THE CHINESE ENVIRONMENTAL POLICY RESEARCH WORKING PAPER

Issue 8 Volume 3 No.2 August 2016

Chinese Academy for Environmental Planning
http://www.caep.org.cn

Synergies between Biodiversity Conservation and Poverty Alleviation in China

ZHANG Lirong, WANG Xiahui, MENG Rui, HOU Yilei, JIN Shichao

Forword »

Editor in Chief: Prof. WANG Jinnan



Since its opening-up and reform, China has been in the process of rapid economic development with its people enjoying an increasingly improved standard of life. Meanwhile accompanying this dramatic economic growth is the degradation of environment which has, to some extent, damaged the gains of the opening-up and reform and prevented the economy from a healthy and sustainable development. The Chinese government is increasingly aware of that without addressing the environmental issues it is facing now will jeopardize its long term goal of the great rejuvenation of the Chinese nation. Given the magnitude and complexity of the environmental issues in China, there is no easy way in addressing them and the solution to them entails an equal priority being given to environmental protection, ecological conservation and economic development or even higher than the latter by mainstreaming the former into the overall socio-economic decision-making process. As a matter of fact, China has been in the struggle against environmental pollution since the very beginning of its economic take-off and trying to explore a pathway that could help address China's environmental issues in the way most suitable to China's specific circumstances.

In recent years, especially since the 12th Five-Year Plan period, the enhanced measures including legislation, policy, regulatory and economic means have been taken by the Chinese government in dealing with environmental problems, of which environmental policies have played an important role in this regard. Corresponding to this situation and in meeting the demand of governments at different levels for environmental policy tools, the environmental policy research projects on topics of a wide range have been conducted by some Chinese environmental research institutions including the Chinese Academy for Environmental Planning (CAEP).

CAEP founded in 2001 is a research advisory body supporting governments in the

development of key environmental planning, national environmental policies, and major environmental engineering projects. In the past more than 10 years, CAEP accomplished the development of the overall planning of national environmental protection for the 10th, 11th and 12th Five-Year Plan periods; water pollution prevention and control planning for key river basins; air pollution prevention and control planning for key regions; soil pollution prevention and control planning; and some regional environmental protection plans. In the same period of time, CAEP also actively engaged in research on such topics as green GDP, environmental taxation, emission trading, ecological compensation, green financing, etc. By so doing, CAEP has become an indispensable advisory body in the environmental decision-making in mainland China. According to *2013 Global Go To Think Tanks Report and Policy Advice* published by University of Pennsylvania, CAEP was ranked 31 in the field of environment in the world. Many of CAEP's research results and project outcomes regarding environmental policies have drawn great attention of decision makers and international institutions, and have been utilized to contribute to the formulation of national environmental policies concerned.

The Chinese Environmental Policy Research Working Paper (CEPRWP) is a new internal publication produced by CAEP for the purpose of facilitating the academic exchange with foreign colleagues in this field, in which the selected research papers on environmental policies from CAEP are set out on the irregular basis. It is expected that this publication will not only make CAEP's research results on environmental policies be known by foreign colleagues but also serve as a catalyst for creating opportunity of international cooperation in the field of environmental policies, and environmental economics in particular, with a view of both the academic research and practical policy needs.

Ecological degradation and poverty are the two main problems in socioeconomic development. Both Convention on Biological Diversity (CBD) and United Nation Millennium Development Goals take biodiversity conservation and poverty alleviation as an important target. In September 2015, the Central Committee of the Communist Party of China and the State Council released Overall Scheme of Ecological Civilization Structural Reform. However, the sharply losing trend of biodiversity is not halted and poverty is still severe. The contradiction between biodiversity conservation and poverty alleviation is emerging, which restricts economic development, the achievement of a moderately prosperous society and human well-being. The Biodiversity Research Group from Chinese Academy for Environmental Planning did a research on the coupling effect of biodiversity conservation and poverty alleviation as well as related environmental policies, then proposed major models and applied region of synergic development of biodiversity conservation and poverty alleviation, which provides reference for regional sustainable development.

Contents

Poverty alleviation and environment protection are two major topics in the field of sustainable development. The contradiction between biodiversity conservation and socioeconomic development is a worldwide problem. Biodiversity conservation and socioeconomic development are both involved in United Nations Millennium Development Goals, issued in 2000, and Post-2015 Development Agenda approved by United Nations Development Summit. China is one of the countries with the most abundant biodiversity. Varieties of biological resources are mostly located in the central and western regions with the poor population. Accelerating the transition of impoverished production and living style and taking advantage of biodiversity resources to achieve the goal of poverty alleviation are the major approaches to promote harmonious development between human and nature, environment and economy, human and society. Additionally, they are the major motivation for poor areas under the "new normal" in China.

1. RELATION ANALYSIS BETWEEN BIODIVERSITY CONSERVATION AND POVERTY ALLEVIATION

Impoverished areas are usually the areas where ecosystem and biodiversity need to be preserved. There are 592 national-level poverty counties in China. 60 of them are located in the areas where grassland is degrading and land is in desertification. 40 of them are located in water-shortage areas. 130 of them are located in loess plateau with water and soil loss. 50 of them are located in Qin-ba Mountain. 40 of them are located in the isolated alpine canyon areas of Hengduan Mountain. The rest of them are located in the eastern area where disaster frequently occurs. Poor areas, eco-fragile areas, and abundant biodiversity areas are highly overlapped. Basically, the problem of poverty alleviation and biodiversity conservation is the relation between development and resources and environmental protection.

Poor areas have plenty of natural resource legacies because of the backward development; they become the areas with the most abundant biodiversity. The relation between regional development and environmental conservation in poor and mega-biodiversity areas is both opposite and unified. Coordination and prohibition both exist. (Figure 1)

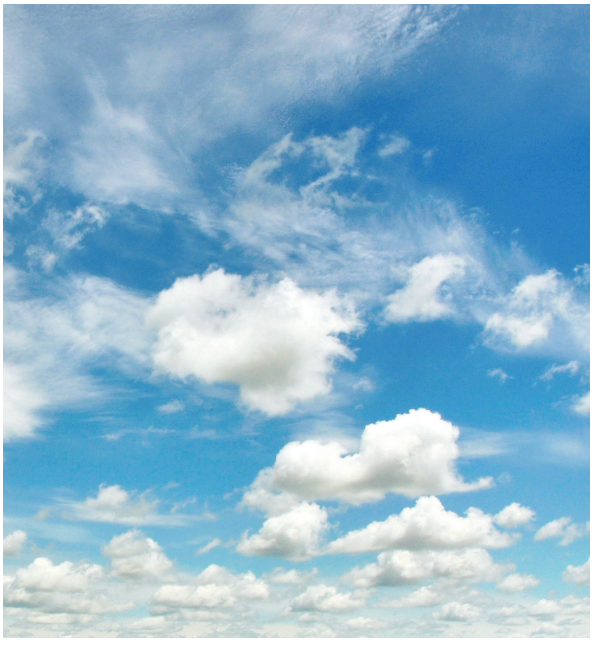
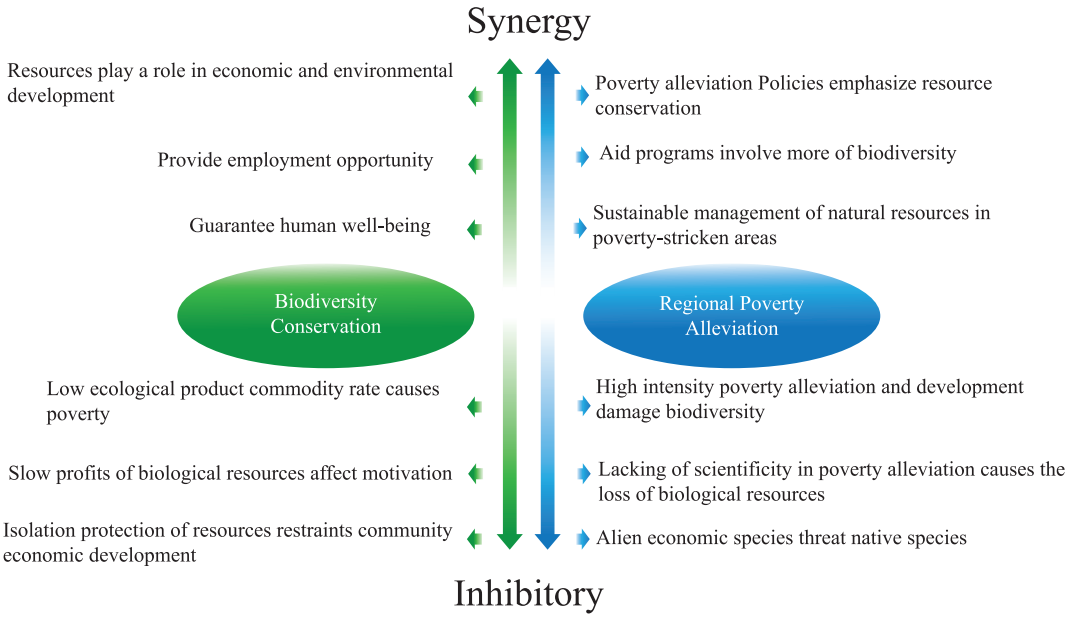
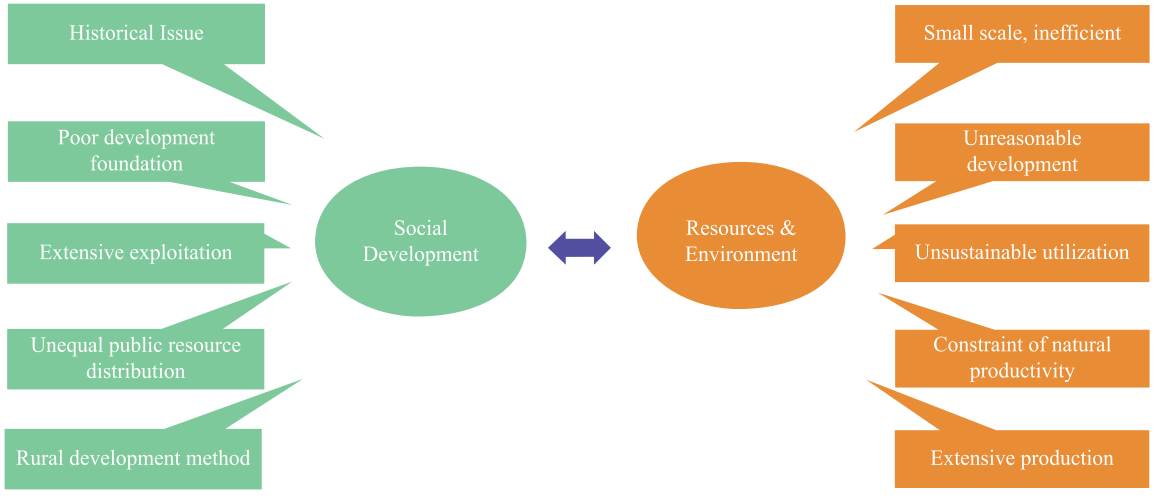


