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Integrating Connectivity Conservation Factors Into Legal Frameworks of China

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Abstract

National legislation has been recognized as a valid and effective tool for connectivity conservation worldwide. However, the existing policy and law in China is not sufficient to meet the increasing challenges of connectivity conservation. Only a few regulations focus on fundamental principles rather than any substantive result, these are related to issues including without consideration of connectivity conservation in land-use plans, ambiguity of responsibility and accountability of design entity and management authority, lack of corresponding design criteria and operating guidelines. China needs to strengthen and integrate connectivity conservation factors into legal frameworks, which relate to plan content, the rights and responsibilities of all parties, and the process of environmental impact statement preparation.

Key words: Connectivity Conservation; Ecological Corridors; Legal Frameworks

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INTRODUCTION

The rapid economic growth always has implications on the environment. In China, a tremendous amount of recent urban development has occurred, the rapid development of road network, rail network, and

hydropower station construction, it poses challenges to connectivity conservation. Natural habitats are shrinking to islands surrounded by modified landscapes. Many species (especially wide-ranging ones) are confined to isolated areas too small to allow them to find adequate food, water, mates, or refuge from predators. The destruction and degradation of natural habitats on which all organisms rely, is occurring at an unprecedented rate across most regions of China, and we need to take collective action to manage the externalities in an effective manner. Connectivity conservation provide land or water pathways that link natural habitats with one another, allow plants and animals to disperse and migrate, and facilitate ecosystem dynamics, through the flow of resources and energy and through accommodating the complex interrelated processes of ecological systems. In order to deal with the challenge, national legislators and scholars worldwide have developed a variety of legal approaches for integrating connectivity conservation into legal frameworks. The purpose of the survey is to find out what are the major problems and deficiencies on relevant policy and law in China so as to provide a good basis for further studying the connectivity conservation initiatives and strengthening the legislation.

1. CONNECTIVITY CONSERVATION AND LEGAL FRAMEWORKS

1.1 The Concept of Connectivity Conservation

“Connectivity conservation” is emerging as the generic term for various connectivity functions for conservation, including such terms as “ecological corridors” and “environmental corridors”. (Lausche et al., 2011, p.23) The concept of connectivity conservation has become increasingly important in the past three decades as a result of modification of ecosystems and subsequent declines in biodiversity resulting from a range of direct and/or

indirect human influences including vegetation clearing (and resulting habitat loss), altered fire regimes, invasion by exotic species and climate change (Fitzsimons, et al., 2013). In the most basic terms, connectivity conservation is a conservation measure in natural areas that are interconnected and in environments that are degraded or fragmented by human impacts and development where the aim is to maintain or restore the integrity of the affected natural ecosystems, linkages between critical habitats for wildlife, and ecological processes important for the goods and services they provide to nature and people (Lausche et al., 2013, pp.3-25). At the common application of the ecological corridors idea, connectivity conservation seeks to protect and conserve natural ecosystems, biological diversity, and ecological processes.

However, the scientific concept of ecological processes and the spatial pattern and scale of vegetation cover, not only in natural landscapes, but also in semi-natural and even highly modified landscapes (Forman, 1995). Worboys further refines the concept of connectivity and defines four major types of connectivity, including habitat connectivity, landscape connectivity, ecological connectivity and evolutionary process connectivity (Worboys, et al., 2010). In that sense, connectivity conservation may also provide recreational, tourism, educational, and aesthetic benefits, which can enhance the relationship between human and nature, improve the quality of residents life, as well as maintain overall regional ecological security. Cities sometimes choose to preserve greenways in an effort to improve the quality of human life by limiting urban sprawl and providing opportunities for aesthetic enhancements and recreation (Hilty et al., 2009, p.3). Therefore, it is important for the legislation to identify and incorporate both natural areas and modified landscapes within the national connectivity conservation legal frameworks.

