Influencing factors and improvement strategies of forestry investigation planning and design

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Abstract: Forestry investigation planning and design is an important basic work in forestry production and construction. Scientific, rational and efficient forestry investigation planning and design is of great significance for promoting the sustainable development of forestry. This paper analyzes the natural factors, economic factors, technical factors and talent factors that affect the planning and design of forestry investigation, points out the existing problems in the current planning and design of forestry investigation, and puts forward some strategic suggestions for optimizing the planning and design of forestry investigation. It includes strengthening the basic theoretical research, improving the technical system of forestry investigation planning and design, establishing and improving the standards and norms of forestry investigation planning and design, strengthening the construction of talent team, and innovating the system mechanism, so as to provide references for improving the level of forestry investigation planning and design in China and promoting the high-quality development of forestry.

1. Introduction

Forestry investigation planning and design is a systematic engineering that scientifically establishes forestry development objectives, lays out forestry production and optimizes resource allocation on the basis of comprehensive investigation and evaluation of forestry natural resources and ecological environment in the region, uses multidisciplinary theories and modern technical means. High quality forestry investigation planning and design is the key link to carry out forestry production construction and promote forestry sustainable development. Since the founding of New China, China's forestry investigation, planning and design have made remarkable achievements, playing an important role in ensuring national ecological security, promoting forestry development, and serving economic and social construction. But at the same time, we should also see that with the rise of ecological civilization construction as a national strategy, forestry development has entered a new historical stage, and higher requirements are put forward for forestry investigation, planning and design. At present, there are still some problems in China's forestry investigation planning and design, such as relatively lagging basic theoretical research, technical means to be updated, and personnel construction to be strengthened, which restrict the improvement of quality and efficiency of forestry investigation planning and design to a certain extent. Based on the new development stage, the practice of new development concepts, and the construction of new development patterns, it is urgent to comprehensively improve the level of forestry investigation, planning and design, and better serve the national ecological civilization construction and high-quality forestry development. Therefore, it is urgent to deeply analyze the key factors affecting the planning and design of forestry investigation, and study and formulate measures and methods to improve the planning and design ability of forestry investigation.

2. Main factors affecting forestry investigation planning and design

2.1 Natural factors

Forestry production has a strong dependence on natural conditions, and different natural

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geographical elements such as topography, climate, hydrology and soil have an important impact on forest vegetation types, growth conditions and site conditions, thus affecting the content, precision requirements and technical route selection of forestry investigation planning and design. For example, forestry survey planning and design in mountainous and hilly areas require different sampling design and survey methods from those in plain areas. In general, natural factors affect the pertinence, scientificity and operability of forestry investigation planning and design mainly by affecting the background status of forest resources. Therefore, accurate grasp of regional natural geographical characteristics and full consideration of their impact on forestry production layout and growth and development are the prerequisite and basis for scientific forestry investigation planning and design [1].

2.2 Economic factors

Forestry development level is closely related to economic and social development level. On the one hand, the level of economic development determines the forestry input capacity of a region, affects the condition of forestry infrastructure, the level of forestry science and technology, and the ability of forestry management. On the other hand, different stages of economic development have different demands for forestry ecological products and forest products, which objectively requires forestry development to meet the needs of economic and social development. Therefore, it is of great significance to accurately grasp the level and trend of regional economic and social development for scientifically formulating forestry development objectives and reasonably determining forestry production layout. At the same time, the new changes in economic and social development also put forward new requirements for forestry investigation, planning and design, which need to coordinate ecological, economic and social benefits under the guidance of ecological priority and green development, and accelerate the high-quality development of forestry.

2.3 Technical factors

Modern forestry investigation planning and design has developed from the traditional manual drawing mode of field investigation to the digital investigation planning system integrating 3S(RS, GIS, GPS), digital mapping, mass data processing and other advanced technologies. Advanced and applicable technical means can significantly improve the breadth, depth, accuracy and efficiency of forestry investigation, and provide more comprehensive, accurate and timely data support for forestry planning and design. However, due to the gap in economic level and informatization level, the technical means of forestry investigation planning and design in different regions are still quite different, and some grassroots forestry work mainly relies on traditional means. Different technical means directly affect the quality of data and work efficiency, therefore, to improve the level of information technology, accelerate the application of advanced technology in forestry investigation planning and design, to improve the ability and level of work is crucial.