Figure 1 Synergy and Inhibitory of Biodiversity Conservation and Regional Poverty Alleviation



From the perspective of development, rural development put pressure on the protection of resources and environment because of the history, poor development foundation, unfair distribution of public resources, rural development measures, etc. From the perspectives of resources and environment, the advantages of abundant resources and the benefits of ecosystem protection are suppressed because of small scale and low efficiency of resource utilization, unreasonable exploitation and development, restriction of natural production, and eco-fragile in poor mountain areas. (Figure 2)

Figure 2 The Relation Between Regional Development and Conservation of Resources and Environment in Impoverished Biodiversity-Rich Areas



1.1 Synergic Relation between Biodiversity Conservation and Poverty Alleviation

1.1.1 Biodiversity Conservation Supports Poverty Alleviation

Good natural environment and rich biodiversity can provide socioeconomic and cultural support for poor areas. As far as the Chinese special conditions, especially the western areas, biodiversity builds foundation for poor areas from the following perspectives:

Biodiversity provides with necessary material foundation. Abundant biodiversity is a huge gene pool, which consists of plenty of valuable resources of species and germ-plasma. It is the essential material basis for the human society survival and development. The more abundant the species are in ecosystem, the more creative ecosystem is. As for the ethnic minorities in western areas with abundant species, the production relies on the utilization of bio-resources, such as industrial materials, food, medicine, germ-plasma, firewood, etc.

Biodiversity provides with multiple values for community development. Biodiversity contributes to improving crop yields by absorbing and decomposing organic waste, pesticides, and other pollutants. Meanwhile, it contributes to protecting water source, keeping water body cycling in a natural way, and preventing drought and flood. It also improves quality of air, soil, and water, which have positive effects on resident health. At the same time, local unique biodiversity plays an important role in entertainment, athletics, ethnic culture, spirit, history, etc, which represents its unique features of physical geography and humanism.

Biodiversity conserves regional ecological security. Environmental disasters occur frequently in the western areas of China, such as drought, flood, hail, and debris flow. These disasters also cause harm to the environment. Especially for the impoverished communities in southwest, agricultural production is essential for living because of larger population and less land. These areas are lack of crops and the yield is relatively low. However, natural disasters occur less frequently and cause less damage in the places where biodiversity is more abundant and well conserved.

1.1.2 Poverty Alleviation Supports Biodiversity Conservation

Poverty elimination and environmental protection are the two major topics in the field of world sustainable development. United Nations proposed that “eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. By 2030, we are committed to achieving sustainable development in its three dimensions – economic, social and environmental– in a balanced and integrated manner”.

Development-oriented poverty relief is a national strategy which focuses on the economic construction, supporting and encouraging residents to improve production condition in poverty stricken area, exploiting local resources, developing commodity production, and improving the abilities of self-accumulation as well as self-development. Confronting the increasingly serious environmental pressure and existing problems in the process of implementation and management of poverty alleviation projects, China has issued a series of

major policies, development plans, and programmatic documents, which emphasizes the integration of poverty alleviation and development, resource protection as well as ecological construction to strengthen the biodiversity conservation in ecologically fragile areas. (Table 1)

Table 1 The Beneficial Incentives of Poverty Alleviation for Biodiversity Conservation

No.	Designation of Incentive Measures	Time	Institutions/ Sectors	Document Sources
1	Protect the earth and natural resources. Create conditions to achieve sustainable, inclusive, and persistent economic growth.	2015	UN General Assembly	Transforming our world: the 2030 Agenda for Sustainable Development
2	Participate in poverty alleviation and development through various ways, such as exploiting resources, fostering industries, developing the market, construction by villages and companies, etc.	2014	General Office of the State Council	General Office of the State Council Proposal on Further Motivating the Social Various Strengths to Participate in Poverty Alleviation and Development
3	Encourage the work on characteristic industry to raise income in poverty-stricken areas, especially supporting rural tourism development.	2014	General Office of CPC Central Committee, General Office of the State Council	Proposals on Making Steady Headway of Poverty Alleviation and Development through Innovative Mechanism
4	Advance environmental protection, poverty alleviation and development in the balanced and integrated manner. Promote green sustainable development in poverty-stricken areas.	2015	Ministry of Environmental Protection	Insist the Principle that "Green is Gold". Win the tough battle of poverty alleviation.
5	Promote poverty alleviation, development, and improvement in people's livelihood in areas with abundant biodiversity.	2012	Website portal of CPC Central Committee	The First Meeting of Chinese National Commission for Biodiversity Conservation
6	Poverty alleviation and development must integrate with resource conservation and ecological construction.	2011	The State Council Leading Group Office of Poverty Alleviation & Development	National Development Program for Rural Poverty Alleviation(2001-2010)

Poverty alleviation and development, in the course of ecological civilization construction, should focus on sustainable utilization of natural resources based on the natural carrying capacity. Additionally, factors including sustainable utilization of natural resources, conditions, abilities, environment of regional development should be focused. The concentration of rural development program management should be shifted from standardized financial management and project benefit management to sustainable management of natural resources in poverty-stricken areas for further improving scientific management level of poverty alleviation programs, converting the growth mode of poverty alleviation benefit and improving the quality of poverty alleviation programs. In the process of project implementation and management, each policy and law, which ensures environmental management (resource management) and control, should be involved in the project goals to guarantee achieving sustainable development of natural resources when exploiting resources.

1.2 Mutual Suppression Relation between Biodiversity Conservation and Poverty Alleviation

In the fact of accelerated development, the

rural impoverished areas or mountainous regions with abundant biodiversity have lower level of owning public resources compared to developed regions. Imbalanced public resource distribution is the major inducement of imbalanced development and poverty, which causing the increasingly big difference between interregional social welfare and social supply, at last, leads to the developmental abilities falling behind and threatens the ecological environment as well as biodiversity conservation.

1.2.1 Poverty Alleviation Restrains Biodiversity Conservation

Biodiversity will decrease, when the intensity of poverty alleviation and development is bigger than ecological carrying capacity. In the ecologically environmental fragile areas, poverty alleviation and development ignore the ecological natural principles. The amount of species is abundant while the population of each species is small. Some of them cannot adopt the ecological environment. They can easily be endangered, even extinct, especially when confronting human destruction and natural disaster. Ecological revegetation and succession can be quite slow as the result of mountain slope, infertile land, plateau altitude, cold climate, etc. It could be hard to recover when encountering high-intensity poverty alleviation and development, especially the places with strategic supply bases for water, electricity, and mineral resources as well as poverty-stricken areas with low productivity. The contradiction between resource-oriented poverty alleviation and development as well as biodiversity conservation is severe. In other words, biodiversity conservation is essential.

Unscientific methods of poverty alleviation and development cause reduction of biological resources. Lacking of scientific poverty alleviation and development, natural ecosystem with abundant biodiversity converts to the agriculture ecosystem with singular species. If the area of natural vegetation decreases sharply, it will lead in habitants to be divided into isolated ecosystems, which restrains intraspecific genetic exchange. Parts of genetic biodiversity will lose. At the same time, the resistance ability of biological population against diseases, predators, occasional catastrophe will decrease. Species population might fall down and biodiversity will be reduced.

