	133 731	2431	58 935	816 129
MaXiu	16 389	2 980	13 602	2 473	2 787	507
Zhongti-JuGong	48 293	8 781	24 899	4 527	23 394	4 253
Aninang	2 939	534	2 939	534		
Star sea	7 610	1 384	7 610	1 384		
Nianbaoyuze	10 576	1 923	8 059	1 465	2 517	458
DuKe River	1 299	236	830	151	469	85
TongTianRiver	36 109	6 565	16 234	2 952	19 875	3 614
Estem Zhong	4 138	752	4 138	752		
JiangXi	36 221	6 467	5 092	926	31 129	5 541
BaZha	5 438	989	5 438	989		
AngSai	3 694	672	1 872	340	1 822	331
DangQu	3 335	606	3 335	606		
SuoJia-Qua river	13 867	2 521	13 867	2 521		
Geladandong	2 113	503	2 113	384		
Yueguzonglie	9 234	1 679	6 263	1 139	2 971	540
Zhalin-ElinLake	1 902	346	1 902	346		
Gozongmuzha	12 297	2 236	12 297	2 236		
Make River	7 636	1 388	3 242	589	4 394	799

Source of the materials: Qinghai Province develops planning commission, Qinghai Province bureau of forestry and agriculture and animal husbandry of Qinghai Province, "master plan of Sanjiangyuan nature reserve ecological protection and build", February of 2004.

### 3 Thinking and focal points of the Eco-industry

#### 3.1 Development thinking

The regional ecological-industry's development should base on ecological protection firstly. we can propose regional overall location, development goals of the industry development, focal points and develop direction based on the double angle of protection and ecology-production-living, respect natural law and scientific development view, step by step to divide the level (core layer, buffer layer, test layer, periphery layer), and then put forward ecological industry's system and industrial structure adjustment, which are built and met with resource rational distribution, and optimize the overall arrangement scheme; cultivate pillar and taking over industries; build several different kinds of demonstration district, advance the ecology of national economy and economic social activities. Implement rolling monitor and assessment and carry on roll prewarning to the effect. Turn Sanjiangyuan nature reserves into the ecological productive live mutual flourishing nature reserve, national-level sustainable development test block and national recycle economy demonstration area (see Fig. 3).

**3.1.1 Guide the industrial structure to pluralism** structure from the single animal husbandry. Establish the system of Eco-industry. The regional transition of industrial structure should regard sustainable development as the cardinal principle; choose characteristic farming and animal husbandry, light industry and tourism as the non-pollution, ecological industries<sup>[11]</sup>, such as industry based on energy, raw materials and tourist industry, etc. Develop recycle economy and set up the regional development framework of recycle economy<sup>[12]</sup>; promote the transformation of scientific and technical result and shorten the cycle that the scientific and technical result turns into realistic productivity. Rely on science and technology to promote the upgrading<sup>[13]</sup> of the industrial structure further change the industrial structure taking animal husbandry as leading single factor. Set up the Eco-industry's system including ecological agriculture, ecological forestry, ecologi-

cal animal husbandry, ecological industry, ecology tourist industry, service trade of the ecology progressively. Handle upstream, middle stream and downstream ecological construction relation. Form rational financial transferring payment mechanism and the compensation mechanism of ecological protection.

