

Introspection of sustainable development and environmental planning of National Park management

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Abstract Because of slender land and high mountain, steep slope, and rapids of natural environment, the whole regional ecosystem has the changeable terrain and landscape with diverse ecology and species. During the past 300 years, the humanity lives and spreads on this splendid domain, accomplished the complex, fragment and sensitive of nature and humanities ecosystem, and its Landscape ecology texture. This paper finds out that, although the National Parks system in China has been in operation for over 30 years and has achieved the objective of species conservation, it is still facing the a conflicting situation and coordinated demand of its conservation and recreation. With the global tendency of “sustainable development” and “ecotourism”, this paper suggests that National Park system should establish a sustainable development mechanism integrating “conservation, recreation, and research.” Therefore, this paper suggests shifting the traditional planning paradigm of resource benefit guidance and resource valuation framework of Ecological Planning to the “Sustainable Planning” theory and technique that are suitable for sustainable development concept in order to meet the demand for a new conservation concept and technique of sustainable development for the human beings dealing with the environment resources. Also, the texture and model of Landscape ecology and the model and method of Geographic Informational System could be considered as the proper tool. This paper points out that the landscape ecology texture and tendency should represent the secret code of sustainable development. Furthermore, the situation of the sustainable development is dynamic, and the GIS model is necessary for corresponding planning. Finally, this paper develops a suitable sustainable development operation definition and planning methodology to represent the interlacing framework of ecology (conservation) and human being (e.g., recreation, research, life, etc.) system of National Park management.

Keywords National Parks, sustainable development, landscape ecology

1 Introduction

Although the World Commission on Environment and Development (WCED) released the most recognized concept and definition of sustainable development in 1987, National Park Law has not clearly regulated the relationship between environment management and sustainable development until now. It is hard to establish a suitable managing direction and clear developing strategy for the National Park authority. Thus, “Enclosure Protection” has usually been adopted as the normal and easy strategy for environment management of the National Parks but has not been an appropriate one.

In addition, the National Park authority has two important but conflicting objectives: conservation and recreation, which come from the definition of National Park by the World Conservation Union (IUCN) in 1994. The conflict is obvious and inevitable. Therefore, although the National Parks have been in operation for 137 years and pursued sustainable development for 22 years, the environmental management strategy of the National Park is just on the right way toward sustainable development, especially for the environmental planning issue. This study intends to point out the introspection of sustainable development and environmental planning of the National Parks with the forward-looking consideration of sustainable development in National Parks.

The objective of this study is thus to understand the problem, clarify the conflicting feature, and explore the mechanism to solve the issue of sustainable development and environmental planning in National Park management. In such ways, this paper is to highlight the importance of sustainable development in National Parks in order to strengthen the concept of sustainable development, to continue the establishment and service function of

National Parks, and to achieve the sustainable development objective of the National Park.

First, this paper reviews the essence and paradigm of National Parks, sustainable development and environmental planning, from the definition and theoretical aspects. Then, it broadly discusses the integrated operating mechanism of sustainable development and environmental planning in National Parks from the practice and empirical aspect. Thus, the study focuses on the origin, definition, and empirical scope of National Park. The study process includes the discussion of paradigm shifting and the construction of theoretical operation framework. Finally, this paper attempts to establish a new model of sustainable development for National Parks and to build a discussion platform with other National Parks.

2 Review and critics

2.1 National Park

The concept of National Parks could be traced back to the end of the 18th century. By singing the praises of nature, the romanticists expressed their pursuit of the ideal world and avoidance of the environment damage caused by the Industrial Revolution. Historically, a National Park was seen as an ideal, a pastoral, and an arcadian environment. In other aspects, the National Park is an important mode of land use planned by natural environment conservation institutions. It is also the spatial interface that connects the human spirit with the natural ecological environment. Its operation mechanism is adjusted by human's treatment and usage of the environment resource. For humans, it has the values of market, living, recreation, science, genetic diversity, aesthetic, cultural symbols, history, character sculpture, treatment, holy, hope, choice, and essence (Ehrenfeld, 1978). Thus, from the aspect of meaning and value, the National Park is opening the interacting possibility of human and natural environment. However, it is sometimes inevitably regarded as the symbolic sign of the national identity and ecological priority.

Second, the original concept of the National Park was the "human's public park", providing the function of conservation, research, education, and recreation. Until now, following the trend of ecological conservation and sustainable development, the international recognition and current concept of the National Park is the "ecology-based conservation area", which is also providing the same functions. However, the noumenon of the National Park is shifting from people to ecosystem. This shifting is not only the progress in conservation strategy but also represents the identity adjustment of the National Park after the accurate recognition of human's ecological position. It demonstrates that the core value of the National Park conservation is shifting from human usage to ecosustainable modes. However, through the introspection of the

conservation of National Parks, its conservation strategy is still the traditional management recognition of "species and location", which is the main point of this study.

