Review on land management and ecological natural restoration evaluation

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Abstract: Many lands will be destroyed due to construction, development and utilization, thus losing the function of Ecological Environment Service. In 2019, the state put forward the strategy of ecological civilization and green development, the idea of Life Community of mountains, rivers, forests, fields, lakes and grasses, etc. This paper first introduces the foreign experience of land renovation and ecological natural restoration, and puts forward the evaluation angle of land renovation and ecological natural restoration. From the key issues of governance and rehabilitation, such as the prerequisite elements, cost-benefit analysis, value judgment and adaptability principle, we draw lessons from foreign research cases, constructing the path and strategy of land renovation and ecological natural restoration suited to China’s national conditions. The research provides the feasible measurement standard and the scientific basis for the enterprise and the government.

1. Introduction
Based on the experience of Foreign Countries, this paper discusses the key problems of the rehabilitation and restoration of the damaged land and Ecology in construction, development and utilization. Most of the Earth's land surface has been affected by man-made impacts and thus lost the function of environmental services. The rapid economic growth of the country in recent years has been accompanied by industrialization, urbanization, mining and the exploitation of oil, animal husbandry and other resources, among many other development activities that may have an impact on and damage to the land and ecology. Such as loss of biodiversity, biological reagents, heavy metals or radioactive elements of soil pollution caused by acidification, salinization, immersion, compaction and other damage; the ecological environment caused by erosion, eutrophication, loss of land functions, nutrient deficiency and other damage. Land Rehabilitation and natural ecological restoration means that the above-mentioned problems should be repaired and avoided. Mentis (2015) discusses the pros and cons of the hierarchical element. In the context of this article, this activity should be avoided if it can not be mitigated by a higher standard. If the damage has been more or less irreparable, as described below.
2. Overseas experience of land improvement projects and evaluation of ecological natural restoration

In the rehabilitation objectives, foreign land rehabilitation objectives can be divided into three aspects: (1) improve people's livelihood. In order to make use of the natural environment to improve the living and living environment of the residents, land rehabilitation should try to achieve species diversity, rich water resources, good air quality and the improvement of land production capacity. (2) improving the environment for agricultural development. Land Improvement is to strengthen the agricultural and forestry economic capacity by improving the conditions of agricultural production and development, and the European developed countries have significant advantages in this respect. Germany through the planning of agricultural land area, shape, the number of units occupied requires responsible enterprises to undertake the relevant areas of soil improvement and land development, through the role of modern machinery to achieve production and management scale development. (3) sustainable development and integrated planning. Germany pays attention to sustainable development, land planning and distribution, landscape and ecological construction in the pursuit of long-term value. The Netherlands coordinates the interests of farms, residents and the environment, solves employment problems, guarantees outdoor recreation facilities, allocates land as a whole and develops the regional economy in a sustainable way.