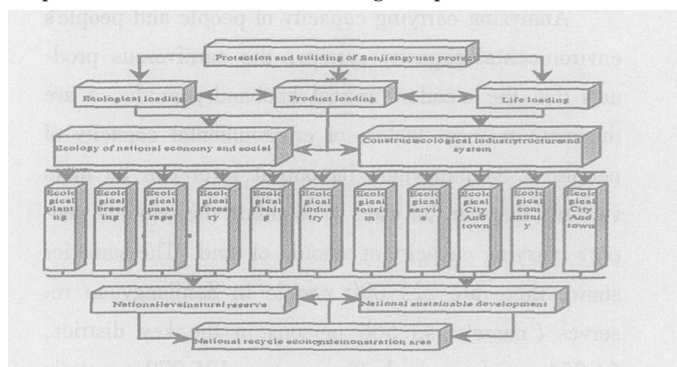


Fig. 3 The Eco-industry system building Sanjiangyuan natural protection region

**3.1.2 Guide the industrial structure to the input-output type** from put into-spilling type and pursue the intensive style of economic increase. The industrial structure from the input-spilling type to the input-output type is the change of economic development in fact, it is also optimization and upgrading of the industrial structure. Traditional economy is one of linear economy<sup>[14]</sup>, Sanjiangyuan's traditional animal husbandry is one of self-sufficiency or half self-sufficiency, elementary, extensive linear economy, which usually sell resources with high cost and gain a low economic development, namely "three low": low profit, low level, poor benefit. Local industrial structure, product structure, export structure lead on natural resources and have neglected the spilling of the ecological benefits and social benefit while asking the economic benefits, it also cause the backwardness of the rural economy, the pauperization and deteriorate the ecological environment. So we must find and foster the regional superior resources and form the advantage industry actively; foster and extend the industry chain, realize the vertical, horizontal coupling of the ecological industry through imitating the biological life cycle<sup>[15,16]</sup> in the ecosystem; strengthen coupling from source to end to form absorbing circulation inside the industry. Carry on

horizontal coupling between different industries and trade by initiating the food chain network, form industry chain network, which including the production, circulation, consumption, recovery, environmental protection. Realize the industry to transform into input-output type by the biggest degree circulation.

3.1.3 Guide the industrial structure to convert from production-living type to the ecology-Production-living type. The traditional industrial structure regards products profit to maximize as the direction and pursue the improvement of the economic benefits, but ignored the ecological benefits deeply. The final purpose of industry development should be to meet increasing constantly needs material of people and create good living environment, especially for Sanjiangyuan, that has great ecological strategic position. But Sanjiangyuan is also ecology fragile sensitive area, so we should fully pay attention to ecological environment protection and lead industrial structure convert to ecotype-produce-ecological-living industrial structure.

3.1.4 Set up Eco-industrial structure system with economizing type of resource and environment friendly type. Adopt the recycle economy and form the closed circulatory system of industry—The ecological industry's garden in some area finish closing the circulation return circuit from raw materials to input-products making—Products use—Offal treatment—Raw materials input, explore rationally on the basis of ecological balance, make mankind produce and the consumption pattern confined to range of bearing of ecosystem; pay attention to the high integration of market factors and ecological factors, form the ecology of the industry finally, build up the ecological industry garden; form ecological circulation in the economy<sup>[17]</sup> under the products aspect, enterprise aspect, garden aspect.

3.1.5 Foster and extend the Eco-industrial chain based on the ecological resource advantage, choose and optimize the pillar industry. Sanjiangyuan enriches not only meadow resource but also hides crude drugs resource, waterpower resources, tourist resources, etc. The region can set up new-type industrial structure chain through the reasonable exploitation of these superior resources, based on reflecting the characteristic.

Give priority to processing, storing, keeping, fresh transportation and sales industry; accelerate the transformation and improve traditional leading industries, such as building, building materials, smelting, leather, water and electricity, etc; develop the tertiary industry, such as eco-tour, catering service, communications and transportation, circulation of commodities, information consultation, financing assurance, talent training, etc; foster new industry, such as Tibetan medicine, living beings, etc; new high-tech industry<sup>[18, 19]</sup>. Extend the chain of the industry regarding pluralism development as support, form the centralization and scale effect, set up high-efficient ecological industry, including the following major pillar industries.

Extend the grass livestock producing, processing and utilizing the industry chain synthetically based on the modern grass farm of meadow resources. Develop large aquaculture family, special village and professional township, proper agriculture and stock raising, form numbers self-fertile project, introduce a number of livestock produce and process backbone's leading enterprises, build domestic animal's production processing base. Utilize resources of livestock's organ to develop biochemical products, such as serum albumen, etc. Jointly carry on the groping research of the biochemical products with the scientific research institution and high-tech enterprise. Set up the artificial meadow of high yield and high quality, develop grass products processing industry actively and promote the development of regional grass industry.

Modern medical industry based on Tibetan medicine resources——form Tibetan medicine products industry chain of China. Quicken the development and research of the new products of Tibetan medicine, popularize Tibetan pharmacy and make it big and powerful.

foster the ecological tourist industry chain based on high, cold and magical resource, national conditions and customs and religious culture.