From the definition of the National Park, although it is mainly providing the conservation and recreation opportunity for human beings, the current international definition (Guidelines for Protected Area Management Categories, IUCN, 1994) focuses on the ecological integrity, exclusion of inimical purposes, provision of spiritual, scientific, educational, and recreational opportunities, and compatibility with environment and culture. From evolution of the National Park definition, the protection mechanism had been changed from rigid standard to flexible adjustment, from visual protection to biodiversity conservation, from negative protection to positive conservation, and from single species or landscape to diverse ecosystem, indicating the shifting of ideology of being "people oriented" to "ecosystem based". In other words, the National Park has become a worldwide natural and cultural protection movement, and a series of protection thinking and model. However, National Parks have not yet developed the complete and sustainable managing strategy for the new recreation activity such as ecotourism.

In 2001, the United States National Park Service addressed the "Rethinking the National Parks for the 21st Century" with expectation that the National Park could become the education field of all the human being in the changing world, including the integration of environmental history, maintenance of biodiversity, achievement of sustainable education, nurturing of cultural and community sense, and promotion of management ability. It was in accordance with this study in that National Parks should strengthen its functions.

From analysis of the themes of the five World Parks Congresses (Table 1), the developing mode of National Parks has been shifted from scattered patch to ecosystem network. This trend could be characterized by following shifting: the protection concept had changed from a single species or a simple environment to environmental conservation of ecosystem or ecoregion; the identity of human had changed from human's avoidance of environmental sustainability to human's participation in and promotion of environmental sustainability; and the identity of the National Park had changed from individual participation to the independent role of overall ecosystem. The comprehensive system and institution were always the criterion and most important foundation of excellent management. Financial sustainability is the main point of the management.

Adrian Phillips pointed out the differences in the concept of protected areas between new paradigm and old paradigm, in terms of their objectives, governance, local people, wider context, perceptions, management techniques, finance, and management skills. This study summarizes his analysis and proposes that the paradigm

Table 1 World parks congress theme analysis

year	1962	1972	1982	1992	2003
conference	first congress, Seattle, USA	second congress, Yellowstone, USA	third congress, Bali, Indonesia	fourth congress, Caracas, Venezuela	fifth congress, Durban, S. Africa
theme	effective understanding and further development	a heritage for better world	parks for development	parks for life	benefits beyond boundaries
ecosystem integrity	species extinction	special environment, such as tropical	marine protected areas of demand etc	diversity, regional scale	link with the surrounding land
human and environment interaction	human to environmental impact	public support	sustainable development	ignore the relationship with environment	broad support
park management	management practice	planning and manage- ment, wildlife manage- ment	management promotion, consistent classification, monitoring	advocate, fund	system, sustainable finance
international network	international monitoring of the border	international training, global system	network incomplete, cooperation mechanism		complete system of protected areas

shifting aspect of National Park is diversification, systematization, and localization. These are the challenges facing the National Park in the new century. The challenge of diversification is to introduce the diversified concepts of National Park management and governance to response to the dynamic and changing of environment, such as multiobjective for diversified development of ecological conservation, environmental education and ecotourism, or multigovernance for diversified management of efficiency, flexibility, and demand.

The challenge of systematization is to promote the systematized framework of National Park connection and interaction to achieve the communication and mutual support of management, such as “region to global” protection system and multiple profession support. The challenge of localization is to re-establish the localized main operation body of National Park management and development to ensure the sustainability and inheritance of existence value, such as the practical application of “Community Conserved Area”, or experimental translation of “global priority” into “localized reality”.

From the trend of challenge facing the National Park in the new century challenge, this study indicates that diversity and network is the core of the trend. Diversity will increase the complexity of the composition and effectively reduce the dependence of or disturbance to the environment. Network will increase the flexibility of the system structure and thus provide dispersal and hiding places for species. These trends could be flexibly applied to all National Parks in order to enhance the global ecosystem conservation network and establish the ecologically sustainable development on the Earth.

2.2 Sustainable development

Sustainable development is not a new concept of human’s introspection under the dramatic environment change of 20th century. In fact, it has always been human’s prudent

attitude toward the use of resources. However, after the high development of the economy, human beings seem to gradually forget the ancestors’ life wisdom. The worst is that the human wants to completely control the nature for their demand and has gradually deviated from the harmonious coexistence with the nature. Sustainable development can be interpreted as the maintaining or extension of resource production and usage, using forever by human, should not influence the future generation production and living.