Local species will destruct, when introduce alien economic species. Introducing alien species, including genetically modified species, for poverty alleviation and development adds pressure on local biological security. Lacking of predators in a new environment, the alien species population will increase rapidly, destroy the biodiversity, break the balance of local ecosystem, and threat the livelihood of native species. Meanwhile, they also damage economy and human well-being dramatically. That's why people should be cautious when introducing alien species to relief poverty and develop.

1.2.2 Biodiversity Conservation Restrains Poverty Alleviation

Self-sufficient agricultural production leads to low commodity rate of agricultural product. Although there are a lot of agricultural and forestry eco-products with high added value in biodiversity conservation areas, the benefits of ecological resources cannot be transferred to economic benefits because biodiversity conservation areas are far away from market. Additionally, major

areas of biodiversity conservation are mostly former revolutionary base areas and the areas inhabited by minority nationalities, which means residents' values and local commercial system fall behind a lot compared to modern economy. Self-sufficient agricultural production style still dominates in the areas so agricultural products have lower commodity rate. In other words, it is hard to eliminate poverty through agricultural production.

The term of investment in biodiversity conservation is long and benefit is slow. According to many practical and theoretical instructions, if environmental protection is invested financially, economic benefits will be huge with corresponding ecological benefits. However, investing in environment is difficult for poverty-stricken area, especially Chinese economy is improving rapidly at present. These areas are lack of long-term and sustainable development plan because of their guiding ideology of rapid resource exploitation and utilization. Additionally, policies on environmental protection, forestry utilization, and resource exploitation change frequently, which makes the expectation for the future in poverty region is fading. Nobody is going to invest long-term industry when policies change frequently.

Biodiversity conservation is inconvenient for residents' living in the surrounding communities. Most residents rely on economic woods and timber forest for a living in and around biodiversity conservation areas. The construction of biodiversity conservation areas restrains the utilization of resources for local communities, which leads to the severe conflict between communities and biodiversity conservation. In recent years, illegal exploitation of resources outbursts in biodiversity conservation areas, such as self-operated tourism, deforestation, land reclaim, etc. It causes negative influence on effective protection and management in biodiversity conservation areas.

1.3 Great Significance of Coordination between Biodiversity Conservation and Poverty Alleviation

1.3.1 Perform International Duties and Build International Image

In August, 2015, United Nations General Assembly proposed, in *Transforming our world: the 2030 Agenda for Sustainable Development,* that eradicating poverty in all its forms and dimensions and achieve economic, social, and technical progress for protecting nature. Additionally, UN claimed 17 Sustainable Development Goals and 169 targets. China has helped 60 million people shake off poverty, which has been recognized internationally. At the same time, Report on China's Implementation of the Millennium Development Goals (2000-2015) states that China is still confronting challenges of decreasing environmental resources and biodiversity and China is expected to play an important role in Post 2015 Development Agenda. Involving biodiversity conservation into regional poverty alleviation, balancing and integrating current and future, short-term and long-term, economic and environmental relations are necessary to perform UN relative agreement, set a good image of a responsible country, protect nature, and eliminate poverty around the world.

1.3.2 Protect the Foundation of Economic Development and Conserve National Ecological Defense

According to statistics, 14 centralized and contiguous special impoverished areas and 25 national major ecological functional areas are highly overlapped. Based on

China National Biodiversity Conservation Strategy and Action Plan (2011-2030), there are more than 300 national poverty-stricken counties locating in the 32 designated inland and aquatic biodiversity conservation priority areas. 95% of impoverished people and most poverty-stricken areas are in ecologically fragile, sensitive, and dominated conservative areas. All of them are the national and regional major ecological defense. Once the environment of these areas are damaged, people's lives and assets, national ecological security will suffer unrecoverable loss. Balancing and integrating biodiversity conservation, poverty alleviation, and development should base on biodiversity in conservative areas. It will assist in accelerating to convert advantage of green resources to development, developing applicable value of regional biological resources, motivating to decrease regional poverty internally, and achieving the win-win situation of both poverty alleviation and environmental protection.

1.3.3 Strengthen Construction of Ecological Homeland Security and Maintain the Stability and Prosperity of the Frontier

China has the longest border and world's most land-based neighbors. The total land border is 22,000 km. Border area plays an important role in regional climate adjustment, water source security, and biodiversity conservation because of its abundant ecosystem types, which has significant mutual effects with ecosystems in surrounding countries. There are 88 out of 136 boundary counties locating in biodiversity conservation priority areas. More than 45% of them are poverty-stricken counties. Because of the historical and natural problems, they have been less developed for a long time. The basic infrastructure is relatively weak. The development level falls behind compared to inland areas. Simultaneous promotion of biodiversity conservation and poverty alleviation will accelerate to improve people's living conditions, promote ethnic unity and good neighborly friendship, and maintain territorial security in border areas and social stability.

1.3.4 Promote Regional Harmonious Development and Realize Social Fairness and Justice

Chinese Communist Party Central Committee and the State Council pay high attention on poverty alleviation and development in the new era. They highlight two focuses, including accurate poverty-relief at the single village or family level and regional crucial promotion of poverty alleviation. Additionally, they propose to not only eliminate systematical and mechanism obstruction, but also strength inner motivation and vigor for development based on the aspiration of revolution and innovation. At present, China has identified 128,000 poverty-stricken villages and 88 million poverty population through archiving. Most of these areas have weak infrastructure, lagging industries, scarce educational resources, and public supply. Sided restrictions of local economic development, due to environmental protection, are not corresponding to requirements for social equity and justice. Combining biodiversity conservation and poverty alleviation, achieving inner integration of environmental protection and poverty alleviation, and promoting green sustainable development in poverty-stricken areas all contribute to social justice of public service. They are also the major initiatives for sharing revolutionary development achievement and attaining common prosperity.

2. POLITIC AND ENVIRONMENTAL ANALYSIS ON SIMULTANEOUS PROMOTION BETWEEN BIODIVERSITY CONSERVATION AND POVERTY ALLEVIATION IN CHINA

Biodiversity conservation and poverty alleviation are two contradictory research fields. Especially for China, as a developing country in the course of rapid development, the rapid consumption of biological resources will cause loss of biodiversity in the process of poverty alleviation, while biodiversity conservation will constrain the utilization of wild biological resources, which is an inevitable fact. In China, biodiversity conservation and poverty alleviation both highly rely on policy to be realized. Therefore, summarizing and analyzing the environment of macro policies related to biodiversity conservation and poverty alleviation, holding to the overall trend of biodiversity conservation, social economic development, and poverty alleviation policies, guiding and assessing projects of biodiversity-friendly poverty alleviation in a scientific way, all of these have significance for coordinating development models of biodiversity conservation and poverty alleviation.

2.1 Policy Environment Beneficial to Simultaneous Promotion of Biodiversity Conservation and Poverty Alleviation

2.1.1 International Driving Force -Convention on Biological Diversity(CBD)

China is one of the parties of Convention on Biological Diversity. Performing CBD is the strong external driving force for biodiversity conservation. In October 2010, the 10th meeting of Conference of Parties to the Convention on Biological Diversity, which was hold in Nagoya Japan, stipulated and approved Strategic Plan for Biodiversity 2011-2020 & Aichi Biodiversity Targets. The content of Target 2 is that by 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategy and planning and are being incorporated into national economic accounting, and reporting systems as appropriate. Additionally, the subject of China Action Plans under United Nations Decade on Biodiversity has been confirmed. The subject of China Action Plans for the year of 2018 is “Biodiversity and poverty alleviation”. With this opportunity, future performance for CBD will motivate the simultaneous promotion of biodiversity conservation and poverty alleviation.

2.1.2 Promulgation and Implementation of National Policies and Major Plans

From the perspective of biodiversity conservation, Chinese government has formulated and promulgated National Major Functional Zoning Plans, China Biodiversity Conservation and Strategy Action Plan (2011-2030), and National Biological Species Resource Conservation and Utilization Program 2016-2020, etc. Additionally, Chinese government set up special biodiversity conservation institution to balance, integrate, and organize issues on biodiversity conservation, which promotes the mainstreaming process of biodiversity conservation. From the perspective of poverty alleviation, China Rural Poverty

Alleviation and Development Program (2011-2020), proposes several requirements, for example, "implement major ecological restoration programs in poverty-stricken area", "ecological compensation mechanism favors to poverty-stricken areas", "emphasize biodiversity conservation in poverty-stricken area", etc. Under "new normal" of China's macro-economic, Notification of Comments on Innovation Mechanism of Promoting Rural Poverty Alleviation and Development states the implementation plan of setting up accurate poverty alleviation working mechanism. The 3rd Plenary Session of 18th Communist Party of China (CPC) Central Committee specifically proposed that "poverty alleviation and development in restricted development areas and national ecologically fragile major counties, it is necessary to cancel regional assessment of gross development product, explore to compile balance sheet of natural resources and assets, implement executive cadres "off-office" natural resource responsibility auditing, and set up lifetime investigation rules for ecological environment destruction responsibility". These policies and measures are beneficial to biodiversity conservation and sustainable utilization.