3.1.6 Accelerate various kinds of ecological industry demonstration district. Develop the new high-tech industry plan and build the ecological industry garden, for example "start an undertaking in the incubator



base" in industry's gardens. "Hi-Tech garden of the biotechnology", etc. Offer a high-efficiency development model for industry transition of our country's economic growth and environmental protection use industry's ecology principle and form the pluralistic organization mode that inner-structure should be compact. Each ecological industry garden should set up through combining with the local characteristic; form the intergrowth system in the garden based on the existing trusting relationship and abundant interchangeable information foundation between different cooperative partners.

### 3.2 The thinking and direction of the ecological agriculture and forestry animal husbandry

The region should deal with the relationship of grain-production and animal husbandry and forestry while developing ecological agriculture. While emphasizing grain self-sufficiency, ecological agriculture should focus on ecological animal husbandry and ecological forestry.

Ecological animal husbandry development should adhere to the principles of the ecological sustainable development, natural resource endowment advantage, the requirement and demand guide of the market and the effect of the industry spread<sup>[20]</sup>; make the type of operation shift from tradition to intensification, and guide herdsmen to develop toward intensification and specialized direction. Engraft and receive the possibility of enterprises<sup>[21]</sup> of new and high technology outside the district, strengthen scientific and technical innovation of the animal husbandry and technology popularization, promote the industrialization management level of the animal husbandry<sup>[22-23]</sup>. Animal husbandry in the agricultural district uses the fodder as the breach combining grow grass, improve the natural meadow and increase the utilization ratio of the straw, artificially make the development center of the animal husbandry shift from pastoral area to agricultural district and half agricultural-half pastoral area<sup>[24]</sup>; promote to scale development of the animal husbandry through construction of base and "tap" enterprise. The government implements the financial subsidy to insist on production naturally; advance the development and utilization of the ec-

ological livestock produce in an all-round way make sure high-quality, high yield, high-efficient ecology security. The ecological animal husbandry of grassland utilizes traditional animal husbandry quintessence and modern science and technology in the pastoral area coordinate economic development and environment through designing the ecological animal husbandry's project of meadow artificially. Define the meadow property right, assign area rotation grazing with the grass in an all-round way, give priority to the ecological animal husbandry of grassland wetland, relying mainly on meat type livestock produce, give priority to develop top-grade livestock produce, improve the grade of the livestock produce in the cattle-producing area and add value of primary product, strengthen livestock controlling and improve domestic animal's product quality.

Ecological forestry's development need to break "green barrier" after our country entering into WTO. The forest vegetation types of Sanjiangyuan are abundant. The resources protection should focus on the ecological environment, regard the forest land, forest, high and cold shrub forest, high and cold grassy marshland, high and cold grassland, high and cold desert lake, river, wetland and wild animal as the protection targets, take effective measures to classify and manage according to different function areas, such as key district, buffering area and test block, etc. develop characteristic industry of planting forest or fruit trees of ecology through fully utilizing the light and hot ecological advantage of the plateau, develop forest fruit assortment of the high benefit and form the ecological advantage and change the simple shelter type forestry into economy forestry.

The ecological medicine should take large wetland crude drugs, which the country needs badly, as the focal point that can ensure the crude drugs demand of the country also can prevent effectively digging the destruction to ecology of medicinal herb<sup>[25]</sup> arbitrarily.

### 3.3 The thinking and focal point of ecological industry development

Industrial development must be accomplished by environmental protection and industrial development through developing recycle economy, obtain the low

and zero emission of the environmental pollution. Ecological industry is one important form of the recycle economy; therefore, it is necessary to form the whole social circulation of "the utilization of resources - the products - the regenerated resources" of ecological industry. Through setting up economy enterprises of circulation, ecological industry garden, realize the circulation of material, energy and water in the garden, through the exchanges of the by-product between every industry chain and form a close system, reach the stability and balanced of the ecological industrialized country; through the open system,<sup>[26]</sup> build the economic system of urban recycled resource recovery and production system further.

Circulation-industry should pay attention to the protection of the environment and popularize the cleaner production<sup>[27]</sup> in an all-round way in process of production, namely developing processing-industry characteristic light industry<sup>[28]</sup> and characteristic products in regions according to the special natural environment, humane environment. Because resources of the products are restricted by region, nationality, climatic conditions for this kind of industry and relatively rare, it has a small scale produce, relative scattering and has non-pollution to the environment. Some focal points should be fostered. Develops the green foods industries<sup>[29]</sup>, which taking agriculture, forest, the fishing products as main material, such as edible wild herbs, national characters food, local and special products, etc. Relying mainly on resources of Tibetan medicine to cultivate the medical industry. Taking fabrics as raw materials to make clothing, shoes and hats, embroider products. Foster beautiful and practical arts and daily necessities industry<sup>[30]</sup>.