1.2 National Legal Approaches for Connectivity Conservation

Ecological networks, corridors and buffer zones have been increasingly deployed as mechanisms to support strengthened environmental linkages in the landscape and seascape (IUCN, 2012). Worldwide, the concept of ecological corridors and networks is being incorporated in nature conservation legislation as well as other supporting laws as a tool to address the connectivity issue. A survey of legal approaches to connectivity, conducted by IUCN in 2007, found that a variety of methods are being used, from a specific connectivity law in the Ukraine to the incorporation of connectivity issues in a biodiversity law in Bulgaria.¹

There are a variety of legal approaches to support national connectivity conservation. One is linked to nature conservation laws, which provide specific mechanisms

or necessary requirements for connectivity conservation, include: biodiversity conservation legislation, such as Australian Environment Protection and Biodiversity Conservation Act 1999; protected area legislation, such as Lithuania Law on Protected Areas 1993, amended in 1995; wildlife conservation legislation, such as Indian Wildlife Protection Act 1972, amended in 2002. Some countries also linked it to land use planning laws, which require that connectivity conservation need to be integrated into land use, such as Danish Consolidated Planning Act No. 883, amended in 2004. Alternatively, enacting a distinct law on connectivity conservation or for a specific connectivity area also may be an option, such as the South Korea Act on the Protection of the Baekdu Daegan Mountain System (BDMS) 2003 (Act No.7038, as amended in 2009). This is a relatively new approach being tried in some countries especially for large-scale corridors (Lausche et al., 2013, p.104). In addition, the voluntary conservation agreement is increasingly used in connectivity conservation, mainly dominated by private or community lands, in light of the diversity of governance situations.

Regardless of the approach, three key elements should be respected and engaged in connectivity conservation design. Firstly, connectivity conservation requires integrated planning and long-term commitment. To establish sustainable and workable ecological corridors need to plan in advance, consider fully to respond to changing conditions, and takes time and patience for adaptive management. Secondly, connectivity conservation requires a institutional arrangement for cross-sector, multi-jurisdiction and multi-stakeholder partnerships, in order to facilitate effective implementation and ensure long-term conservation. This can include not only the cooperation of all government agencies whose interests are affected by corridors, but also the public and private sectors involved in planning and implementation. Thirdly, using the best available scientific information, assess the plan, program and project, which may presents current and potential impacts to connectivity conservation. It is important to incorporate connectivity conservation considerations into environmental impact assessment, and make detailed guidelines.

2. CHINA'S RELEVANT POLICY AND LAW ON CONNECTIVITY CONSERVATION

2.1 National Policy and Law

2.1.1 The National Plan for Development Priority Zones

On June 8, 2011, China officially published the National Plan for Development Priority Zones. The Plan acts as a fundamental strategy, indicating a major shift of the thinking and patterns in national land development, and providing the stage for development and protection of the valuable land in a proper way.

1 Barbara Lausche, *supra* note 1, p.108.

In order to ensure long-term ecology conservation, one of the development principles is that ecological restoration behaviors should be beneficial to the construction of ecological corridors and network. Article V calls upon optimized exploitation regions to establish several ecological corridors at national level:

- In the Beijing-Tianjin-Hebei region, the ecological corridors and ecological networks consisting of Taihang Mountain, Yan Mountain, Daqing River, Yongding River, Chaobai River, and coastal wetlands.

- In the central-southern of Liaoning, the ecological corridors consisting of Changbai Mountain, Liao River, Yalu River, as well as coastal wetlands and coastal shelter forest.

- In the Shandong peninsula, surrounding the ecological central ridges, constructed flake ecological networks and coastal ecological corridors.

- In the Yangtze River Delta, the ecological networks consisting of Yangtze River and Qiantang River, Tai Lake, Beijing-Hangzhou grand canal, Yixing-Liyang hill areas, Tianmu Mountain-Siming Mountain and coastal ecological corridors.

- In the west channel economic zone, the ecological corridors to be protected, such as Minjiang River and Jiulong River.

- In the Poyang Lake Eco-Economic Zone, the ecological corridors consisting of Gan River, Fu River, Xin River, Rao River, and Xiu River.

- In the Guanzhong-Tianshui areas, the ecological corridors consisting of Qinling north-Mountain, Wei River and Jing River.

