

A Participation Method for Implementation of the Mountains Sustainable Well-being in China: a Case Study in Qinba Mountains Area of Sichuan Province

Y Tang*

Sichuan University, Chengdu city, Sichuan Province, 610065

Corresponding author and e-mail: Y Tang, tangyan618@126.com

Abstract. In China, a sustainable development of Qinling- Daba (Qinba) mountains region project “The green development strategy research in Qinba mountains area, Sichuan province” aimed at exploring the sustainable development policy at the regional level. Qinba mountains area is an important national ecological protecting zone which located in the northern and north-eastern part of Sichuan province. The area remains one of the most economically impoverished regions of China. Chinese president Xi said that lucid waters and lush mountains are invaluable assets. However, translating the green mountains into the stack of riches is still open to debate. Obviously, Qinba mountains area faces a two-fold policy demands which include environmental conservation and poverty eradication. According participation method, this study explored the sustainable development of Qinba mountains area from the local governments view. And the academic institute made a key role in this study process. Based on the workshop with the local governments and academics, we explore the main problems of the sustainable human well-being. This study recommended that establishing a joint committee for Qinba mountains area to manage their common resources would be a good start. The joint committee would be the platform of the joint common resources management, also be the platform of the science and policy communication.

1. Introduction

The mountainous regions of China, where more than 50% of the rural population resident lived, cover two third area of territory [1]. A sustainable development of Qinling- Daba (Qinba) mountains region project “The green development strategy research in Qinba mountains area, Sichuan province” aimed at exploring the sustainable development policy at the regional level, using Qinba mountains area in Sichuan as a case study. Qinba mountains area is the watershed of the Yangtze and Yellow river. And it is the one of the largest biological gene pool of China. This area is the biological function zone and water protected zone. However, it is also the national poverty alleviation zone.

As Holdren(2008) indicated that sustainable human well-being rests on a foundation of three pillars which includes environment preservation, social equity and economic demands[2]. Each of the three pillars is indispensable, human well-being dependent on the integrity all three pillars. In theory, if institutions recognize the values of ecosystem services, then we can greatly enhance investments in the natural capital that generates them and foster human well-being at the same time [3]. In practice,

we are still in the early stages of developing the scientific basis, the policy and finance mechanisms, for integrating natural capital into land use and other resource decisions on large scales [4].

This study uses participatory approach to identify what are the shortfalls of the policy status in Qinba mountains region. And explore the reasonable recommendations for the sustainable development. This can provide a reference for later policy-making of local government, and promote sustainable development of this region.

2. Theory and methods

2.1. Participatory approaches

Participation was not only seen as a way of developing better technologies in relation to sustainable development, but also a way of expanding the equity of people [5]. The one reason is that natural systems are complex and the information for the managers is often uncertain. The other is divergent views about management objectives and different people hold different opinions and values about how management systems operate. Moreover, the information is often fragmented and scattered throughout scientific publications, reports, and databases, making it difficult for managers to utilize [6]. Sustainable development is thus about the quantity and quality of participation of people.

The local government agencies and academic institutes are the important participants for the sustainable policy making. The participation of the local governments can generate more effective policy evaluations and further optimization of policy recommendations [7]. It encourages and arouses the awareness of participation among regional governmental agencies through the coordinating role of outsiders. Besides the government agencies' participation, the academic institute has an important role in the improvement of sustainable well-being policy. Participatory approaches have assumed a prominent role in order to promote the use of scientific knowledge in policymaking [8]. Academics can play major, collaborative roles in transforming the dominant social paradigm globally by opening new options and incentives to change. The academic community can be more effective in stimulating innovation, and in testing promising new approaches in major demonstrations that integrate the environment preservation and socioeconomic equity.

2.2. Method

There are three groups of actors involved in the active working process of the project: a project team, a focus group and workshops participants. The analysis is based on several different data sources: government policy documents, literatures, recording from meetings, observations in investigations. The secondary data sources are form the government internet sites. Quantitative and qualitative data were collected at county level from December 2014 to September 2015. We gathered statistical information from county statistical yearbook of social and economic statistics in 2014.

This paper is a case study and the material is largely qualitative. We hosted two meetings with the local governmental officers in June and July 2015 to explore the status of governance. 96 people from 14 government departments attended the meetings. In the meantime, two separate investigations were carried out in Qinba mountains area. Based on the investigation, we used focus group discussions with key informants and physical observations by several research staff members.