3.4 The thinking and direction of ecological tourist industry

The eco-tour of Sanjiangyuan should adhere to optimum principle of ecology and economic benefits, insist on the guidelines of sustainable development to develop the ecological tour products<sup>[31]</sup>; implement green marketing mode and keep the integrality of the bio-diversity of tourist sites and culture through rational management, utilization and planning of tourist resources. Im-

prove local living standard while offering high quality tourist environment to tourist and keep the benign cycle of the ecological environment. Analyze tour product design and feasibility of construction especially. Propose the landscape reservation and repair the plan and design ecological tourism development system including ecological guiding system, commentary system, the system of visitor's centre, identification system etc. Set up Qinghai-Tibet highland tour circle and develop exploring travel, sports mountaineering, scientific investigation and travel, lie fallow in the circuits, motor tour, foot tours, drifting etc. Strengthen traffic for tourism and service facility construction. It should be developed from two following general orientations especially.

3.4.1 The natural grassland ecology-tour. The natural grassland scene eco-tour includes meadow, forest, river, lake, snow-covered mountain, desert. The natural grassland eco-tour should base on the tourist resources of mysterious, holy and pure Qinghai-Tibet Plateau, vast grassland, dense virgin forest, towering snow-covered mountain, scene charming plateau lake and large depopulated zone.

3.4.2 Culture, historical and folk custom tour. Local culture resources have offered the condition for developing ecology tourist industry. There has a dozen ethnic minorities, such as Tibet, Hui, Mongolia, Yugu, Kazak, and the festival of Tibetan Buddhist, Painted-Pottery Culture, Taer Monastery, tulip festival, cycle racing etc. They all can be used well.

3.5 Aim and focal point of Eco-urban construction

Because of ecological environment relative fragility and economic development slowly, The ecological environment is worsening, so it should think much of ecological environment construction and adopt the urbanization strategy to reduce the population pressure on the ecological environment, promote regional sustainable development. This needs to take "ecological immigrant" plan, build "ecological small town"<sup>[32]</sup> and rational science structure the system. 22 central towns should be formed based on Tibetan's habits, customs and religious belief and the scale of the herdsman. The

newly-built site selection should be sited under conceiving overall arrangement scheme. Offer the immigrating mode and herdsman entering to town approach and move semi-herdsman to live in concentrated communities of the city and small town progressively, which should be based on calculating surplus labor's quantity in the pastoral area and investigating the will and main obstacle enter in town, accelerate the construction of urban infrastructure and strengthen attract ability of the people to the cities and towns. Conformity the urban population, resource, economy, society, environment in the economic ecological system; promote the benign cycle of the urban ecosystem and the comprehensive benefit; optimize it by the artificial multi-functional integrated system<sup>[33]</sup>, which include urban ecosystem, environmental system, and technological system. Form the grassland cities and towns, tour-cities and towns, ecological house landscape; Change the lag actuality and unreasonable urban system structure<sup>[34]</sup> in Sanjiangyuan to complementary functions.

3.6 The ecological immigrant's focal points and direction that suits for the Eco-industry system and ecological cities and towns

According to the needs of protection of Sanjiangyuan nature reserves, calculate capacity of people and environment rationally and the immigrant scale based on "the ecological immigrant and employment plan of Sanjiangyuan nature reserve"; Put forward the quantity of immigrating stage by stage, immigration mode. Propose immigration allocation standard and build scheme constructor of small towns and self-saving scheme that correspond to immigrant take smooth left-measure and locate them safety.

The ecological immigrant and lead herdsman to go to the cities and towns to settle down is under the premise that the herdsman is voluntary and regional reality. Organize the original herdsman of Tibetan to transfer to manage and protect personnel that engage in ecological protection. Improve the living environment of pastoral area in virtue of small town construction, basic education construction, energy construction in pastoral area etc. The ecological immigrant can adopt some ways, such as moving outside, export of labor

services, etc; encourage animal husbandry's people move to different county town, reduce animal husbandry's people's total amount and lighten the environmental pressure; improve the receiving ability of workforce of pastoral area. The ecological immigrant project should be demonstrated firstly and implement progressively. Build "the ecological small town" in the natural landscape finally. Realize the high quality, high starting point, modernized small town progressively type with national characteristics instead of the old, scattered random household type<sup>[36]</sup>. Handle the bottom line of people's capacity in the nature reserve well correctly and regard people as importance component of the nature reserve.