Moreover, the Plan is explicit that controlling the expansion of roads and railways construction, and if really necessary, animal migration corridors should be planned in advance. It is important to construct ecological corridors by use of water system and green belts, where appropriate, avoiding isolated 'ecological islands' to be formed.

2.1.2 National Plan on New Urbanization (2014-2020)

National Plan on New Urbanization, issued in March 2014, is a macroscopic, strategic and fundamental plan, and also China's first plan on urbanization enacted by the central authorities. The Plan emphasizes ecological conservation in the process of urbanization development.

The Plan marks all boundaries of the ecological resources, farmlands and city areas with red lines. The scale of the new construction lands would be under strictly control. To promote the urban green development effectively, it is necessary to divide the ecological red lines reasonably, expand urban ecological spaces, and increase the area of forests, lakes, and wetlands. For reducing the negative effects on nature and environment as much as possible, the waste land in rural, industrial and mining land, and

other polluted land need to be converted to ecological land. In particular, the Plan explicitly requires that green ecological corridors should be established in urbanization area.

2.1.3 Environmental Protection Law (2014)

The Environmental Protection Law of the People's Republic of China was revised on 24 April 2014, and would come into force on 1 January 2015. This law is formulated for the purpose of protecting and improving environment, preventing and controlling pollution and other public hazards, safeguarding public health, promoting ecological civilization improvement and facilitating sustainable economic and social development.² With regard to connectivity conservation, the law specifies that the state should define ecological redline for strict protection on key ecological functional zones, areas of sensitive and fragile ecological environment, including the following³:

The people's governments at various levels shall take measures to protect regions representing various types of natural ecological systems, regions with a natural distribution of rare and endangered wild animals and plants, regions where major sources of water are conserved, geological structures of major scientific and cultural value, famous regions where karst caves and fossil deposits are distributed, traces of glaciers, volcanoes and hot springs, traces of human history, and ancient and precious trees. Damage to the above shall be strictly forbidden.

Exploitation and utilization of natural resources shall be developed in a rational way that conserves biological diversity and safeguards ecological security. Ecological protection and restoration programs shall be developed in accordance with laws and be implemented.

2.2 Specific Initiatives and Local Rule

2.2.1 Urban Planning of Local Government

Master Planning of Guangzhou (2011-2020) launched the plans to conserve natural landscape and maintain ecological integrality, which include: conserving Baiyun Mountain and Pearl River to build to natural landscape system; and enhancing the guidance of the waterfront landscape and vegetation landscape protection, and serving ecological connectivity and ecosystem integrity, through conserving mountains, water system and vegetation.⁴ Urban Functions Layout Plan of Guangzhou, adopted in 2012, goes further by setting a target for ecological corridors establishment, that is to build ecological corridor and group of isolation belt based on mountains, water, and green space, in order to form the 'three vertical three horizontal' system of ecological

2 Environmental Protection Law of the People's Republic of China, Article 1.

3 *Idib.*, Article 30.

4 See Master Planning of Guangzhou (2011-2020).

corridors, whose width may range from 300 meters to 1000 meters, and total length about 1000 km.⁵

In the Guangzhou Panyu ecological corridor planning, it designated fourteen compound ecological priority zones and five important structural corridors, composing the ecological connectivity corridor system. Based on sustainable development of the urban ecosystem, it proposed the protective development policy of urban ecological corridor planning which in terms of establishment of the corridor space, classification and control of land use, industrial layout of ecological conservation priorities and strong operational guide of corridor land space. As a recognized planning and management principle for ecological corridors, it is an important concept to incorporate in urban planning.

2.2.2 Infrastructure Projects

In the preparation process of EIA for Qinghai-Tibet railway, first introduced the concept of wildlife passage in China, and incorporated the landscape features into the assessment scope. The migratory and moving routes of wildlife, especially the annually and cosmically migration routes of Tibetan antelopes, were interdicted by Qinghai-Tibet railway built. In order to connect the intersected environment and animal migratory routes, thirty three animal passages had been set along Qinghai-Tibet railway, divided into three types such as bridge, tempered roadbed and tunnel. According to the monitor log from 2004 to 2007, the three types of animal passage played important roles in animal communication through the railway. Their efficiency of being used increased year after year, and no Tibetan antelope had been found interdicted by Qinghai-Tibet railway during migration.