2.1.3 Improvement of Public Awareness

With continuous development of economy and society in China, like climate change, biodiversity conservation, is more and more familiar among public and has become the major symbol of ecological civilization and major content of sustainable development. In other words, the awareness to ecological civilization and biodiversity conservation has been enhanced. The amount of environmental non-governmental organization and the investment scale for public welfare are increasing. Social publicity and education have improved. Residents living in poverty-stricken areas have gradually realized that resources and environment are crucial material basis for surviving. Biodiversity conservation is the efficient way to avoid "poverty trap". The problem on poverty and ecological environment has raised wide awareness among academic fields. The in-depth study in poverty-stricken areas, including conservation and sustainable utilization of biological resources, biodiversity value assessment, regional economy and sustainable development, co-community management in natural conservation areas, etc, will provide scientific basis and technical reference for simultaneous development of policy and measure.

2.2 Challenges and Limitations

2.2.1 Development Pressure from Economic Downturn

China is the largest developing country in the world. In regard to poverty, being salient is still the essential feature in the primary stage. There are about 10 Million people in poverty according to the national standard, while there are about 20 Million people in poverty according to the international standard. At present, poverty alleviation and development work is confronting new challenges. On one hand, macro economy has been "New Normal". On the other hand, the pressure of downturn is increasing. Both of them make normal economic growth difficult for poor people to raise income. Additionally, it is hard to avoid overwhelming consumption and damage of biological resources in poverty-stricken areas. As a result, material basis for economic development has been damaged. Regional development effectiveness has

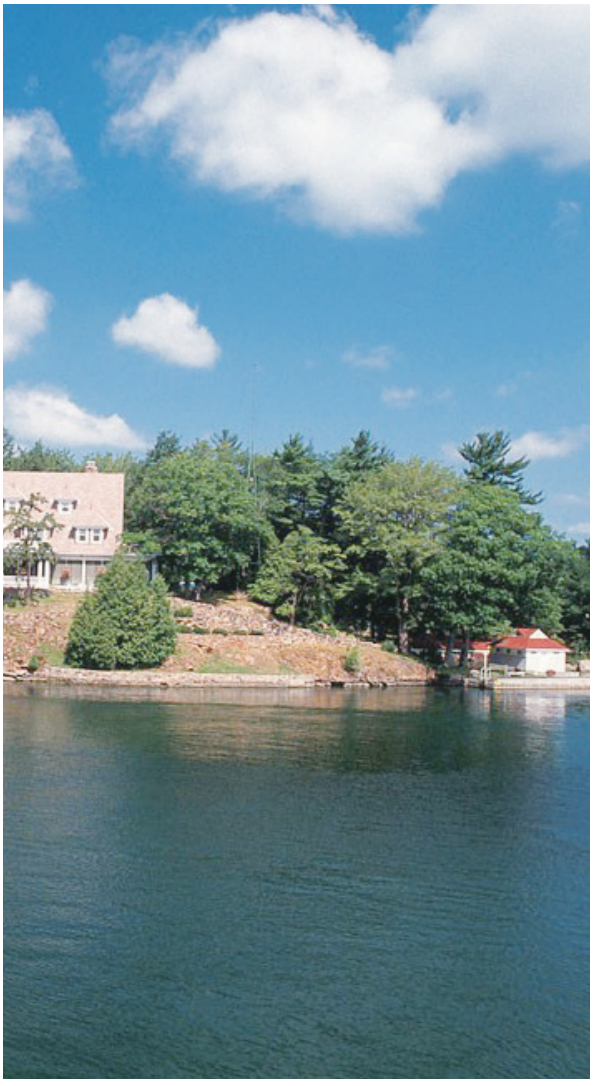
been influenced as well. Policies of poverty alleviation and development policies in a transfusional way cannot relief developmental pressure fundamentally in poverty-stricken areas.

2.2.2 Lacking Effective Legal Reference and Guarantee

First of all, legislation concerning biodiversity conservation in each sector hasn't explicit regulation on how to conserve biodiversity, which means lacking of legal responsibility system causes law enforcement out of control and ineffective. Besides, current law system is dominated by protection legislation, which clearly values protection and ignores utilization. If the guiding ideology of sustainable utilization of biodiversity resources is missing in legal dimension, it will be difficult to promote rational utilization of biological resources in poverty-stricken communities by legal guarantee and guidance.

2.2.3 Related Management and Participation Mechanism Need to be Improved

Management sectors lack public negotiation mechanism. Biodiversity conservation and poverty alleviation need to be coordinated by various sectors, which is adverse for simultaneous promotion. However, each sector acts as its own will and lacks of cooperation, which influences the effectiveness of decision making. Additionally, it is hard to achieve the maximum benefit of biodiversity conservation and poverty alleviation. The mechanism for ecological compensation is not perfect. Local government has to offer the cost of biodiversity conservation. The financial loss of revenues, profits, opportunities, catastrophic destruction, and wildlife, in the course of conservation, are lack of valid compensation methods. The cost and profit of biodiversity conservation are not coordinated with each other, which is adverse for the achievement of poverty alleviation. The mechanism for public participation and feedback is inadequate. The platform and path of public participation and biodiversity conservation are both in absence. Official organizations for fundamental education, media publication, and ability training also need to be improved.



3. MAJOR MODELS FOR SIMULTANEOUS PROMOTION OF BIODIVERSITY CONSERVATION AND POVERTY ALLEVIATION

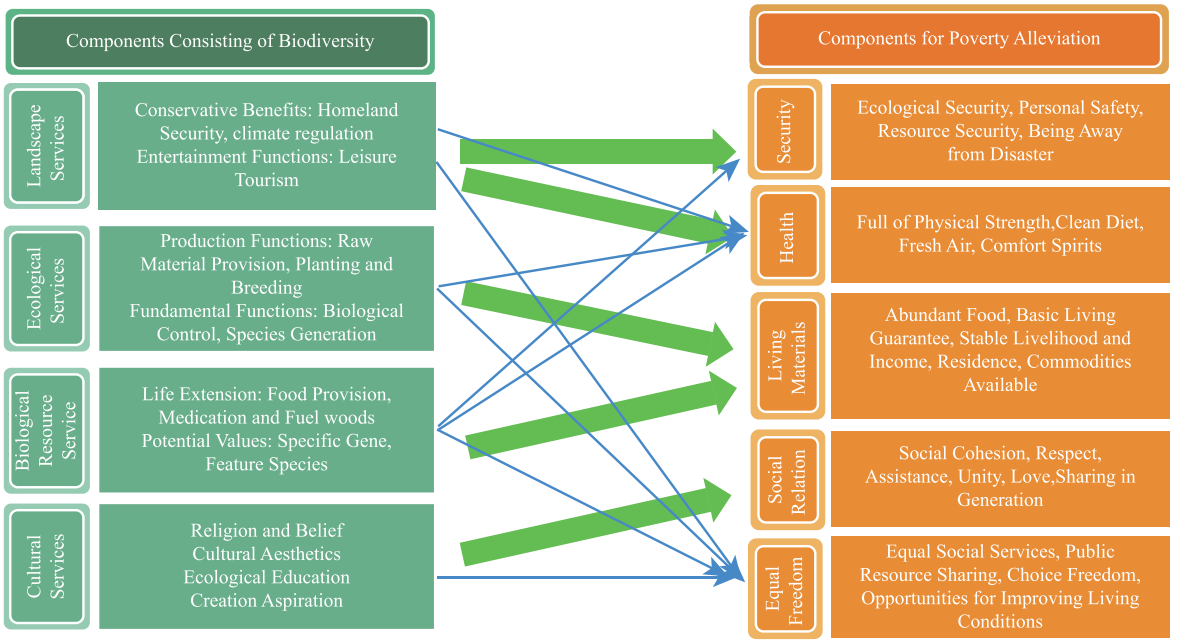
Creating models for simultaneous promotion of biodiversity conservation and poverty alleviation should begin with analyzing the conjugate relation between biodiversity conservation and regional poverty from the perspective of components of biodiversity and poverty. In order to relieve even solve the conflict among biodiversity conservation, poverty alleviation, and development, analyzing national strategic features for poverty alleviation and development is in urgent. Additionally, the corresponding point of simultaneous promotion of biodiversity conservation and poverty alleviation should be found.