2.4 Talent factor

Forestry investigation planning and design is a highly technical work, which requires a master of forestry, mapping, computer, management and other multidisciplinary knowledge, with high professional ability and comprehensive quality. Talent is the primary resource of forestry investigation planning and design, and the quantity and quality of talent are directly related to whether the forestry investigation planning and design work can be carried out with high quality and efficiency. At present, China's forestry investigation planning and design talents are insufficient, knowledge structure is not optimized, high-level compound talents are lacking, grass-roots personnel aging problem is prominent, talent team construction lag has become a prominent shortcoming restricting the innovation and development of forestry investigation planning and design. Strengthening the construction of forestry investigation planning and design personnel, improving the mechanism of personnel training, use, evaluation and incentive, and focusing on cultivating a group of high-quality professional talents will inject new impetus and vitality into forestry investigation planning and design.

3. Strategic suggestions for optimizing forestry investigation planning and design

3.1 Strengthen basic theoretical research and consolidate the foundation of forestry investigation, planning and design disciplines

Forestry survey planning and design is a complex systematic engineering, involving forestry, ecology, geography, surveying and mapping, information science and other disciplines. Strengthening the basic theory research and consolidating the discipline foundation is the fundamental way to improve the scientific level of forestry investigation planning and design. On the one hand, we should base on the national forest situation of our country, focus on the key and difficult problems of forestry investigation planning and design, and continue to carry out basic and prospective research in forest ecology, forestry remote sensing, forestry informatics, etc., to provide solid theoretical support for forestry investigation planning and design. On the other hand, it is necessary to conform to the development trend of interdisciplinary integration, promote the deep integration of forestry investigation planning and design with surveying and mapping science, computer science, big data science and other related disciplines, broaden the research horizon, innovate the research paradigm, and enhance the scientific connotation and technical core of forestry investigation planning and design. At the same time, it is necessary to give full play to the main role of universities and scientific research institutes in basic research, strengthen the collaborative innovation of government, industry, university and research, build an innovation platform for open cooperation and cross-integration, and promote the transformation and application of basic theoretical research results. Local governments are encouraged to actively explore through rich practices, summarize and refine advanced and applicable technical models and practical examples in a timely manner, and promote the exchange of experience and the sharing of results among regions. Actively participate in and lead international exchanges and cooperation in the field of forestry investigation planning and design, learn from international advanced concepts and development experience, enhance the theoretical level and international influence of China's forestry investigation planning and design, and constantly consolidate the scientific basis of forestry investigation planning and design [2].

3.2 Improve the technical system of forestry investigation, planning and design, and improve the level of digital intelligence

Forestry investigation planning and design involve many links of forest resources and ecological factors investigation, evaluation, mapping, planning and so on. The technical means, data standards and precision requirements of different links are very different. It is necessary to base on the needs of forestry development, scientifically design standardized, standardized and modular survey planning technical schemes for different work objects and work contents, further refine and improve the index system, data standards, work processes and technical specifications of survey planning, etc., to ensure that all links are organically connected, synergistic and efficient, and to improve the accuracy, systematicness and operability of survey planning and design.

It is necessary to keep up with the development of surveying and mapping remote sensing and information technology, and accelerate the in-depth application and integration of advanced technologies such as Beidou navigation, unmanned aerial vehicle remote sensing and mobile GIS in all aspects of forestry investigation, planning and design. We should use Beidou navigation to achieve accurate positioning in field investigations, use remote sensing of unmanned aerial vehicles to obtain high-resolution images, and use mobile GIS to realize the integration of data collection, transmission, processing and mapping, so as to significantly improve the breadth, depth, accuracy and efficiency of field investigations. Strengthen cross-departmental and cross-industry data sharing and exchange, dig deep into the potential value of multi-source heterogeneous data, including continuous inventory of forest resources, forest fire prevention, forest pest census, etc., and realize the integration and integrated application of data.