The environmental impact post-assessment of Qinghai-Tibet railway, issued in October 2012, found that, the wildlife corridors, ecological corridors and other connectivity conservation initiatives providing in controls that achieve specific conservation objectives, and effectively protect the wildlife migratory routes, evolutionary process connectivity, wetland ecosystem, and natural landscapes. It is therefore particularly important to require that effectively incorporate connectivity conservations into construction project design and management, and promote EIA for proposed measures may pose a significant threat to the connectivity conservation.

2.2.3 The Local Government Rule

In October 2014, Zhengzhou municipal government, one of the few local governments, issued Measures for the Administration of Ecological Corridors Establishment, regulating ecological corridors planning and management on the ground. According to this rule, ecological corridors refer to open greenbelts and greenways, they are often created along roadways and rivers and are designed to

prevent cities from merging and to provide visual and sometimes recreational amenities to the public. The greenbelts and greenways may offer some conservation benefits, in that sense, the ecological corridors produce areas of character with greening and landscaping values, and also provide sites for public sport and recreational activities. It prescribes management principles, competent authorities and funding sources for ecological corridors. They include the following:

- The management of ecological corridors should follow unified planning, hierarchical accountability and dependency administration principles.

- The landscape bureau and the forestry agency of municipality are responsible for ecological corridors work overall, conducting establishment plan and program, and providing guidance and oversight on management of subordinate departments.

- Government budgets are essential for core financing of ecological corridors establishment and management, deference to the principle of territoriality, and within relevant agencies' own spheres of responsibility.

3. DISCUSSION

3.1 Barriers Caused by Connectivity Conservation Design in China

Overall, the existing laws in China have little direct provision for connectivity conservation design. Only a few regulations focus on fundamental principles rather than any substantive result, these are related to issues including without consideration of connectivity conservation in land-use plans, ambiguity of responsibility and accountability of design entity and management authority, lack of corresponding design criteria and operating guidelines. The deficiencies in the legal safeguard not only block the effective operation of connectivity conservation in China, but also impede the effective implement of national plans related to connectivity conservation. It should recognize that the existing policy and law is not sufficient to meet the increasing challenges of connectivity conservation.

The authorities, especially at sub-national and local level in China, always do not take into account connectivity conservation in land-use planning. The ignorance of the importance of connectivity conservation mostly results from the idea of economic benefits priority. Most cities only pay attention to the economic benefits of land, and ignore its ecological value. The authorities should take precautionary measures to anticipate, prevent or minimize the causes of habitat fragmentation and mitigate its adverse effects. To integrate connectivity conservation elements into land-use planning could avoid and mitigate the serious or irreversible damage to the natural environment and wildlife from habitat fragmentation, and be cost-effective so as to ensure

⁵ See Urban Functions Layout Plan of Guangzhou.

benefits at the lowest possible cost. However, in the process of land-use planning preparation, the non-construction land-use of connectivity conservation has not obtained the corresponding legal status. Although a few cities have made some beneficial exploration, to apply the planning effectively need incorporate connectivity conservation explicitly into appropriate legal frameworks.

According to the existing laws, the governments at various levels in general take charge of connectivity conservation without the regulations of clear agencies. The environmental protection law in China regulates that all levels governments should take measures to protect all kinds of representative natural ecosystem zone and the natural distributing zone of the endangered and threatened wildlife. However, this provision is too principle, it could not have an effect on connectivity conservation. As a result, there is no entity to assume responsibility and accountability necessary for effective plan design and implementation, if any, the established ecological corridors would suffer from damage, and the daily management is facing more and more challenges. In addition, connectivity conservation often relates to transboundary issues, where multiple jurisdictions may be involved, it would further exacerbate the difficulties of design and management. It was leading to further decline in ecological and species connectivity.