3.1 Analysis of Referential Features

3.1.1 Analysis the Features of Biodiversity

Biodiversity refers to the diversity degree of all kinds of creature, including terrestrial, marine, other aquatic ecosystem as well as the eco-complex consisting of them. Additionally, biodiversity includes intraspecific, interspecific, and ecosystem diversity. In a word, biodiversity is the

Figure 3 The Influence on Poverty Alleviation from Components of Biodiversity



Note:1.The width of arrow represents the level of relation between service functions of components of biodiversity and poverty alleviation (well-being)

2. Frame material source: Comprehensive Report on Ecosystem and Human Well-being Biodiversity, The Millennium Ecosystem Assessment/World Resources Institute, 2005,9:iii

overall diversity and variability consisting of creatures and the system composed of these creatures. There are three dimensions of biodiversity, including ecosystem, species, and genetic diversity. Species and genetic resources can be generally recognized as biological resources. Besides, landscape diversity and civilization diversity are two dimensions that cannot be neglected in biodiversity. Each feature of biodiversity has influences on poverty alleviation and human well-being at different level. (Figure 3)

3.1.2 Analysis the Features of Poverty

Poverty line is the standard that identifies impoverished individuals and communities. National poverty line is the poverty standard that reflects domestic poverty condition based on the economic and social development as well as price level of each nation and region. According to the research by many experts from World Bank and other international as well as domestic organizations, the definition of poverty develops from single indicator of low income to comprehensive indicators of abilities, which are composed of comprehensive social attributes, then to the indicators of power, which include non-economic factors. The connotation of poverty has been deepening continuously. Theoretical category of poverty has not only single economic indicator, but also social and political indicators.

Solving regional poverty issues cannot just rely on passive transfusion measures, such as financial compensation, increasing subsidies, etc. It should improve the ability of self-development by investing in different factors that cause poverty, including infrastructure, public services, health care, education, technical training, etc, Thus to solve regional poverty issues also makes more requests to national strategies of biodiversity conservation, poverty alleviation, and development.

3.1.2.1 Natural Environment

Chinese economy development appears the character of regional disparity by different natural conditions of historical circumstances and social economic development. From the perspective of the distribution and number of impoverished population, the main distribution areas of poverty are rural

Table 3 Chinese Rural Poverty Standard and Low-income Standard

Year	1978	1985	1990	1995	2000	2002	2004	2005	2006	2007	2009	2011
Poverty line (Yuan/Year)	100	206	300	530	625	627	668	683	693	785	1196	2300
Low income standard (Yuan/Year)	-	-	-	-	865	869	924	924	958	1067	-	-

Source: Chinese Agriculture Policy Review and Evaluation, Economic Press. China, 2005, P34; Chinese Rural Poverty and Monitoring Report, National Bureau of Statistics of China, Department of Rural Surveys, related data collation in the year of 2005、2006、2007.

areas, especially the mountainous, cold, dry areas lacking of resources with inconvenient transport and inefficient information in the Midwest. The main problems of poverty alleviation in those areas are relatively bad natural environment, serious soil erosion, drought, water shortage, and fragile ecological environment. Besides, back-to-poverty phenomenon caused by natural disaster is still salient in those areas.

3.1.2.2 Knowledge and Labor

According to some surveys, lacking of education is another main reason that makes poverty alleviation hard to achieve. In some of poverty-stricken villages, people with primary school degree accounts for half of the population. The proportion of junior high school or senior high school degree is even smaller. The lower education degree a household has, the less average income a household has, which is reflected in the formation of ideology. Because of the low education degree and lack of knowledge, developing ideas and abilities of these people are restrained, and more prone to negative emotions and hard to adopt advanced scientific technologies and management methods, which means comprehensive qualities of society are low. The humanistic environment formed in these circumstances has a significant influence on livelihood and development of impoverished individuals.

Poverty caused by lacking of labor was prominent in the late 1990's. Most of poverty-stricken areas have less land but large population, which means labors are badly overmuch. With rapid development of market economy in the late 1990's, labors outflowed from poverty-stricken areas in order to maintain livelihood. The amount of left-behind senior citizens and children was large but they couldn't make effective agricultural production, which also caused many new social problems. Income from labor outflow can temporally shake off poverty. However, in the long-term, poverty-stricken areas will lose the basis of regional development because of the lack of labor forces.

3.1.2.3 Public Resource

Public resource refers to the guarantee of the whole social development, including road traffic, energy, education, endowment insurance, subsistence allowance, etc. Configuration of public resources is the crucial ability-formation condition as well as guarantee in the course of regional social and economic development. The reality of national development shows that poverty-stricken and biodiversity-rich villages or mountainous areas have much lower level of public resources compared to developed areas. The unequal distribution of public resources is the major incentive to cause the imbalanced social development and poverty. Generally, it is the inequity that makes the gap of inter-regional social welfare and public supply bigger and bigger, which leads to the self-development ability falling behind, and threat against the protection of biodiversity and ecological environment.

3.1.3 Analysis the Strategic Features of Poverty Alleviation and Development

3.1.3.1 Poverty Alleviation by Policy

There is a close relation between environment and poverty. The inappropriate policy is the main incentive for degradation of environment. Poverty alleviation can be

achieved by investing in environmental protection management, establishing multilateral participation institutions, and developing environmental management system. China has issued industry favorable policies, including building village roads, developing comprehensive agriculture, managing land, governing small watershed and land erosion, establishing rural hydro-electricity plants, leading to relocating and investing labor-compact industries in poverty-stricken areas, mainly through fiscal policies, such as general purpose transfer payment, lottery public welfare funds, poverty-alleviation discount-interest loan, etc. In addition to these, China has issued policies on land use, ecological compensation, targeted assist, etc.

3.1.3.2 Poverty Alleviation by Industries

China has been insisting the principle of comprehensive administration, taking advantage of each related sector of government, and working on the poverty alleviation through industries based on the conditions of poverty-stricken areas. For example, China is proposing industrialization of poverty alleviation and development, providing leading enterprises with specific supportive plans, and developing labor transfer training in poverty-stricken areas to improve the possibility of employment, technical level, and market consciousness of peasants. According to the statistics of these 14 cities in Mid-western of China, there have been established 1499 training bases. These bases had trained 2.42 million rural labor forces from 2001 to 2004.

3.1.3.3 Poverty Alleviation by Society

It emphasizes the prevalence and diversity of participation majority. People's organizations, social organizations, private enterprises, and general public can participate in poverty alleviation and development, which target the requirements of shaking off poverty for masses in special and difficult areas. They can support industrial development, assist to build infrastructure, develop education and sanitation, improve production and living conditions, such as promoting whole villages to relief poverty, voluntary resettlement, etc. The efficient paths can be diverse, including targeting assistance, coupling assistance, implementing special projects for poverty alleviation, participating in specific poverty-relief activities, etc. All kinds of organizations should motivate professionals that are willing to contribute to poverty alleviation to participate in voluntary activities which help impoverished masses to get rid of poverty. Additionally, private enterprises should perform social duties through donation, employment, and establishing industries as well as training bases to assist poverty alleviation and development.

3.2 Matrix and Key Features of Major Models

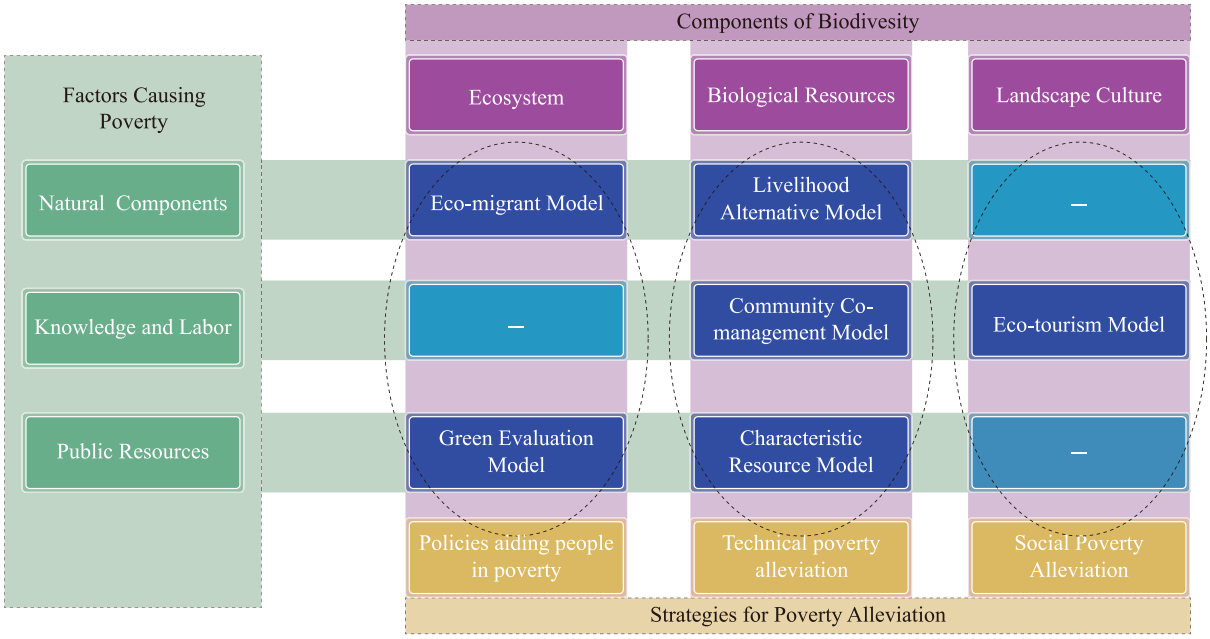
3.2.1 Schematic Diagram of Matrix Structure

According to the analysis of different features of biodiversity, poverty alleviation, development strategies, we analyzed the features and focus of each model after combining domestic practices. The following six models on simultaneous promotion of biodiversity and poverty alleviation are summarized based on the matrix analysis frame.