During the implementation of the project, through the interviews we get the knowledge about the situation of production, operation and the current demands for alleviation of poverty and biodiversity protection plan. We explore the challenges of the regional sustainable development by discussing with the governments. Because they are the ones that make policy decisions about the problems and have successful experience. Meanwhile, through semi-structured interviews, we interacted with professors and leader to understand the existing problems in the management process from the administrator's point of view.

2.3. Study area

Qinba mountains area is located in north Sichuan province and joined to Shaanxi province, Gansu province and Chongqing municipality. Qinba mountains area is a part of the Yangtze platform, North China platform and Qinghai-Tibet plateau [9]. This region is the intersection area of the Belt and Road economic zone and the Yangtze economic zone, where surrounded by Xi'an-Chengdu-Chongqing-Wuhan Urban Agglomeration.

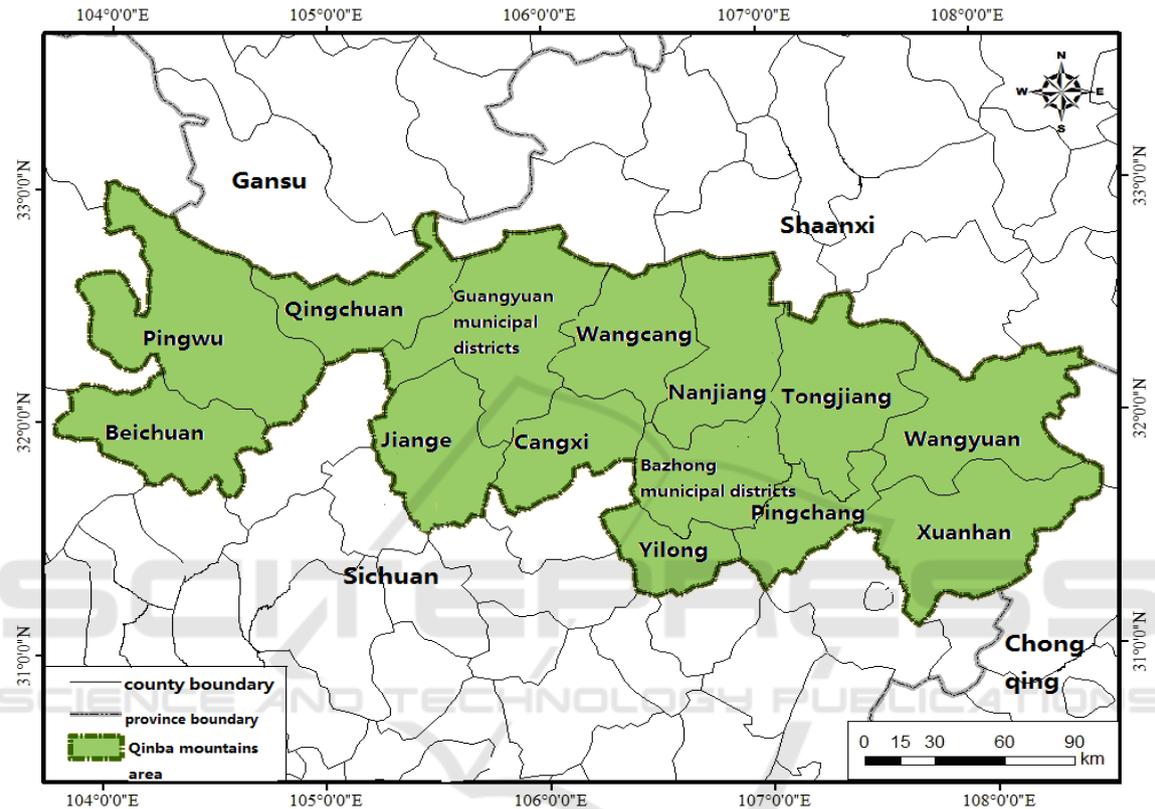


Figure 1. The administrative jurisdiction of Qinba mountain area in Sichuan province.

Table 1. The statistics 2014 of Qinba mountains area in Sichuan Province, China.