3.7 Construction and developing direction of the ecological energy

Adopt clean energy strategy of "take precedence of energy-conservation, pay attention to efficiency and structural adjustment". Take advantage of the new energy and abundant regenerated energy resource to adjust the energy structure, while using high-new technological transformation and improving traditional energy industry. Insist on comprehensive resource utilization and promote the use of new energy and regenerated energy, explore natural gas resources. Improve some new energy proportions in the energy consumption structure, such as wind energy, hydroelectric energy, solar energy, geothermal power and living beings energy; promote the utilization of high-efficient energy. Make great efforts to develop the nuclear power and make the clean energy become local preponderant basic industry.

## 4 Construction of ecological industry's demonstration district

Because the region has a vast territory, we must choose the typical area and demonstrate at firstly, then popularize it in line with the local conditions and accumulating the demonstration achievement and successful experience. Choose the important construction area and feasible these districts under protecting and building the scheme based on the resource natural endowment conditions of these key areas and social development foundation of economy, national custom of religion,

etc.; choose and plan the ecological economic demonstration district, the ecological rebuild demonstration district, eco-tour demonstration district and ecological small town. Propose the detailed design plan and point out content, direction, focal point and technology of demonstration district; propose the construction scale and mode of every demonstration district and make the benefit analysis of input and output of every demonstration district. Ecological demonstration district construction must base on the local resource advantage and focus on the ecological forest animal husbandry (planting, cultivating, water conservancy, etc.), ecological industry (cleaner production), eco-tour, ecological cities and towns and ecological science of demonstration area.

#### 4.1 The high-efficient ecological agriculture demonstration district

The high-efficient ecological agriculture demonstration district need reflect the nature, regional characteristic and make full use of peculiar ecological resources by the recycle economy mode. It can set up ecological sight-seeing agriculture demonstration district<sup>[37]</sup>, including the high-quality environment-friendly vegetables base, livestock produce production base, edible wild herbs production base, fine works base of characteristic melon and fruit, planting base of fresh grape and strawberry raw, ecological economic demonstration district of forest and fruit, forest animal husbandry's and offal circulation utilizes the demonstration district, raising and training demonstration district of wild animals and plants, the cultivating demonstration district of crude medicinal materials and irrigate the demonstration district of fodder grass.

Do some good projects of retreating herding and returning grasses, reforesting the fathering of land of the ecology worsens area, the protection of mouse hurts water and soil conservation and management facility and ability construction. The light-degraded and un-degraded grassland should be sealed breeding for the self recovery of the grassland vegetation and ecological environment. The project requires the reforesting from cultivated land in the key district and buffering area of the protection zone. The fathering of degraded

land includes facilitating forestation of hillsides, wetland ecosystem protection and curing and desertification and prevention, etc. Prevention and demonstrates project of the mouse pest relies mainly on biologic and physics measure, adopt the biological toxin prevention combined with the control of hawk's shelf for the key district, buffering area, test block, project of management facilities and construction of ability demonstration include transformation and building of administrative station, setup protecting administration bureau, branch office of construction, planning of mere stone, wild animal's protection project, and taboo fishing project of the lake and wetland.

#### 4.2 The construction of ecological industrial demonstration district

Construction of the ecological industrial demonstration district can be realized through setting up ecological industrial garden, which the ecological industrial garden means to cooperate each other and local community for sharing resources high-efficiently (information, goods and materials, water, energy, infrastructure); it is a based circulatory system<sup>[38]</sup> based on ecological circulation and regeneration with the minimum waste disposal cost. It contents ecological management of garden, ecological construction about energy, ecological construction of industry, ecological view construction and control of environmental index. Need to strengthen the developmental research<sup>[39]</sup> of new technology, which is a Hi-Tech, for guarantee the lasting supply of ecological resources and high-efficient and sustainable of ecological industrial development that can form the production scale and market scale and make ecological industry become the high-efficient industry finally. The key point is the selection of "the key enterprises". Ecological forestry industry can be taken on a kind of key enterprises based on resources now<sup>[40]</sup>. Form a compound the ecosystem<sup>[41]</sup> including social subsystem, environmental subsystem, economic subsystem and ecological and resource subsystem. It can also build the metallurgical industrial garden based on "alluvial gold" and medical garden used of "national crude drugs".