Sustainable development mainly emphasizes on the system’s long-term stability, including the fairness, sustainability, and commonality. In other words, it pursues the ideal balance of economic efficiency, social equity and environmental integration. Therefore, this study realizes that the core meaning of sustainable development is “fairness”, with a hope for efficiency and care to heal the gap. The composition of sustainable development is “system”, with a hope for the complex ecological system to achieve internal self-balance. The operating mode of sustainable development is “balanced”, which means that the dynamic equilibrium of energy and natural flow, rather than the static equilibrium of human observation. In fact, sustainable development is the essence of the natural environment.

Although the human does not have the more consistent consensus of the current definition of sustainable development yet, the common perception is that sustainable development could improve the sustainability of human and environment, after the modification of human-nature and human-human relationship, and the accomplishment of ecological, social, and economic benefit. The ultimate goal of sustainable development is to meet the environmental need of human in appropriate ways, accompanying the continuous conservation of ecological environment and resource. Therefore, this study believes that sustainable development should be interpreted as “the attitude and process of maintaining sustainability”, and the core issue is

not “could achieve or not” but rather “how much effort should be done”.

However, the sustainable development is always the goal and not the current situation. In 1987, WCED chairwoman Brundtland pointed out that sustainable development is a moral principle, as well as a belief in ethical values. For human’s survival and well-being, sustainable development should be raised to the global success of ethics. Therefore, sustainable development is a comprehensive and dynamic concept of co-ordination in resource, economy, society, and environment.

Therefore, this study summarizes three characteristics and introspection of sustainable development. First, each elements of environment has the means and mechanisms of its own sustainable development. That means sustainable development is the appropriate usage of the proper environment. Only if the human could respond to the environment characteristics, understand the executing mechanism, and draft the development approach, could the sustainable development be practiced more effectively.

Second, the real sustainable development is starting from the heart of the human. The main part of practice is “the management of the humans” and not “the management of resources”. Third, in real practice, sustainable development lacks the reference system or the threshold of the assessment (Brink et al., 1991); or different indicators of sustainable development may have a different answer, these all reflect the multioriented nature of sustainable development. (Hanley et al., 1999)

2.3 Environmental planning

Due to the issue of resource depletion and regional imbalance in the 1920–1930s, the United States proposed the regionalism to spere the overall development of the relevant region and encourages the rational and effective exploitation of resources in order to promote regional development. The environmental planning paradigm of this period was “the considerations of the overall development of the region and the effective usage of natural resources, to promote the harmony between human and environment”. The balanced development of the region was the primary objective.

The concept of system, combined with different subjects, comprehensively analyzed a variety of natural factors and the difference of its spatial distribution in the 1950–1960s, which were influenced by the ecological and environmental science. The environmental planning paradigm of this period was “integrating the different disciplines and application of environment resource in the system concept to urge the well-planned environment.” The effective usage of environment resource was the primary objective. The paradigm was shifted from “the balance of development” to “the management of growth”.

In 1969, after Ian McHarg proposed the ecological

planning, the environmental planning paradigm of this period was “exploring the development potential of land-use and limitation of natural environment in the established development goals to enhance the overall interest of the environment”. The most suitable supply of natural environment resource was the primary objective. The paradigm was shifted from “the management of growth” to “the planning of suitability”.

Therefore, this study summarizes three introspections of environmental planning. First, environmental planning needs to respond to the diversification, systematicization, and localization. After 1990, the elaboration of environmental planning has been required to face the key ecological and sustainable issue of global environment. Moreover, in the viewpoint of landscape ecology, the natural environment is the dynamic ecological network system composed by the ecological patch, corridor, and mosaic. Its conservation should be the entire space and the system as a dynamic mosaic (Forman, 1995). Therefore, whether the paradigm of environmental planning could be shifted from “the ecology-oriented suitable planning” to “the landscape ecology-oriented trend planning”, as a response to the diversification, systematicization, and localization of human-environment relationship under the framework of globalization is the focus of this study.

Second, could the environmental planning avoid the “environmentalism” thought? Someone has the environmental determinism opinion of the environmental planning. In fact, each environment has its unique characteristics and composition of resources. The natural environment factor is not the only option of environmental planning.

Third, the paradigm shifting from vertical comparison of environment factors to horizontal spatial structure inter-relationship is the most important discussion of current environmental planning theory. The comprehensive analysis of vertical environment factors, or known as topological analysis, emphasizes on the ecological status occurring in a particular landscape unit but neglects the ecological relationship or interactive processes between the landscape units. As the relationship between natural environment and human has been increasingly complicated, its horizontal or spatial interactive structure will become more important. Landscape ecology becomes one of the possible amendments of environmental planning in order to emphasize the landscape changes and the spatial structure analysis.