3.2.2 Key Features of the Major Models

According to applied spatial scope and frequency of practical application, key

Figure 4 Schematic Diagram of Matrix and Analysis of Simultaneous Development Models



features have been summarized preliminarily as follows.

1. Livelihood Alternative Model

[Key Features] 1. Change traditional livelihood. 2. Protect natural resources and environment.

2. Characteristic Resource Model

[Key Features] 1. Rely on the regional characteristic resources. 2. Make benefits from biological resources.

3. Eco-tourism Model

[Key Features] 1. Protect landscape and sustain functions. 2. Include regional cultural connotation.

4. Community Co-management Model

[Key Features] 1. Provide technological assistance for communities. 2. Manage natural resources jointly.

5. Eco-migrant Model

[Key Features] 1. Relocate migrants. 2. Relief ecosystem pressure.

6. Green Evaluation Model

[Key Features] 1. Convert traditional evaluation mechanism. 2. Value ecological environment conservation.

3.3 Model analysis and Case Study

3.3.1 Livelihood Alternative Model

1. Definition

It refers to the production and management model which can harmonize the resources, environment, and technology under current policies and institutions when current resources and environment cannot bear the present production and management, or current production and management actions are destroying the resources and environment.

Livelihood alternative model is not only just vegetation or cultivation, but also the systematic strategy, which is the most prevalent model of simultaneous promotion in China, such as energy alternative, under-forest economy, eco-agriculture, etc.

2. Applicable Conditions

1) For some reason, traditional livelihood cannot be carried out or current livelihood cannot sustainable under the background of natural (ecological) conservation.

2) Regional livelihood needs to be changed to achieve sustainable development.

3) Changing livelihood conforms to rural situations. Communities (peasant household) can get involved widely.

3. Regional Practices and Case Study

At present, livelihood alternative model is carried out in three forms:

The first one is to support by rolling fund. Government or organizations provide donation, microcredit, or poverty-alleviation funds to support local communities to engage in poverty-alleviation projects which are environment friendly. Part of the income will be used to append production investment. This form is widely used in projects of international cooperation such as GEF, WWF.

The second one is energy alternative form. It means changing the extensive energy utilization to relief the productive and livelihood reliance on natural resources for peasants by substituting clean energy for high-carbon mineral fuel, such as Plank-to-Tile Program in Bai-Ma Mountain in Yunnan, hydro-power and methane energy exploitation in Guidong County, Hunan province, etc.

The third one is production alternative form, which means changing the extensive production mode (including inappropriate cultivation, extensive livestock and poultry management, unscientific excavation and hunting, etc.). It contributes to protect natural resources and ecological environment. Additionally, it guarantees the sustainable development of livelihood by modern scientific technology and appropriate ecological distribution, such as "Wuzidengke" mountainous vertical agriculture in Bijie, Guizhou, intercropping of Chinese herb, industrial crops, grain crops in Baoxing County, Sichuan, projects of terrace cropping and water-saving irrigation in Jihe Demonstration Zone, Tianshui, Gansu.

Taking energy-substitution form in Bai-Ma Mountain of Yunnan as an example, people in Bai-Ma substitute tiles for roof woods and use energy-saving equipment, such as solar energy, wood-saving ovens, iron-sheet stoves, etc. These actions save fuel woods, decrease deforestation, and play a positive role in protecting forest resources. Meanwhile, this form saves large amount of labor forces, improves the peasants' living conditions, and relieves the reliance of peasants on surrounding resources as well as the conflict between community economic development and natural resource conservation.

3.3.2 Characteristic Resource Model

1. Definition

It refers to a sustainable development model

that relies on abundant or characteristic bio-resources by special production technology, technique, tools, procedure, and management approaches in a particular area.

2. Applicable Conditions

1) It applies to the areas where there are abundant or characteristic biological resources. Meanwhile, regional climate and natural conditions are relatively steady.

2) It applies to the areas where society, economy, and market potential of products keep developing. Public resources, including culture, technology, production and communication logistics, are relatively sound.

3) The areas should be supported by government, enterprises, peasants, etc. Additionally, they are capable for comprehensive development of plantation, forestry, farming, avocation, fishery, etc, which can contribute to the integration of primary industry, secondary industry, and tertiary industry.

4) The areas should emphasize the investment in technologies. Traditional production and modern scientific technologies are developing simultaneously. Besides, the areas should create virtuous cycle of ecological and environmental development and enlarge regional economic aggregate.

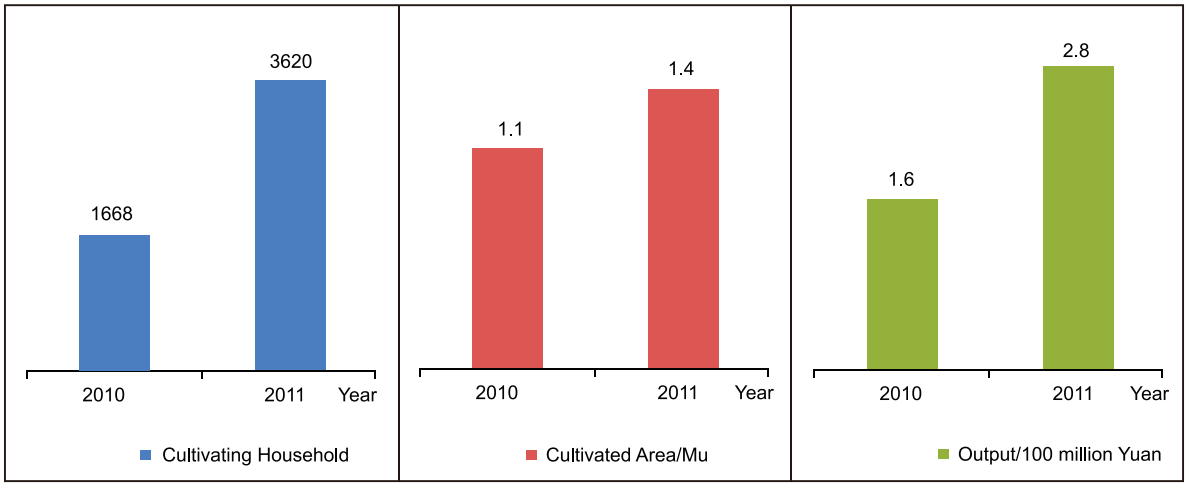
3. Regional Practices and Case Study

Characteristic resource model can provide the industrial backbone for regional economic development. Meanwhile, it solves the problems of labor development, employment, poverty alleviation, etc, and gains wide attention from each region. According to the natural conditions and development characteristics, many regions have created their own practical forms, such as scale-up development of fresh cutting flower and ornamental plant industry in Yunnan, special industry development of wine brewing, Muslim beef, mutton, medlar, etc, in Ningxia Autonomous District, professional cooperatives of ecological stock farming in Hulun Buir Grassland of Inner Mongolia, etc.

Taking Guizhou as an example, Guizhou has been assisting in developing national herbal industry based on its abundant herbal resources and national medicine resources. So far, Guizhou has primarily built the industry scale which is dominated by large enterprises and coordinated with small and medium-sized enterprises. By 2011, Guizhou had built 8 medical industrial zones, including Wudang, Huaxi, Qingzhen, etc, and generated modern medicine industry agglomeration consisting of a bunch of major companies including Guizhou Yibai, Shenqi, Bailing, etc. There had been 2 million mu of herb plantation in the whole province. The gross domestic product of medicine industry reached 29.5 billion Yuan in 2013.

The effect of poverty alleviation, which results from the development of regional natural capital industries, is obvious. (Figure 5) For example, herbalists have built cooperatives to participate in the development of Chinese traditional medicine industry and raw material planting in Yiwanshui Village, Huangping County, Autonomous Prefecture of Miao and Dong Minority of Southeast of Guizhou. In 2010, there were 1668 household planting pseudostellaria heterophylla in the whole village. The cultivated area was 11,000 mu and production value was 160

Figure 5 Pseudostellaria Heterophylla Planting Profits Chart in Yiwanshui Town, Huangping County, Qiandongnan Prefecture, Guizhou Province



million Yuan. In 2011, the number of planting household reached to 3620. The cultivated area reached to 14,000 mu and production value was 280 million Yuan.

3.3.3 Eco-tourism Model

1. Definition

This model presents a comprehensive form of the integration of landscape cultural carrying capacity, resource conservation, and economic development. It focuses on the ecological effects of keeping original landscape as well as cultural connotation. In other word, the products of eco-tourism model are highly comprehensive. They are the consumer goods with special value in use integrating catering industry, lodging industry, travel agency industry, transportation industry, entertainment industry, etc.

2. Applicable Conditions

Eco-tourism has complicated background, various forms and covers wide range and sectors. It has to meet the following requirements:

1) There have to be beautiful and characteristic nature, ecology, and landscape culture as basis.

2) The areas have to pay high attention on natural ecological conservation.

3) The areas have to implement sustainable management and operation.

4) The areas have to be able to play an educational role in environment.