#### 4.3 The construction of eco-tour demonstration district

Cobriful resources form the mysterious charming tourism landscape. It is pivotal to develop ecological tourist industry and build eco-tour demonstration district. It need stress its characteristic<sup>[42]</sup> and develop products that embodying unique intellectual interest stimulating character including natural sight-seeing products about the earth's surface, water areas, biology (the grassland, Forest Park, wild animals and plants); recreation and health care tourism products such as skating, drifting, climbing the mountain, rock-climbing, forest bath, salt bath, etc.; green tourism products of ecological visiting, touring flowers, etc.; Culture and custom tourism products<sup>[43]</sup> of community's tour, religious tour, legacy tour, village tour etc.; agricultural sight-seeing products<sup>[44]</sup> with the agricultural cultural landscape, agricultural ecological environment, the farming activity, peasant's daily life. Meanwhile, design the tour product brand and image rationally according to market demand and one's own condition. Do good job of tourist promotion and strengthen marketing management for the eco-tour.

It must insure the priority of ecological benefits while building the eco-tour demonstration district. It must appraise scientifically and rational planning, keep ecological balance of natural tourist resources and humane tourist resources, develop with the dividing area in detail of completeness wholly and dividing layer. Forbid visitors. In the all closed protecting key areas, but can view with the telescope in the distant place on the platform and watch tower through. In the buffering area, can access under the centralization, adopt the eco-tour experience in the world for reference and launch small-scale, small quantity tourist mode of fine works to develop low intensity tourism project such as view bird, view flowers, lake of view. In the rational experimental development zone, it is the centre of visitor's main distributing consumption, and it can set up visitor center and popular science center of wetland and plateau etc. It is should respect culture and life tradition of local people.

#### 4.4 Demonstration and construction of the ecological cities and towns

Ecological environment and backward economy contain its developing mode of "ecological cities and towns". It can make people centralized to the cities and towns through changing the mode of production, adjusting the industrial structure and lighten the carrying pressure of the ecological environment. On the one hand, adopt the unbalanced development strategy to improve its importance of the main cities and towns to develop key cities in the area, such as YuShu county and Luozhou county, which have higher scale merit and gather benefit; on the other hand, guide consciously "characteristic town", such as local medical town, tour cities and towns, agricultural and town of sideline livestock produce process. The key of ecology urban construction is to build ecological industrial system and design the ecological industry chain of small town well pursue cleaner production, develop recycle economy, build the characteristic ecological industrial garden of small town, adjust and optimize the industrial structure of small town, implement the green management of the industrial enterprise and set up the supporting system of ecological industrial technology and information. Foster several typical demonstration district of pivotal towns of ecotype, comprehensive type, trade and business type, religious culture type, tour type. Promote the development of village and community around.

According to the scale of the cities and towns and mode of the herdsman. It can take every county town of one area as the centre cities. There are some key small towns, including Jiugu town (Yushu county), Chengwen town (Chengwen county), Xiangda town (Xiangda county), Jiajboluoge town (Zhiduo county), Sahuteng town (Zaduo county), Yue Giatan town (Quma county), Dawu town (Maqin county), MaCharlie town (Maduo county), Jinaitown (Dari county), Kequ town (Gande county), Zhiqingsongduo town (Jizhi county), SaLaitang town (Bama county), Zketan town (Xinghai county), Gabasoduo town (Tongde county), Youganning town (Henan county), Nahe town (Zeku county), Longbao town, Xiewu town, Shuiqinghe town, Baizha town etc; these cities and towns are focal points of regional ecology urban construction in the future.

People are first while the ecological cities and towns are built. Pay attention to the urban people's cultivation by selecting site and overall arrangement rationally, ecological culture and urban history merging modern culture into historical culture better. Pay attention to the concordance of urban construction, the efficiency, main environment of ecological cities and towns, environmental quality and environmental planning etc.; Pay attention to the function of the modern science and technology and construction about external environment condition, establish the extensive cooperation relation between the cities and towns in the area.