	Qinba area	Sichuan
Total area(km ²)	49010.9	486052.0
Mean population (1 000)	1051.7	8140.2
Population density(Capita/km ²)	214.6	167.5
GDP (RMB, billion yuan)	160.89	2853.67
urban per capita disposable income (RMB, yuan)	20252.9	24381.0
rural per capita net income (RMB, yuan)	6735.5	8803.0
Structure of production (% of value added, total 100)		
primary production	20.4	12.4
secondary production	48.4	50.9
third production	31.1	36.8
forest coverage (%)	55.1	35.2

Sources: the seventies counties yearbooks of the Qinba mountains in Sichuan province

The total area of Qinba mountains region is about 49 000km², which is about 10% of Sichuan’s area. According to the Qinba mountains area ten years planning for regional development and poverty alleviation in 2011, this area totally includes 17 counties (Figure 1). The details of the counties and the statistics in this region are described in Table 1.

3. Results and discussion

3.1. The key ecological function area of China

Qinba mountains area has been designated as biodiversity conservation zone and water source protected area based on national major function oriented zoning in 2011. Lush plant life and dense wildlife are the hallmarks of Qinba mountains area [10]. In this area, forest coverage rate reached over 50%, especially the forest coverage of Qingchuan County reached 71.5%, which higher than the province average level. By the end of 2012, there were 6 national natural reserves and 30 provincial ones. This region also has many natural landscape resources, including state-level scenic spot, national forest parks, national geological park, and national wetland park.

Abundant forests provide the habitat for the rare wildlife. This region is home to many rare wild animals, such as giant panda, golden-haired monkey. Meanwhile, this region is a production base for organic agriculture food and herbs. There are more than 3000 medicine species, some of them unique to this area, such as *Lonicera* in Nanjiang County, *Rhizoma Gastrodiae* in Qingchuan County, *Eucommia* in Wangcang County [11]. Traditional Chinese medicine producing could promote both the agricultural industry structure adjustment and grain transform, and improve the ecological conservation.

Another feature of this area is the abundant regional water resources. There are many rivers in Qinba area. And it’s the drinking water protected areas for the river-basin and the lower riparian regions. Meanwhile, waters offered rich fishing for the local residents. There are 160 and 90 kinds of fish species in Jialing river and Fujiang river separately [12].

3.2. The well-known poor areas of China

As it is known, 92% of rural poor households are living in the vulnerable ecological regions and even worse 78 poor counties located in serious land degradation, extreme vulnerable ecological areas [13]. Qinba mountains area is a very important ecologic function zone where the environment is vulnerable in the center of China. And the local residents still live in poverty in this region [14]. There are 9 counties identified as the national poverty alleviation county in this area. The urban per capital disposable income and rural per capital net income are lower than the province average level.

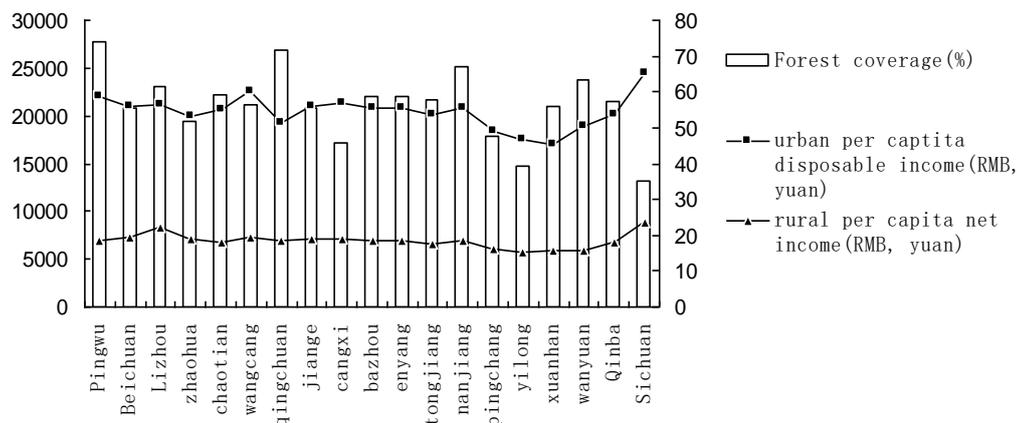


Figure 2. Per capita income and forest coverage in Qinba mountains area, the statistics 2014.

Qinba mountains region's geographical position and natural conditions endow this area with unique resources advantages. However, the abundance resource isn't benefiting the local residents whose per capita income was far below the Sichuan province average. The statistics in 2014 show that the local resident's per capital income has not a positive correlation with forest coverage (Figure 2), and the forest resources had never give the local residents an effective influence on their economic development.