China has issued national standard, which is Construction and Operation Criterion of National Eco-Tourism Demonstration District (GB/T26362-2010), to provide macro guideline for ecological tourism in the whole country.

3. Regional Practices and Case Study

The applicable scope of eco-tourism model can be either wide or narrow; its organization

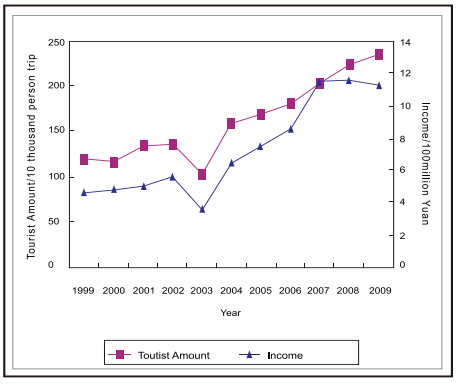
form is flexible. The continuous development of Chinese economy and the improvement of people's living condition have stimulated the large market demand for eco-tourism and provide unprecedented development opportunity for eco-tourism industry. As macro as national parks, there are 1392 national 5A and 4A scenic zones, including Mount Huang, Mount Emei, Summer Palace, Mount Fanjing, etc. As micro as rural counties, areas, such as Jiangdongyinxing Village in Tengchong County of Yunnan, and Nuoergazha in Hulun Buir Grassland of Inner Mongolia, etc, all have developed eco-tourism industry.

Taking Mount Huang as an example, the natural ecological environment of Mount Huang has been well protected based on the sustainable management, such as rest rotation of scenic spot, low-carbon development, technical management, etc. Forest coverage rate has increased from 56% to 84.7%. Vegetation coverage rate has reached to 93.6%. Tourism industry has been developing steadily. The number of tourists increased from 98,700 in 1978 to 2,356,200 in 2009 (Figure 6), which grew as many as 23.87 times. Tourism income increased from 610,000 Yuan in 1978 to 1.128 billion Yuan in 2009, which grew as many as 1849 times. Meanwhile, scenic zone stimulates rapid development of surrounding tourism service industry, such as hotel, restaurant, happy farmhouse, etc. In addition to that, it also motivates regional development of traditional artifact, food, stationary, etc, which cover local plantation industry, farming industry, and agricultural products and by-products processing industry. The commercial circulation market has been perfecting gradually and it stimulates social and economic development in the whole region.

3.3.4 Community Co-management Model

1. Definition

Figure 6 The Annual Amount of Tourists and Revenue in Mount Huang Scenic Spot



Community co-management model is to build cooperative partnership with neighborhood and management departments in protection zone, which applies to the management of natural protection zone and surrounding communities.

2. Applicable Conditions

1) The cooperation subject is the integration of natural conservation zone and surrounding communities.

2) Stakeholders are willing to cooperate to plan conservative zone and surrounding communities comprehensively based on the goal of resource protection and community development.

3) The management sectors of conservative zone can provide economic or technical assistance, which corresponds with community situations and is available to residents.

3. Regional Practices and Case Study

Community co-management model originates from community (society) programs of forestry and participatory poverty alleviation. The rise and promotion of this model in China mainly relies on the motivation for natural conservative areas from international aid programs. Thus, community co-management model mainly applies to natural conservative areas. There are several forms stating as follows:

The first one is the multi-participation type consisting of management sectors in conservative areas, communities, and related departments of government. Conservative areas and government are in charge of organization and guidance. Economic profits generated from programs belong to residents in communities. One of the most typical cases is seaweed production mode of Guizhou.

The second one is the multi-participation type consisting of management sectors in conservative areas, communities, related departments of government, and private enterprises. Conservative areas and government offer assistance and coordination to guide residents in communities to engage in production relating to biodiversity coordinate development. Private enterprises will be involved in the operation of commercialization. Community residents and private enterprises will share the economic benefits generated from production, such as community sustainable apiculture mode of natural conservative areas in Foping, Shanxi.

The third one is cooperative profit-sharing type between conservative areas and communities. This type is relatively suitable for management sectors of natural conservative areas that integrate conservative duty and local government duty. Natural conservative areas and communities create alliance or build up business together by joint-stock system and share the economic profit. For example, Jiuzhaigou natural conservative area in Sichuan cooperated with local communities to build Jiuzhaigou Tourism Union Operation Company. Community residents engage in tourism service to obtain economic profits. Natural conservative areas coordinate resource conservation and community development. Both of them obtain economic profits by joint-stock operation. If both of the organizations can benefit from resource conservation and community coordinate development, resource conservation will be a self-motivated action.

Taking sustainable apiculture mode in Foping national natural conservative areas as an example, communities have been promoting advanced apiculture and subsidizing to build artificial beehive bases according to “Foping Sustainable Apiculture Programs of Communities and its Surrounding Conservative Areas”, which contributes to improve additional value and economic benefits. By improving income of communities, it contributes to the sustainable utilization of resources in local communities, improves sustainable utilization ability and awareness, and decreases hunting activities. Meanwhile, conservative areas and communities enhance communication with each other based on the conservative mechanism of community participation.

3.3.5 Eco-migrant Model

1. Definition

In order to take engineering management measures to recover or protect the ecosystem,

some nations or companies settle down residents in other places according to specific plan, management, revenue, and policies. As global climate change and human activities have more and more influences on environment, eco-migration, as an important phenomenon of migration, have been emphasized by international and domestic sectors and experts.

2. Applicable Conditions

1) This model is applicable when natural environment is extremely important or fragile. Human activities have huge effects on ecological environment and biodiversity is confronting severe threat.

2) The shortage of natural resources affects local residents' living, production, and development significantly.

3) Ecological environment is extremely sensitive and fragile. The pressure from population growth and extensive living and productive style are threating local biodiversity.

3. Regional Practices and Case Study

Eco-migrants are mostly dominated by policies. It means measures, such as agriculture settlement, industrial settlement, labor export, educational training, etc, lead population in poverty to transfer towards areas where the environment is more suitable for living and development. In order to meet the requirements for both biodiversity conservation and poverty alleviation, implementing eco-migrant programs in steps and phases will be the best choice to solve ecological degradation and difficulties of farms and herdsmen's living without any doubt. Currently, most eco-migrants are located in the western China, such as eco-migrants owing tolithic desertification in Mount Ma, Guizhou, eco-migrants owing to impoverished population in Xihaigu Areas, Ningxia, eco-migrants in the reservoir area of the Longest River Three Gorges Projects, etc.

Taking eco-conservation migrants in Sanjiangyuan National Nature Reserve as an example, in order to protect water source and biodiversity habitat, Party Central Committee and provincial government of Qinghai has been eco-emigrating in a large scale since 2004. The emigration covers 18 core areas in Sanjiangyuan National Nature Reserve and 16 counties in 4 Tibetan Autonomous Prefectures. The eco-migrated population is more than 100,000. By building eco-migrant communities, relocating, settling, improving infrastructure, building capacity, motivating entrepreneurship, etc, Qinghai province has settled many herdsman migrants and followed the "immigrant economy" path that people concentrate, urban expansion, and economy develops.

3.3.6 Green Evaluation Model

1. Definition

Evaluation system should include indicators related to biodiversity conservation and green economy to convert the developing mode dominated by GDP.

The 3rd Plenary Session of 18th Communist Party of China (CPC) Central Committee proposed to explore to compile balance sheet of natural resources and assets, implement executive cadres "off-office" natural resource responsibility auditing, and other requirements to accelerate ecological civilization construction. On one hand, green evaluation system can contribute government to take measures to protect biodiversity and ecological

environment. On the other hand, it will exploit and use resources in a reasonable way to develop regional economy through green methods. The construction and perfection of green evaluation model will contribute to simultaneous promotion of biodiversity conservation and poverty alleviation.

2. Regional Practices and Case Study

Green GDP evaluation system is to take natural resource depletion cost and environment degradation cost into account, which are excluded from traditional GDP based on the accounting of GDP, to measure economic development outcome veritably. So far, some provinces have tried to launch green GDP evaluation, such as Hunan, Jiangsu, Hainan, Anhui, Tangshan in Hebei, Poyang Lake Eco-economic area in Jiangxi, etc. These provinces link indicators, such as ecological environment and biodiversity conservation, to political achievement, emphasize policies as the guidance, promotes government and principals of enterprises to enhance conservation of both environment and biodiversity, and concentrate on socioeconomic sustainable development. Meanwhile, Anhui, Sichuan, Yunnan, Hainan, Kunming, etc, will be the demonstration areas for national environmental economic accounting (Green GDP 2.0).

Taking Hunan as an example, since 2001, Hunan has launched research on green economy accounting. Evaluation system was officially launched in 2011. Green GDP Evaluation Indicator System was initially formulated in 2012. It scores, ranks, and issues economic development, resource depletion, and environment ecological index of each city (county). Economic Development, Resource Depletion, Environment and Ecology account for 40%, 30%, and 30% individually of Hunan green GDP evaluation. Green Development includes economic growth and other 7 indicators. Resource Depletion includes GDP per capita and other 5 indicators. Environment and Ecology includes the proportion of emission of three industrial wastes accounting for GDP and other 5 indicators. The whole indicator system aims to combine economic development and green philosophy, invest and outcome, guidance and evaluation, as well as environment development and public profits.