#### 4.5 The construction of demonstration district of ecological scientific industry

It must perfect the mechanism of researching and developing and solve key technology according to market demand, develop "Produce-Study-Cooperation" to advance the industrialization of scientific and technical result. It can launch some studies to local biodiversity, the mechanism in imminent danger of species, vegetation and the main type of meadow, the protection and continuation of the rivers and wetland, relation study between the human economic activity and ecological environmental protection, the recovery mechanism of degradation in the ecosystem and manage demonstration, monitor mechanism dynamically to Sanjiangyuan's water and soil conditions, relation between the water environment and climate change of the upper reaches of the Yellow River, developing wetland change and climate feedback mechanism, ecological benefits studying, fire prevention and pre-control system, desertification and cure technical etc. It can build the scientific industry demonstration district to promote demonstration test, and also can promote different types of the research of demonstration test in course of ecological industry's demonstration district construction.

### 5 Main guarantee measures of the ecological industry

The ecological industry's system construction must put forward the countermeasure and suggestion, such as the policy guarantee, infrastructure construction,

ensured project, the special charging funds support and ensure rolling dynamic assessing dynamic monitoring and pre-warning.

#### 5.1 The policy guarantee measures

Put forward many kinds of measures, such as the insuring of investment and financing of protection and development, ensuring of talent, the science and technology and education and the taking-over industry. Make various industrial policies for every specialized department of Qinghai Government, such as natural protective policy, tour development policy, environmental protective policy, ecological construction policy, ecological immigration policy, investment policy and attracting foreign fund policy, talent introduction policy of scientific and technological demonstration district construction policy, etc. Amplify the agricultural development policies and perfect the market security system policy for farm products.

#### 5.2 The guarantee measures of the facilities

Propose the educational project, science and technology and human resources training project, traffic facilities, electric facilities, communication facilities, project of potable water facilities for people and livestock, health care facilities, comprehensive facility for prevention and control of disease, central heating facilities, energy facility, warm canopy facility, religion pilgrimage facility, recreational facilities, cultural activity facility, etc. produce the scale, quantity form, investment budget and building time sequence and play the guiding and support function of infrastructure construction in the nature reserve.

#### 5.3 The guarantee measures of the project

Set up protecting projects and development projects separately, the former includes ecology recovering project, the project in the meadow improving the project of increasing rain artificially, water and soil conservation project, fire prevention project of forest and grassland, etc. the development projects include the industrialization project of the livestock produce, the ecology industrial project, construction project of the small town, ecological immigrants project, the tour developing project, educational project, training project, traffic, electricity, communication, potable water facilities,

ities for people and livestock, central heating and gas, etc. Put forward time sequence of investment and fund according to the order of importance and emergency. Guarantee government's investment to become effective early, make local peasants benefited and recover local ecological environment and bio-diversity as soon as possible through the construction of the project.

#### 5.4 The funds support measures

The ecology recovers of Sanjiangyuan need a large amount of fund. So it must form plural investment subject and investment mechanisms. First of all, the governments should have a long arrangement for the input of ecological construction, list the ecological construction fund into the financial budget of governments at all levels. Secondly, the bank should also increase the loan in ecological construction and make the proper extension for the repays time; foreign, long time, low-interest loan and grant should pay the attention to arranging the ecological construction project. Thirdly, encourage folk investing and sell some use right for compensation on the promise of un-change of ownership, support the enterprise and individual to develop economic trees and establish non-pollution industry. The local government can consider certain financial subsidy used for ecological environment construction.

#### 5.5 The roll assess and monitor-prewarning measure

It can adopt some models to make roll tracking assess dynamically, economics assess, ecological risk assess and ecological benefit assess annually, which comes from ecological recover and rebuilding. It also can utilize the investigation questionnaire and valuation law of the terns to assess the social benefit of the nature reserve. Choose the basal system according to the system and goal to establish the system of warning index and early monitor and warning for the project implementation, promulgate the warning of monitoring that the result and deviating from the expected state, and then make instant prediction for running situation and operation result in protection and construction project, put forward the corresponding error-correcting suggestion and improving measures for the optimization of every project's implementing effect and benefit.