We should actively promote the innovative application of new generation information technologies such as big data analysis, artificial intelligence, blockchain, and cloud computing in forestry investigation planning and design, and provide intelligent services such as intelligent

analysis, scenario simulation, and auxiliary decision-making for production management decisions. Use big data analysis to improve the automation and intelligence level of data processing, analysis, modeling, mapping, interpretation and other links, optimize resource allocation, and predict the development trend of forestry. Artificial intelligence technologies such as multi-agent, knowledge graph, and deep learning are comprehensively applied to strengthen intelligent interpretation and classification of complex terrain, complex ground objects, and areas with high canopy density, and improve the quality and efficiency of interpretation. We should also actively explore the application of blockchain technology in the confirmation of forest land rights, forest rights trading and other aspects, and promote the shared application of survey planning results. Cloud computing, big data and other technologies are used to build an integrated collaborative work platform for forestry investigation, planning and design, promote cross-regional and cross-departmental business collaboration and data sharing, significantly improve the digital, intelligent and visual level of forestry investigation, planning and design, and enhance the pertinency, scientificity and effectiveness of forest resource management.

3.3 Establish and improve the standards and norms of forestry investigation planning and design, and improve the standardization level of work

We should aim at building a modern forestry investigation planning and design system, and speed up the establishment of a standard system covering the whole process of investigation planning and design, all elements and all processes. On the basis of existing standards, further refine and improve the technical standards of operation procedures, data standards, drawing specifications, quality control and other key links of investigation planning and design, and unify the basic concepts and terms, investigation planning content, operation process, technical indicators, precision requirements, etc., to ensure that the standard system is systematic, targeted and operable.

We will improve the mechanisms for the formulation, dissemination, supervision and evaluation of standards and norms, and strengthen the authority and enforcement of standards. It is necessary to innovate the supply mechanism of standards and norms, promote the division of labor and cooperation between government functional departments, industry associations, market entities and social organizations in the revision of standards and norms, give full play to the enthusiasm of enterprises and third-party institutions to participate in the development of standards, and enhance the applicability, professionalism and advancement of standards and norms [3]. We should accelerate the establishment of a dynamic update and regular evaluation mechanism for standards and norms, adapt to the rapid development of new technologies and equipment, and enhance the adaptability and leadership of standards and norms for innovation.

We should actively participate in the formulation of international standards in the field of forestry investigation, planning and design, and strengthen exchanges and cooperation with international organizations such as the Food and Agriculture Organization of the United Nations, the International Organization for Standardization, and developed forestry countries in the field of standards and norms. We will encourage domestic organizations and institutions to participate deeply in the formulation of international standards and strive to have a say in more areas. In order to accelerate the convergence of domestic standards and international standards, we should actively adopt the internationally accepted advanced standards to improve the international recognition and influence of China's forestry investigation planning and design standards. In addition, it is necessary to strengthen the implementation of standards and norms, and improve the ability and level of grass-roots forestry workers to implement standards and norms through training, education, guidance and help. It is necessary to strengthen supervision and inspection of the implementation of standards and norms, establish and improve accountability mechanisms, and incorporate the implementation of standards and norms into business assessment and evaluation. It is necessary to exert the "hard constraints" of standards and norms, but also to strengthen policy guidance and public opinion publicity, fully mobilize the consciousness and initiative of all aspects of the implementation of standards and norms, promote the implementation of forestry investigation planning and design standards and norms, and constantly improve the standardization, refinement and scientific level of

forestry resource management.

3.4 Strengthen the construction of talent teams and enhance the professional level of forestry investigation, planning and design personnel