4 CONCLUSIONS AND RECOMMENDATIONS

1 The essence of simultaneous promotion of biodiversity conservation and poverty alleviation is to follow the natural principle, promote sustainable development, convert the advantage of biodiversity resources to the advantage of regional economic development, and create a virtuous cycle of "population-environment-resource-consumption".

Poor areas and the areas with rich biodiversity are highly overlapped. The extensive management manner is a main reason that causes biodiversity loss in poor areas. In the priority counties of biodiversity conservation, national poverty counties account for more than 38%. 88 out of 136 counties along the border fall in the priority areas of biodiversity conservation. 45% of the 88 counties are poverty counties. 76% counties in the ecological fragile zone are categorized as poverty counties. Taking advantage of biodiversity resources to achieve the goal of poverty alleviation is not only the main approach to develop harmonies between human and nature, environment and economy, human and society in the "new normal", but also an essential move to secure the national ecosystem and stabilize the border prosperity. There are two main principles to promote synergy between biodiversity conservation and poverty alleviation. Firstly, the demands of regional economic development should be fully taken into account when policies and projects of biodiversity conservation are developed, so that the sustainable utilization of ecological resources can be achieved. Secondly, the demands of biodiversity conservation should also be fully taken into the consideration when formulating poverty-alleviation policies and developing projects.

2 Biodiversity conservation and poverty alleviation rely on the policies and planning in China. A full understanding of general direction of policies on politic, biodiversity conservation, socioeconomic development and poverty alleviation are of extreme importance for the synergic promotion of biodiversity conservation and poverty alleviation.

The procedure of sustainable utilization and biological resource conservation in poor areas will speed up in the future. So will the mainstreaming of biodiversity conservation. Additionally, it is important to preserve biodiversity to avoid "poverty trap". China is the biggest developing country in the world with about 250 million population that daily living expenditure is under 2 dollars. In other words, poverty alleviation is still a severe mission. In 2010, the 10th Conference of the Parties of United Nations Convention on Biological Diversity formulated and approved Aichi Biodiversity Targets, indicating that, by 2020, at the latest, biodiversity values have been integrated into national and local developing processes and are being incorporated into national accounting and reporting systems. China has promulgated and implemented National Major Functional Zoning Plans, China Biodiversity Conservation Strategy and Action Plan (2011-2030), China Rural Poverty Alleviation and Development Program (2011-2020), etc. All these documents, to different extent, mention that "implement major ecological restoration projects in poverty region" and "biodiversity conservation is the priority in the poor areas". As the major symbol of national ecological civilization construction and the content of sustainable development, opportunities and

challenges coexist in biodiversity conservation while opportunities overweigh challenges.

3 There are six models about simultaneous promotion on biodiversity conservation and poverty alleviation, including Livelihood Alternative, Characteristic Resource, Eco-tourism, Community Co-management, Eco-migrant, and Green Evaluation. Each model represents its own systematic strategy indicating the approach to simultaneous promotion of sustainability of biodiversity conservation and poverty alleviation.

Livelihood Alternative Model

It refers to the production and management model which is compatible with the resources, environment, and technology under current policies and institutions if the current resources and environment cannot bear the present production and management, or the current production and management actions are destroying resources and environment. Livelihood alternative model is the most prevalent model for simultaneous promotion in China. The specific types include energy alternative, under-forest economy, eco-agriculture, etc.

Characteristic Resource Model

It refers to a sustainable development model that relies on the rich or characteristic bio-resources through special production technology, technique, tools, procedure, and management approaches within a particular spatial area. Characteristic resources can be the pillar of local industries. Characteristic Resource Model can provide developmental motivation for regional economy. Meanwhile, it can solve the problems of labor development, employment, poverty alleviation, etc, which has received extensive attention from all regions. At the same time, it requires regions to possess public resources and potential marketing of products, such as social economy, cultural technologies, productivity, communication, and logistics.

Eco-tourism Model

This model focuses on the protection of ecological effects of original landscape as well as natural connotation, of which commodities are highly comprehensive. It is reflected through the forms of landscape cultural carrying capacity, resource conservation, and economic development. At present, economy is developing rapidly in China. Meanwhile, people's living condition is improving. Both of them provide a unique opportunity and huge market demand for eco-tourism industry.

Community Co-management Model

Community Co-management Model is mainly applied to the management of Natural Protection Zone and its surrounding communities. Neighborhood and management departments of Natural Protection Zone cooperate to contribute to the development of Natural Protection Zone and its surrounding communities. Currently, this model still applies in Natural Protection Zone and its surrounding communities and is involved in many international cooperation programs.

Eco-migrant Model

In order to take engineering management measures to recover or protect the ecosystem, some nations or companies settle down residents in other places according to specific plan, management, revenue, and policies. Eco-migrants are mostly led by policies. These residents migrate to the places which are more suitable for living and development through

agriculture settlement, industry settlement, labor exporting, education, training, etc.

Green Evaluation Model

It refers to development model that converts the traditional evaluation system, which is dominated by GDP, to the one considering the indicators related to the biodiversity conservation, green economic development, etc. With the continuing refinement of national ecological civilization, green evaluation model will contribute to the development of China. On one hand, it prompts local government to take measures to conserve biodiversity and ecosystem. On the other hand, it contributes to the local green economic development and reasonable natural resources exploitation.

4 Continue Simultaneous Promotion of Biodiversity Conservation and Poverty Alleviation

Based on the systematic summary of complete simultaneous promotion of biodiversity conservation and poverty alleviation, we suggest continue the research following the ideas below.

Firstly, identify the key areas of simultaneous promotion of biodiversity conservation and poverty alleviation, which is the primary problem that needs to be solved in the future phase. Research on characteristics of distribution of primary areas where biodiversity conservation and poverty alleviation need to be promoted simultaneously. Explore the distribution principle of primary areas where biodiversity conservation and poverty alleviation will be promoted simultaneously. The characteristics and principle of distribution are the efficient paths and important carriers to promote the combination of biodiversity conservation and poverty alleviation. They also contribute to identifying research scope of the future work.

Secondly, complete spatial zoning of primary areas for simultaneous promotion of biodiversity conservation and poverty alleviation. The primary areas are also the key areas for simultaneous promotion of biodiversity conservation and poverty alleviation or other important areas where biodiversity conservation and poverty alleviation are linked closely. Balance Chinese macro strategies such as biodiversity conservation, poverty alleviation, development, and civic improvement. Combine biodiversity conservation, management, and poverty alleviation. Consider the feasibility and scientificity of regional spatial zoning plan. Two-stage system can be applied to spatial zoning of primary areas of synergy.

Thirdly, complete the zoning plan of simultaneous promotion of biodiversity conservation and poverty alleviation. According to the lone-stage and two-stage spatial zoning of simultaneous promotion of biodiversity conservation and poverty alleviation, it is crucial to summarize the status quo and threatening factors such as topographic features, climate conditions, biodiversity, feature factors of primarily protected ecosystem and creatures, goals of poverty alleviation. Based on the specific requirement of poverty alleviation and biodiversity conservation in two-stage zoning, simultaneous promotion plans need to be finished in each primary area. According to the major models and research of simultaneous promotion of biodiversity conservation and poverty alleviation, specific measures need to be clear for each primary area to provide solid and effective technical support for simultaneous promotion.

REFERENCES

1 Secretariat of CBD. Convention on Biological Diversity[M]. ICAO, Canada, April, 1998.

2 Keping.Ma, Yingqian.Qian, Biodiversity Conservation and Research Progress[J]. Journal of Application and Environment, 1998,4(1): 95-99

3 Lirong.Zhang, Xiahui.Wang, Yilei.Hou, Cuihua.Li. Synergy Development Modes of Biodiversity Conservation and Poverty Alleviation in China[J]. Biodiversity Conservation,2015,23(2):271-277

4 Xiaoyun.Li, Ting.Zuo, Leshan.Ji, Co-management: From Conflict to Cooperation[M]. Beijing: Social Science Academic Press. 2006:19-80

5 Dayuan.Xue, Rong.Dai, Luo.Guo, Eco-agriculture Modes and Case Study[M]. Beijing: Science Press, 2014:117

6 Dahe.Qin. Sanjiangyuan National Nature Reserve Conservation and Sustainable Development[M]. Beijing: Chinese Environmental Science Press, 2012:1

7 Jining.Chen, Insist the principle that beautiful mountain is the gold and silver.Win the tough battle of poverty alleviation[EB/OL]. http://www.mep.gov.cn/gkml/hbb/qt/201510/t20151019_315119.htm

Chinese Academy for Environmental Planning

8 Dayangfang, BeiYuan Road, Chaoyang District, Beijing 100012, China

Editor in chief: Prof. WANG Jinnan

Vice President, Chinese Academy for Environmental Planning

Contact person: Ms. YANG Xiaolan

Tel: 86-10-84916891

Fax: 86-10-84918581

E-mail: yangxl@caep.org.cn

Web: www.caep.org.cn