3.3. Fragmentation and overlapping management

Frequent conflicts are related to the use and preservation of natural resources in the mountain region, although the high environmental values in terms of biodiversity, recreation, culture, and landscape [15]. According to the seminars with the local administrator and the field investigation, we found that the management systems are ineffective in this area. On the one hand, this region is governance by multi-counties administrative districts. The natural resources span administrative boundaries. And the management of natural resources was affected and restricted by the surrounding districts. On the other hand, the administrative machinery has a great overlap that aggravated by sector approaches that the natural resources management involves agriculture, soil and water, forestry sectors, etc. The sector approaches create a heavy workload for the natural resources management.

3.4. How to evaluate the achievements of local governments

The achievements of local governments meet twofold requirements, one is that the achievements should be recognized by the superior government, and the other is the local government needs the supports and understandings of local communities. Qinba mountains area is abundant of forestry and other natural resources. However, the local residents still suffer from poverty. How to make the achievements of environment conservation equal to the social and economic development success? The administrator complained that the ecological improvement system is not soundness. The system that evaluates the achievements of local governments should be rebuilt. In China, the assessment system is undergoing the reform which is based on the green GDP [16]. The governments appealed building up environmental assessment mechanism for the ecological environment sustainable development.

3.5. Perception of respondents towards the socioeconomic equity and environment conservation

In the words of the Brundtland Commission, "...poverty itself pollutes the environment... Those who are poor and hungry will often destroy their immediate environment in order to survive... poverty itself is a major global scourge" [17]. Qinba mountains area is the key national poverty alleviation region. For the lagging of economic development, the infrastructure is very poor. The poor infrastructure is also the most mentioned problems by the local governments in the workshops.

The poor infrastructure is mainly reflected in two aspects. One is weak transport infrastructure. There are high mountains and rough roads in the Qinba mountains area. And this region is an area where geological hazards occur frequently. Especially in the summer, the rainy season lead to more traffic jams, because of the landslides and debris flows [18]. The other is poor environment protected facilities. Lack of waste treatment facilities is a common phenomenon at rural level. Wastes and sedimentation pollution generally exists in local rural wilds, rivers and ponds. Meanwhile, the environmental monitoring facilities are absence at the rural level, too. Furthermore, the local administrators said that there are funding gaps to solve the environmental problems caused by mineral exploitation and farming soil pollutant.

4. Recommendations

Establishing a joint committee for Qinba mountains area to manage their common resources would be a good start. For the effective utilization of the resources, it should need a coordination and

cooperation among multi-sectors and an integrated application of social, economical, environmental, etc. The committee is an integrated agency of forestry, agriculture, land, soil and water, poverty alleviation sectors, etc. And the committee should develop more effective and legitimate mechanisms for joint management. The following conclude sustainable well-being recommendations based on the participating academics and local governments in the workshop (Table 2).

The joint committee would be a boundary institution that serves to link science information and public policy. In 2010, the Intergovernmental Science- Policy Platform on Biodiversity Ecosystem Services (IPBES) was established, and China is the first batch of the IPBES member states. Establishing a joint committee in the regional level would improve the communication between the science and policy in local sustainable policy decisions. Proper exploitation of the botanical resource will benefit to the sustainable well-being of this area. Research states that the joint committee should agree on clear rights or concessions to local people, such as resource use agreements and infrastructure rights for important resources in buffer zones [19]. To date, the use of experience rather than evidence-based knowledge to support policy making has been common in this area [20]. We suggest that the regional resources should be investigated more clearly for formulating local resource utilization policy.

Table 2. Summaries of the recommendations from the participating workshops.

Regional sustainable well-being recommendations	
Regional combined development	Transportation development; The communication and sharing of the information; Joint committee for management of the common resources
Regional sustainable policy system	Building the resource utilization policy; The evaluation of the government achievements based on the environment protection; Making a different policy between the protected area and the surrounding area
Regional poverty eradication	Migration and eco-compensation; Ecologic education and ecology tourism; Natural and cultural resources utilization

Moreover, the leadership's assessment mechanism should be perfected to make the achievements of environment conservation equal to the soci-economic development. Practicing the area management, making a difference between the protected areas and the surrounding areas is necessarily. The government should increase the fund support in the protected areas, and translate the natural resources to economic earns in the surrounding areas. The fund support would be used to the ecology education and the eco-compensation in this area. Most of the participants indicate that the ecology tourism is an effective pathway to add earns of residents in the surrounding areas.