The concept of ecological restoration was first proposed by the United States Environmental Protection Agency in 1998 in a strategy for the treatment of contaminated sediments, which proposed that the self restoration of ecosystems could be achieved through the forces of nature. It is suggested that ecological natural self-repair should be realized as far as possible, and less artificial intervention should be used. Natural repair does not negate human initiative. Natural Restoration emphasizes the self-repair ability of the ecosystem, which is the change of the concept of ecological restoration. For a long time, ecological restoration has mainly taken man-made measures such as levelling land, soil stripping and reconstruction, vegetation planting and water pollution control. Success stories of artificial engineering restoration to restore damaged ecosystems are endless. But the quantity of artificial engineering restoration is large, the investment is big, the disturbance to the original ecosystem is serious. On the contrary, natural restoration emphasizes the self-repair ability of ecosystem and avoids the disturbance to original ecosystem in the process of ecological restoration, thus changing the concept of "man can conquer nature". However, in the process of natural repair, people are not bystanders, but supervisors, promoters or Interventionists, not dominators. There are two kinds of disputes about the concept of restoration abroad. (1) in the feasibility of ecological natural restoration, natural restoration is not laissez-faire, and sealed is different. Natural Restoration has been regarded as enclosure and laissez-faire, which has led to the illusion that natural restoration is to strengthen the enclosure and let the ecosystem develop freely. Based on the above understanding, some scholars criticized the "natural repair", that it does not conform to realism, is the escape of omission. In fact, sealing is often the preferred method in the natural restoration technology, because the natural restoration process is often slower and weaker than the artificial restoration, and the human interference is serious, the interference degree is greater than the natural restoration degree, the natural restoration of the ecosystem has been damaged to a great extent. However, whether or not a natural fix needs to be sealed depends on the nature of the repaired object. In the United States, for example, fences are used to insulate livestock from grasslands and farms, reducing biological density and diversity to ensure that ecosystems repair themselves. (2) in the applicability of ecological natural restoration, it is different from ecological natural restoration which calls for ecosystem self-restoration, and the subjective initiative and technical participation of human being are the special attributes of natural restoration. After coal mining on the Africa, replaced soil has a typical soil organic carbon content of 0.5%, while unmined topland soils have about 2% carbon. The rate of carbon was a significant function (P<0.0001) of management intensity (rated on 5-4-3-2-1 basis with two applications of nitrogen fertilizer and two defoliation per summer scoring 5, and no nitrogen and no defoliation scoring 1, R²=0.1239) and pasture age (years since establishment, R²=0.1718), via.

Percentage carbon = -0.021+0.053(age)+0.235(management) (R²=0.2687)
According to the definition of natural restoration, the difference of Engineering Investment Degree is the direct difference between natural restoration and artificial restoration. But it's more than that. Natural Restoration highlights the dominant role of the ecosystem and drives corporate responsibility from "effect restoration" to "process restoration". Under the applicability of Ecological Natural Restoration, the role of artificial restoration is relatively simple, the implementation effect is goal-oriented, and the artificial intervention in ecological natural restoration is unstable and destructive. Therefore, it is of great significance to regard the applicability of ecological natural restoration as an important factor in the decision-making of enterprises and governments in China.

3. The evaluation index system of land renovation and ecological natural restoration in foreign countries.

This revegetation paradigm was corroborated with several data bases involving hundreds of sample sites and showing association of perennial grass establishment and soil organic carbon with soil phosphate, potassium and zinc (Table 1). In regression analyses, available soil phosphate was the main independent variable to predict pasture structure, a proxy for revegetation success. There are other cases, such as high-potential land, where scarce or valuable resources are threatened by construction, development and utilization projects that are difficult to rehabilitate and restore, such as wetlands, which are rich in biodiversity but highly vulnerable to destruction. Seemingly simple activities, such as building underground gas and water pipelines, can have surprising effects. Pipes running down the slope can damage the porous wetlands on the slope, which are more permeable than adjacent undisturbed soil because of puncturing impermeable layers or because of inadequate compaction of backfill trenches, and serve as conduits for drainage wetlands. On less rugged land and on Sandy Topsoil on clay subsoil, the construction of pipelines can transform high slope land from arable or forest capacity to wetlands that are no longer viable for planting or afforestation. The pipe is laid at the bottom of the ditch, using sandy topsoil as a cushion and clay as a backfill, a process akin to an underground dam that blocks the flow of groundwater. An understanding of the structure of the landscape, especially its hydrological functions, helps to design the project and guide the restoration, thus restoring the original state and avoiding land degradation. Restoring previous biodiversity can be challenging. Usually, after the disturbance, there will be a place in complete opposition to the previous period, with no or only a few species. With the improvement of secondary succession conditions and the settlement of near and far species, the species richness gradually increased, and the structure and function of the ecosystem were developed. Secondary succession may span decades or centuries. This can be expected in forests, although in some cases the expected climax species richness and composition of restoration may be less than 70 years. Of course, predictions can fail, for example, because species with limited migration and reproduction can take a long time to settle down. Undisturbed native island vegetation in the "oceans" of disturbed areas can contribute to restoration of species richness and composition. These principles are expected to apply not only to forests but to all
vegetation types. The secondary succession of the savanna and Steppe may be faster than that of the forest. But in the steppes of southern Africa, which are humid and semi-arid, restoration can take decades. Fifty years later, satellite images could easily detect the route of underground fuel and water pipelines from space, and in the soil layers, these can also be easily detected at low levels of soil organic carbon and phosphate, as well as at sparse herbaceous layers and nearly a quarter of the composition of weeds or grout.