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# 三江源区生态型产业的发展与示范区建设思路

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**摘 要:** 从三江源地区生态保护与区域建设的双重目标出发, 分析了三江源地区经济发展与产业结构的基本特征。首先, 分析了三江源自然保护区发展生态产业在我国西部生态型产业发展与生态环境建设中的战略影响, 在青藏高原生态型产业发展与生态环境建设中的战略影响及在青海省生态型产业发展与生态环境建设中的战略影响, 阐明三江源地区发展生态型产业的重大意义; 接着分析三江源地区经济社会的基本特征, 发现三江源地区由于地处高原地区, 气候高寒干燥, 并将三江源地区经济发展水平和青海省及全国发展水平作比较, 认为三江源地区的经济发展表现出脆弱独特的高寒降效特征。分析该地区经济结构, 发现三江源地区经济结构表现出粗放落后的经济特性, 产业结构过分单一, 地区发展基本上是依靠农牧经济, 由于过分的依赖畜牧业和采矿业等资源开发型产业, 本地资源开发很大程度上只进行初步利用, 资源的深加工和再利用程度低, 各产业链单一、短小, 前向产业、后向产业和侧向产业发展滞后, 造成中下游产业不发育, 产业发展呈现封闭性、源头性、粗放性的特征。再者, 该地区发展畜牧业经济产生的效益远小于生态环境破坏所造成的生态经济效益, 旅游经济发展中旅游设施和开发靠基本靠外来投资, 实际上造成经济效益在地区经济贡献中流失的实际情况, 经济发展表现出典型的投入漏出特性。另外, 从三江源地区的人口承载统计数据发现, 该地区长期处于人畜超载特性, 人口超载和利益驱动加剧地区脆弱生态环境的恶化。

针对当地实际情况, 文章提出了三江源地区生态型产业发展的基本思路与重点。整体发展思路立足于生态地区生态保护, 从保护与可持续发展的双重角度出发, 针对三江源保护区的特殊性和生态-生产-生活承载力, 尊重自然规律和科学发展观, 分阶段、分层次(核心层、缓冲层、试验层、外未层)提出三江源自然保护区产业发展的总体定位、发展目标、保护重点与发展方向, 进而提出与资源优化配置及生态环境建设相适应的生态型产业体系和产业结构培育方案, 建设若干个不同类型的示范区, 推进三江源自然保护区国民经济的生态化和经济社会活动的生态化。并对建设方案的实施过程进行动态监测评估, 对实施效果进行滚动预警。把三江源自然保护区建设成为生态、生产、生活共同繁荣的自然保护区、国家级可持续发展实验区和国家循环经济示范区。

提出产业结构调整中“三个转变”的整体思路。即引导产业结构由单一畜牧业向林牧业-加工业-旅游业的多元化生态产业结构转变, 建立生态型产业体系; 引导产业结构由投入-产出型向投入-产出型转变, 推行集约型经济增长方式; 引导产业结构由生产-生活型向生态-生产-生活型转变, 推进国民经济生态化。进而提出要立足生态资源优势, 培育和延伸生态型产业链, 选择优化现代草畜业、现代医药和生态旅游业为主的支柱产业, 建立资源节约型、环境友好型和生态型产业结构体系。文章进一步深入, 提出生态农林牧业、生态工业和生态旅游业的发展思路与重点; 生态型城镇建设目标与重点; 与生态型产业体系和生态城镇建设相适应的生态移民的重点与方向以及生态能源建设与发展方向。

鉴于三江源地区面积广大, 地域辽阔, 保护与开发过程中首先必须选择典型地区先行试验示范, 在积累示范区成果和成功经验的基础上再逐步向周围广大地区因地制宜地推广。为此, 建议根据三江源自然保护区综合保护与建设方案, 选择重点建设地区和适宜建设地区, 立足这些重点地区的资源禀赋条件及组合状况, 经济社会发展基础、宗教民俗风俗、发展潜力和前景等, 有选择、有重点地规划若干个生态经济示范区、生态重建示范区、生态旅游示范区和生态型小城镇建设示范区, 对这些示范区提出详细规划设计方案, 指明示范区内容、示范方向、示范重点和示范技术, 提出各示范区的建设规模和建设模式。立足当地优势, 提出要重点建设生态林牧业(种植、养殖、水利等)、生态工业(清洁生产)、生态旅游、生态城镇和生态科研产业示范区5种类型。

为保障三江源地区从保护和建设的双重角度推进三江源地区生态型产业体系建设步伐, 还从政策保障、基础设施建设、项目保障、空间管制、经费支持保障、动态滚动评估与滚动监测预警等方面提出了对策建议。

**关键词:** 三江源; 生态型产业; 生态旅游; 生态重建示范

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