Above all, Qinba mountains area is not only a priority biodiversity conservation area, but also a key region of poverty eradication supported by China government. This region has been designated for biodiversity conservation, ecosystem-service provision, erosion control, and also poverty eradication. However, the sustainable development in Qinba area is facing a range of issues, such as weak transport infrastructure, poor environment protected facilities, low education level and poor environmental awareness. Especially, the fragmentation and overlapping management systems are the main obstacles for the sustainability policy. We recommend that establishing a joint committee for the area. Meanwhile, the local governments appeal an appropriate evaluating policy for the ecological conservation achievements. Building environmental assessment mechanism for the ecological environment sustainable development is necessary.

Acknowledgments

The research was funded by the Chinese Academy of engineering as part of its research program Qinba mountains area green development strategy research. We thank participants in the political science research workshop on green development of Qinba mountains area.

References

- [1] Sun Q L, Feng X F and Ge Y 2015 Topographical effects of climate data and their impacts on the estimation of net primary productivity in complex terrain: a case study in Wuling mountainous area, China *Ecological informatics* 27: 44-54
- [2] Bosch O J H, King C A, Herbohn J L and et al 2007 Getting the big picture in natural resource management-systems thinking as method for scientists, policy makers and other stakeholders *Systems research and behavioral science* 24: 217-232
- [3] Brokerhoff E G, Barbaro L, Castagneyrol B and et al 2017 *Forest biodiversity, ecosystem functioning and the provision of ecosystem services* 26(3): 3005-3035
- [4] Bosch O J H, Ross A H and Beeton R J S 2003 *Integrating science and management through collaborative learning and better information management* *Systems research and behavioral science* 20: 107-118
- [5] Cook C N, Mascia M B, Schwartz M W and et al 2013 Achieving conservation science that bridges the knowledge- action boundary *Conservation Biology* 27: 669-678
- [6] Darvill R and Lindo Z 2016 The inclusion of stakeholders and cultural ecosystem services in land management trade-off decisions using an ecosystem services approach *Landscape Ecol.* 31: 533-545
- [7] Eckerberg K, Bjärstig T and Zachrisson A 2015 Incentives for collaborative governance: top-down and bottom-up initiatives in the Swedish mountain region *Mountain research and development* 35(3): 289-298
- [8] Ehrlich P R, Kareiva P M and Daily G C 2012 *Securing natural capital and expanding equity to rescale civilization.* *Nature* 486: 68-74
- [9] Han J L, Wu S R, Li D L and et al 2007 Distribution regularities and contributing factor of geological hazards in Qinling Daba mountains *Geological science and technology information* 26(1): 101-108. (in Chinese)
- [10] Holdren J P 2008 *Science and technology for sustainable well-being.* *Science* 319: 424-434
- [11] Li Y, Zhang F, Yang H J and et al 2016 On habitat quality change monitoring by remote sensing in Eco-functional area of biological diversity *Environment and sustainable development* (2): 46-48 (in Chinese)
- [12] Liu X F, Zhu X F, Pan Y Z and et al. 2016 Vegetation dynamics in Qinling-Daba mountains in relation to climate factors between 2000-2014 *Journal of geographical science* 26(1): 45-58
- [13] Maselli D 2012. Promoting sustainable mountain development at the global level *Mountain research and development* 32(S1): 64-70.
- [14] Mickwitz P and Melanen M 2009 The role of co-operation between academia and policy makers for the development and use of sustainability indicators- a case from the Finnish Kymenlaakso region *Journal of cleaner production* 17: 1086-1100
- [15] Moen J 2006 Land use in the Swedish mountain region: trends and conflicting goals *International journal of biodiversity science & management* 2(4): 305-314
- [16] Perrings C, Naeem S, Ahrestani F and et al. 2010 *Ecosystem services for 2020* *Science* 330: 323-324
- [17] WCED (World Commission on Environment and Development) 1987 Our Common Future, <http://www.un-documents.net/wced-ocf.htm>
- [18] Roseland M 2000. Sustainable community development: integrating environmental, economic, and social objectives *Progress in planning* 54: 73-132

- [19] Shen J Y, Han X, Hou Y and et al 2015 The relationship between marine biodiversity conservation and poverty alleviation in the strategies of rural development in China *Journal of Coastal Research* 73: 781-785
- [20] Shen M H 2013 The assessment system of the achievement in view of ecological civilization *Environmental economy* (117): 30-31 (in Chinese)