Table 1 Factor loadings in factor analysis of soil and plant variables for 432 pipeline sites

| Variables       | Factor 1 | Factor 2 | Factor 3 |
|-----------------|----------|----------|----------|
| ON_OFF          | 0.83     | -0.05    | 0.09     |
| Density (mg L⁻¹)| 0.07     | 0.33     | 0.09     |
| P (mg kg⁻¹)     | -0.48    | 0.04     | 0.02     |
| K (mg kg⁻¹)     | -0.63    | -0.15    | 0.12     |
| Ca (mg kg⁻¹)    | 0.01     | -0.88    | 0.27     |
| Mg (mg kg⁻¹)    | -0.00    | -0.88    | 0.17     |
| Acidity (mol kg⁻¹)| -0.00   | -0.02    | -0.97    |
| Cations (mol kg⁻¹)| -0.04  | -0.98    | 0.17     |
| H⁺              | -0.07    | 0.33     | -0.73    |
| Zn (mg kg⁻¹)    | -0.59    | 0.05     | 0.03     |
| Mn (mg kg⁻¹)    | -0.28    | 0.07     | -0.19    |
| Cu (mg kg⁻¹)    | -0.36    | -0.07    | -0.01    |
| Carbon (%)      | -0.88    | -0.25    | -0.08    |
| Clay (%)        | -0.14    | -0.52    | -0.12    |
| Pasture structure| -0.04   | 0.09     | -0.11    |

There are also three questions to consider when using cost–benefit analysis metrics. (1) consider the time cost. Remediation and rehabilitation is a long-standing or permanent project. As enterprises and governments, they will consider the discount investment in the cost of investment. However, there is no relevant answer in the study of which discount rate to use. There is no guarantee of future generations’ benefit if there is a high discount. Long-term survival is a real problem, even if the discount rate is low. If investment discounts were the only criterion, static cost–benefit analysis would be a better indicator. (2) consider the nature of the costs involved. In the conventional use of cost–benefit analysis, the cost of labor and mechanization can be measured in terms of price, choosing the cheaper option, but if it is the irreplaceable cost of environmental process (soil nutrient cycling, photosynthesis, weather, etc.), the cost of ecological natural restoration is indispensable and irreplaceable. This means that even without reducing the cost of investment in biosphere function, it can not avoid the loss of direct benefits due to slow environmental processes. (3) the Natural capital is not susceptible between the willing buyer and the willing seller, since the Natural capital has no definite market value and the price can only be estimated. Martinez Paz et Al. (2016) discussed issues related to environmental cost discounting, pricing and sustainability. Although the cost–benefit analysis indicator is somewhat flawed, the cost–benefit analysis could adjust for opportunity costs.

4. Conclusion and discussion
It is one-sided to regard the natural restoration of land and the ecological environment as the main measure. It is necessary to emphasize the subjective “Auxiliary” status of human beings. It is necessary to establish a reasonable value evaluation framework to guide the legislation and related behavior. The need for remediation and repair can not be justified by cost-effectiveness or science and technology, but rather by a value judgment that sustains the Natural capital of present and future generations.
Through the analysis of the assessment indicators of land rehabilitation and ecological restoration in South Africa in the rehabilitation and restoration standards and legal implementation can provide a certain reference. It points out the direction for establishing the evaluation index of land renovation and ecological natural restoration in line with China's national conditions, in the process of new urbanization, China's land rehabilitation and ecological natural restoration are now in an unprecedented strategic opportunity, and the advancement and development of land rehabilitation and ecological natural restoration are facing new situations and new opportunities, it is also faced with many severe challenges, and it is urgent to construct a new pattern of comprehensive rehabilitation of national territory.

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