3 Discussion

The core issues of sustainable development of National Parks should be appropriate interpretation of sustainable development as “the appropriate usage of the proper environment.” First, each different region has its unique

ecological sustainable development environment and therefore should have the appropriate strategy of sustainable development. Second, showing the complex and fragile configuration, the broken and instable natural ecological environment of National Park is raising the rich and diverse biological community. The issue is the vulnerable texture of landscape spatial pattern. Finally, the most important issue is that the enforceability of sustainable development. The appropriate strategy of sustainable development still needs the correct and effective implementation. Therefore, this study identifies the core issues of sustainable development of National Park as “the appropriate usage of the proper environment”, “vulnerable texture”, and “enforceability”.

3.1 Appropriate usage of the proper environment

For the issue of proper usage of National Park sustainable development, this study explores three elements of “multioriented”, “start from heart”, and “appropriate usage” to interpret sustainable development as the theoretical basis of sustainable planning. Therefore, this study suggests the first planning concept of National Park toward the sustainable development be “integrating with sustainable development” in order to completely integrate the sustainable development planning concept of National Park. The characteristics combination and interactive force of natural and humanity environmental factors could form a key land-use environment, emphasizing the potential of the land, the status of the structure, and the force between them.

3.2 Vulnerable texture

For the issue of vulnerable texture of National Park sustainable development, this study explores three factors of “the instability of environment”, “the division and interference of human”, and “the changes of balance” to indicate the planning solution of National Park sustainable development as the theoretical basis of sustainable planning. Therefore, this study suggests the second planning concept of National Park toward the sustainable development be “responding to the diverse environment” in order to develop the multienvironmental planning strategy of National Park sustainable development.

3.3 Enforceability

For the issue of enforceability of the National Park’s sustainable development, this study explores four elements of “diversification”, “systematic”, “localization”, and “horizontal spatial structure” to diagnose National Park sustainable development and to clarify the enforceability of sustainable planning framework. This study suggests the third planning concept of National Park towards the

sustainable development be “planning by the landscape spatial patterns approach”, in order to effectively develop the landscape spatial pattern planning approach of the National Park’s sustainable development.

3.4 Sustainable planning

The sustainable planning objective of National Park is to find out the key factors of natural and stable landscape ecological texture that could affect the sustainable development and then to integrate the interference factors of the environment and human, in order to build the foundation of sustainable development.

The sustainable planning paradigm of National Park is to analyze the hidden message of landscape ecological texture of natural environment and to integrate the sustainable model of environmental texture and human interference, to portray a balanced sustainable status. Therefore, the planning paradigm of sustainable planning will be shifted from “suitable planning” to “balance of sustainable development”.

Finally, the paradigm of sustainable planning gets rid of the “environmental determinism” cognition and moves toward the “ecological sustainability”, and changes from the “environmental restricted planning” and “defensive planning” to the direction of “ecological sustainable planning” and “trend planning”.

4 Conclusions

4.1 Sustainable development of natural resources

The sustainable development of National Park needs to build the ecological network of National Parks. By establishing the full-functional and dynamic balance of the ecosystem structure, the National Park could have the proper adaptation of sustainable development. Therefore, at the regional scale, a variety of conservation sites should be connected into an ecological conservation network, and a higher intensity of ecological conservation sites (such as ecological protected areas, etc.) should be surrounded by the lower intensity of ecological conservation areas (such as National Parks, etc.). At the National Park scale, the ecological protection zone, special landscape, and historical preservation zones should be surrounded by the general control zone to form a complete landscape ecological system.

4.2 Environmental management for sustainable development

The sustainable development of National Parks is in needs to promote the in-situ conservation model. By establishing the appropriate conservation and adaptive mechanism and

the ecological conservation mode of harmonious relationship between people and land, the National Park could have the possibility of sustainable development. Therefore, the ecological protection zone does not have any human operations; and the National Park should have the involvement of management and facilities, in order to maintain the sustainable development of ecosystems.

4.3 Mechanisms for sustainable development

The sustainable development of National Parks will focus on enhancing the public participation mechanism. By establishing the public participation mechanism, the National Park could achieve the objective of sustainable development. The tourist could participate in the ecotourism to experience the positive and natural environment, in order to experience the ecological environment and have the imperceptible influence on their future behavior. Meanwhile, the local community and residents could eventually be able to operate the management independently. The

managing department would always be the implementator of conservation policies, management practices, and environmental sustainability. Therefore, the improvement of relationship between human and environment will lead to the sustainable development of National Parks.

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