It is necessary to take the construction of forestry investigation, planning and design talents as the focus of the development of forestry talents, incorporate it into the overall plan for the development of forestry talents in the new era, formulate a special plan for the training of forestry investigation, planning and design talents, and establish a multi-level, multi-channel and diversified talent training system that is vertically connected by the state, province, city and county, and horizontally linked by universities, scientific research institutes, forestry departments and enterprises. It is necessary to give play to the role of the main position of talent training in colleges and vocational colleges with industry characteristics, adjust and optimize the layout of disciplines in a timely manner, and strengthen the construction of related disciplines such as forestry, surveying and mapping, geographic information, and computer. Innovative personnel training mode, strengthen the integration of production and education, cooperation between schools and enterprises, promote the teaching content and teaching methods to adapt to production practice and technological progress, and vigorously train composite and applied talents in the field of forestry investigation, planning and design. We encourage qualified universities and colleges to collaborate with research institutes and forestry departments to build a high-level scientific research platform to provide a broader stage for young talents to display their talents. It is necessary to make comprehensive use of government purchase services, project entrustment, technical rewards and other ways to strengthen cooperation with socialized professional institutions, and give play to the important role of enterprises in talent practice training. We should support leading enterprises and scientific and technological service institutions to participate in the joint training of talents, develop vocational training programs with forestry characteristics, provide internship and practice positions, and promote the precise connection between the supply side of talent training and the demand side of forestry development. Encourage and guide social capital to set up special funds for the development of forestry talents, and improve the diversified investment mechanism. It is necessary to further improve the personnel management and performance-based pay system of public institutions, optimize the mechanism for the use, evaluation and incentive of talents, smooth the channels for the growth and development of talents, and fully release the vitality of innovation and entrepreneurship of all types of talents. We will open up career development channels for highly skilled personnel and engineering and technical personnel, improve the treatment of skilled workers, and enhance the attractiveness of grass-roots front-line positions. It is necessary to innovate the cooperation mechanism of talents training between schools, localities and enterprises, promote two-way recruitment and temporary training of personnel from universities, scientific research institutes and grassroots forestry departments, improve training systems such as continuing education, and build a team of talents for forestry investigation, planning and design with professional and professional combination, reasonable structure and good quality [4]. In addition, it is necessary to vigorously promote the spirit of forestry in the new era, strengthen the ideal and belief education and professional ethics education of forestry investigation, planning and design personnel, enhance the sense of dedication, responsibility and mission, consciously integrate personal ideals into the great cause of ecological civilization construction, better shoulder the heavy responsibility of promoting the high-quality development of forestry, and constantly create a new situation in forestry investigation, planning and design.

3.5 Innovate the system and mechanism to stimulate new impetus for the development of forestry investigation, planning and design

In accordance with the basic idea of government-led and social participation, we should speed up the establishment and improvement of the management system of forestry investigation planning and design, straighten out the management system, optimize the allocation of functions, eliminate institutional obstacles, and build a management system of forestry investigation planning and design with reasonable division of labor, consistent powers and responsibilities, coordinated

operation and strong execution. It is necessary to innovate the financial investment mechanism, increase the central and local financial investment in forestry investigation planning and design, and improve the diversified investment mechanism with the project system and the contract system as the main way. We will adhere to government guidance and market leadership, give full play to the decisive role of the market in allocating resources, improve market-based operating mechanisms, actively attract the participation of private capital, and expand channels of investment and financing. We should speed up the reform of "decentralization service", create a market environment of fair competition, and stimulate the internal power of market players to participate in forestry investigation planning and design. It is necessary to accelerate the deep integration of investigation, planning and design with production practice, and strengthen the application and transformation of investigation and planning results in various fields such as forest management, resource management and protection, and disaster prevention and reduction. Demand-oriented, accelerate the formation of a social service system covering all aspects of investigation, planning and design, and provide convenient, efficient, high-quality and professional technical services for various subjects. We will support the development of specialized social investigation agencies and third-party monitoring and evaluation agencies, and improve the capacity and level of socialized services for investigation and planning.

In view of the new requirements for forestry investigation planning and design put forward by the implementation of major national development strategies and major project construction, it is necessary to establish and improve the collaborative working mechanism of departmental coordination, military-civilian integration, and government-enterprise linkage, integrate industry advantage resources, realize data sharing, resource sharing, and result sharing, and form the overall joint force of investigation planning and design work. We should actively cultivate and develop a group of professional and market-oriented socialized forestry investigation planning and design institutions, encourage leading enterprises and scientific and technological service institutions to deeply participate in the investigation and planning work, give play to the positive role of the market mechanism in promoting the optimal allocation of resources, and improve the professional and refined level of forestry management. It is necessary to adhere to the Party's overall leadership and strengthen the party's unified leadership of forestry investigation, planning and design. We should give full play to the role of grass-roots party organizations as fighting fortresses and the vanguard and exemplary role of party members, unite and lead the majority of forestry workers to emancipate their minds, reform and innovation, promote the continuous innovation of forestry investigation, planning and design concepts, technologies, methods and mechanisms, and contribute wisdom and strength to the construction of a beautiful China.

4. Conclusion

In short, forestry investigation planning and design is a key link to ensure the development of forestry science and promote the modernization of forestry governance system and governance capacity. It is necessary to accurately grasp the key factors affecting the forestry investigation planning and design, base on the national forest situation in China, focus on the needs of ecological civilization construction, follow the law of forestry development, speed up the construction of a modern forestry investigation planning and design system with complete system, sound system, advanced technology and excellent talents, constantly create a new situation of forestry ecological construction, and make new and greater contributions to the construction of beautiful China.

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