The existing practice shows that, EIA requirements would effectively avoid potentially significant negative impacts on connectivity conservation. An EIA must be prepared for any development project which may cause significant adverse impacts to connectivity conservation. There remains a need to correlate EIA law and the legal framework within which such conservation zone will be established and managed. However, there is no provision on connectivity conservation, either in EIA law or its operational guidelines nowadays. Because lack of corresponding design criteria and operating guidelines, it could not meet the need of connectivity conservation in practice. Moreover, connectivity conservation relates to expertise, it requires the establishment and maintenance of adequately resourced institutions to carry out research into risk in the decision-making and management.

3.2 Integrating Connectivity Conservation Factors Into Legal Frameworks

China needs to increasingly alert to connectivity conservation issues, strengthen and integrate connectivity conservation factors into legal frameworks, and use voluntary conservation initiatives to protect critical connectivity areas. A number of key elements are required consideration within legislation, which relate to plan content, the rights and responsibilities of all parties, and the process of environmental impact statement preparation.

Urban and Rural Planning Law may provide that connectivity conservation should be included in the overall planning of a city or town as mandatory contents. It should emphasize the important of linkages to surrounding ecosystems and ensure that the surrounding landscapes are managed for connectivity conservation. As a legally-mandated land use plan, it shall prohibit any development that is not consistent with the designated land use of a given area and/or allow for development only after formal approval has been given. Regional ecological master plans will be required to respect these national principles when mapping green and blue belts, and the corresponding master plans and local plans will be required to include them among their ecological connectivity objectives.

Environmental Protection Law may provide the definition of connectivity conservation, which should aim to protect and conserve natural ecosystems, biological diversity, and ecological processes. The important legal considerations involve creating certainty as to the basic rights and responsibilities of all parties to design and management connectivity conservation, defining common application of the ecological corridors, identifying indicators to measure performance and accountability, providing for scientific monitoring, placing on the quality of management, governance and sustainable financing, and including mechanisms to rectify malfeasance and the penalties. The law also may provides strengthen the connectivity conservation consciousness of local communities, enabling them to care for their environments, and emphasizing education and awareness building to promote self-enforcement and reporting.

EIA laws may expressly require that an assessment be undertaken for proposed plans, programs and projects with a potentially significant negative impact on connectivity conservation. The purpose of design criteria and operating guidelines is to guide the design and management of connectivity conservation, to take account of the various biophysical characteristics of connectivity conservation, and to develop these connectivity maps an effective process for delineating and prioritizing connectivity areas is essential. There are critical similarities and some unique inclusions in the steps described for designing corridors and connectivity in landscapes, including: creating a vision for extensive connectivity, scoping purpose and structuring goals, identifying conservation targets, establishing collaboration and partnerships, identifying information needs, gathering critical data, defining an appropriate conservation area, and designing robust mapping and assessment analysis (Aune, Beier, Hilty, & Shilling, 2015). The detailed guidelines could be incorporated in Technical Guideline for **Environmental Impact Assessment: Ecological impact**. In addition, other laws may establish certain requirements that make connectivity a necessary consideration, such as Law on

Protection of Wildlife, Grassland Law, Forest Law, Water Law, Fisheries Law, and Regulation on Nature Reserves.

CONCLUSION

In general, most natural conservation laws are required to link to natural connectivity in some manner. It is important to incorporate connectivity conservation considerations into legal frameworks, to support governments in instituting appropriate legislation to adopt specific mechanisms for connectivity, and make a decision-maker to carefully consider the impact of ecological connectivity. An important element for connectivity conservation policy and law is the link to socio-economic and sustainable development. It is benefit to emphasize the vital role of ecological connectivity play in sustainable development and the critical importance of working with and supporting local communities for achieving the connectivity conservation goals. The development of connectivity conservation initiatives in China should be from the urban scale to the regional scale, and further expand the spatial space of ecological corridors, in order to conserve natural ecosystems, biological diversity, ecological processes, and provide recreational functions, benefits for people.

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