Exploration and Application of Resilience Theory in Land Consolidation Engineering

Yufei Xiong1,2,3,4,*

1Shaanxi Geotechnical Engineering Research Institute Co., Ltd., Xi'an 710075, Shanxi China
2Shaanxi Provincial Land Engineering Construction Group Co., Ltd., Xi'an 710075, Shanxi China
3Key Laboratory of Degraded and Unutilized Land Remediation Engineering of Natural Resources Department, Xi'an 710075, Shaanxi China
4Shanxi Land Engineering Technology Research Center, Xi'an 710075, Shaanxi China

*Corresponding author e-mail: 295340477@qq.com

Abstract. Incorporating the theory of resilience into land remediation is an inevitable requirement of the development of the times. This paper explores the combination and application of resilience theory in land remediation projects through literature analysis and logical reasoning, and proposes the planning and design of land remediation. Relying on the theory of resilience, we should explore the theory of resilience and the direction of land rectification under the development of the times.

1. Preface
China has accumulated over 20 years of technology in land regulation. From the traditional local land regulation, mainly rural agricultural wastelands, at the very beginning, to the land regulation in urban and rural areas, the target of land regulation is generally the land that has not been properly used or damaged, that is, the land destroyed by disasters [1].

And with China's social development, ecological protection become a new focus times, with the green environmental protection idea of Jinshan silver, practice strict system of ecological environment protection has become a social consensus, in the face of new development, land management and to meet the new opportunities and new historical mission, the process of land reclamation in the future, need to adhere to the principle of green ecological, overall consideration of ecological environmental protection, innovation concept, optimize land reclamation technology path.

2. Development background of land regulation
Land management in our country has experienced three important period, for now, the current land management is in a critical period, facing the historical development background of the ecological environment protection, land reclamation engineering should take the ecological agricultural land and improve the living environment, to realize rural revitalization for the target into the fourth stage of the land reclamation work [2].

In combination with the requirements of ecological environment protection, the fourth stage of land regulation should not only enhance land productivity and improve land utilization efficiency, but also
give consideration to ecosystem function and structure, improve living environment of organisms, optimize ecological pattern and reduce ecological risks. Set dynamic targets to strengthen the construction of ecological landscape. In the future land remediation process, we should establish a sound ecological theory, renovate the land remediation technology and theoretical level, and realize the development goal of green ecological land remediation.

3. Concept and connotation of restorative force theory

The theory of restorative force means that while maintaining the original structure and function of the system, the system can strengthen its resistance to disturbance and shock and establish a system with restorative force so that the system can continue to operate and develop. According to the resilience theory, more and more human activities interfere with the nature, resulting in the impact of natural ecology.

At present, the interference of human activities to the nature is inevitable, and how to build a resilient ecosystem is the key to sustainable development. Here will land management as a dynamic system, the land management is one of human activities, combined with the restoring force theory, land management is defined as can reduce the land ecological risks, improve the land, the restoring force to keep the land intensive utilization, the sustainable utilization of a kind of human activity, and the restoring force theory surrounding land reclamation activity, can find its specific application field and range.

4. The enlightenment of restorative force theory to land regulation project

According to resilience theory, land management of the planning and design should be coordinated as a whole, the system balance, realize social ecological system, various dynamic balance, not only focus on the object of land reclamation monomer, at the same time, system should consider the influence of various dimensions of a single individual, such as biological scale, spatial scale, regional scale and the social scale, in order to ensure to the solution of the problem of land use, and land reclamation project subsequent interference by natural social and economic aspects, so as to achieve the requirements of sustainable development.

At the same time, land reclamation planning should use elastic design principle, using adaptive management measures in management, instead of the rigid control method, in ecological land management work, the land management center of gravity is still placed in land reclamation project, but should be integrated into the restoring force in the process of regulation theory, the planning and design has certain elasticity, and at the same time, the scheme should be conform to the principle of adaptive [3].

Should be paid attention to on the other hand, in the process of land reclamation, land may suffer from the interference and damage, make the land itself has certain ability to restore, maintain the sustainable utilization of land after the renovation of the follow-up, the specific regulation should be set in the corresponding protection corridor and buffer, combined with the natural and humanistic landscape, promote land reclamation and landscape engineering, the combination of both to ensure that the project continues to function, can also make land regulation after long term service to the society.

5. Resilience + ecological regulation mode design

Future land renovation engineering, + ecological resilience theory should be taken to control the mode, and “ecological +” land regulation principle, the difficulties of the work lies in the ecological itself has abstractness, diversity and complexity, the industry standard for ecological objectives to unification, and the restoring force theory provides a solution for ecological goals. The restoring force theory as the cohesive theory of land reclamation and ecological regulation, so as to optimize the land management work content, blend in land reclamation in restoring force theory, the regulation of the focus, not only focus on the existing problems for land use and at the same time focus on land, the interference and economic impact on the future, so as to improve the development of land use. In the
future, the land remediation project will inevitably be a comprehensive remediation, rather than a single project in the past, and the method will also be combined with a comprehensive balance, adaptive management and elastic system.

Under the guidance of the theory of restorative force, the future land regulation project should improve the system restorative force, organically combine the land regulation and ecological protection, and explore new development practices. In the future, the combination of the theory of restorative force and land regulation project remains to be further explored. The evaluation of the theoretical standard of resilience and the specific construction methods, as well as the ecosystem variables and thresholds with the land as the carrier, the establishment of land regulation and ecological model and the regulation methods and paths need to be further deepened.

6. Conclusion
Revitalization of ecological protection in the country, the development of the natural history background, our country's land reclamation engineering is faced with new opportunities and challenges, under the background of this development, we need innovation concept, innovation management, ecological land management is the development direction of the future, although the object of land management is still is not rational utilization of land, but, in the concrete regulation ways and means of restoring force can be introduced concept, innovation thinking of restoring force, the use of the land restoring force into the new target for land reclamation[4].

Restoring force theory provides the ecological transformation of land management methods and tools, by restoring force theory can establish a system of land reclamation project, but for now, the restoring force theory and land management related research has just started, the role and value has yet to be further test, in the future still need to continue to strengthen the development of resilience theory connotation, so as to bring more land regulation practice techniques and approaches.

References
[1] Xia Fangzhou, Yang Yumeng, Yan Jinming. Summary of Connotation Research on the Comprehensive Land Consolidation in China in the Past 40 Years: Phase Evolution and Development Changes [J]. China Land Science, 2018, v.32; No.242 (05): 80-87.
[2] Wang Jun, Zhong Lina. Ecological construction problems and development suggestions in land remediation [J]. Journal of Agricultural Engineering, 2017 (05): 316-322.
[3] Zhang tian, liu yan-xu, wang yang-lin. Acta ecologica sinica. 2017 (07).
[4] Yang Geng, Cao Yingui, Luo Gubai, et al. Research Progress on Ecosystem Resilience Evaluation [J]. Zhejiang Agricultural Sciences, 60 (03): 162-167.