Karst World Natural Heritage Site of the South China Karst has taken effective measures and been effectively protected.

5.2. Village communities in World Heritage properties and buffer zones face conservation and development issues. How to develop is a major challenge. Yaoshan Township in the buffer zone of Libo World Natural Heritage Site, relying on the outstanding natural heritage resources and local unique culture, has explored five "becomes" to achieve sustainable development of the village.

5.3. World heritage protection can provide high-quality natural resources, tourist resources and policy resources for the development of village communities, and the development of village communities can feed the protection of World natural heritage in terms of raising the awareness of local residents, improving the economic level, improving the appearance of villages and other aspects.

A SINGLE LATENT PLANT GROWTH-PROMOTING ENDOPHYTE BH46 *ENHANCES HOUTTUYNIA CORDATA* THUNB. YIELD AND QUALITY

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Plant growth-promoting endophytes (PGPE) can efectively regulate plant growth and metabolism. The regulation ismodulated by metabolic signals, and the resulting metabolites can have considerable efects on the plant yield and quality. Here, tissue culture *Houttuynia cordata* Thunb., was inoculated with *Rhizobium* sp. (BH46) to determine the efect of BH46 on *H. cordata* growth and metabolism, and elucidate associated regulatory mechanisms. The results revealed that BH46 metabolized indole-3-acetic acid and induced 1-aminocyclopropane-1-carboxylate deaminase to decrease ethylene metabolism. Host peroxidase synthesis MPK3/MPK6 genes were signifcantly downregulated, whereas eight genes associated with auxins, cytokinins, abscisic acid, jasmonicacid, and antioxidant enzymes were signifcantly upregulated. Eight genes associated with favonoid biosynthesis were significantly upregulated, with the CPY75B1 gene regulating the production of rutin and quercitrin and the HCT gene directly regulating the production of chlorogenic acid. Therefore, BH46 infuences metabolic signals in *H. cordata* to modulate its growth and metabolism, in turn, enhancing yield and quality of *H. cordata*.

AN ASSEMBLED BACTERIAL COMMUNITY ASSOCIATED WITH *ARTEMISIA ANNUA* L. CAUSES PLANT PROTECTION AGAINST A PATHOGENIC FUNGUS

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The microorganisms associated with a plant influence its growth and fitness. These microorganisms accumulate on the aerial and root surfaces of plants, as well as within the plants, as endophytes, although how the interaction between microorganisms protects the plant from pathogens is still little understood. In the current study, the impact of assembled

the bacterial communities against the pathogenic fungus to promote *Artemisia annua* L. growths was investigated. We established a model of bacterium–fungus–plant system. Eight bacterial strains and a fungal pathogen *Globisporangium ultimum* (Glo) were isolated from wild *A. annua* roots and leaves, respectively. We assembled the six-bacteria community (C6: *Rhizobium pusense*, *Paracoccus* sp., *Flavobacterium* sp., *Brevundimonas* sp., *Stenotrophomonas* sp., and *Bacillus* sp.) with inhibition,and eight-bacteria community (C8) composing of C6 plus another two bacteria (*Brevibacillus nitrificans* and *Cupriavidus* sp.) without inhibition against Glo inindividually dual culture assays. Inoculation of seedlings with C8 significantly reduced impact of Glo. The growth and disease suppression of *A. annua* seedlings inoculated with C8 + Glo were significantly better than those of seedlings inoculated with only Glo. C8 had more inhibitory effects on Glo, and also enhanced the contents of four metabolites in seedling roots compared to Glo treatment only. Additionally, the inhibitory effects of root extracts from *A. annua* seedlings showed that Glo was most sensitive, the degree of eight bacteria sensitivity were various with different concentrations. Our findings suggested that the non-inhibitory bacteria played a vital role in the bacterial community composition and that some bacterial taxa were associated with disease suppression. The construction of a defined assembled bacterial community could be used as a biological fungicide, promoting biological disease control of plants.

APPLICATION OF MACHINE LEARNING TECHNOLOGY IN DYNAMIC MONITORING AND MANAGEMENT OPTIMIZATION OF FOREST RESOURCES

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This project explores how machine learning technology can be utilized to enhance the efficiency and accuracy of forestry resource dynamic monitoring and management. We are planing to construct an efficient data processing platform, based on our previous knowledge, that integrates multiple data sources, providing accurate and real-time data support for machine learning models. Additionally, we are developing specialized deep learning models, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN), for identifying and predicting changes in forestry resources. Experimental results show that the application of these technologies may significantly improve the scientific and effective management of forestry resources.

1. Introduction. Forestry resources are a crucial component of ecosystems, vital for maintaining ecological balance and promoting sustainable development. However, traditional forestry resource management faces challenges such as difficulties in data acquisition and low data processing efficiency, making it hard to meet modern demands. Recent advancements in big data and machine learning technologies offer new opportunities for improving forestry resource management. This project explores how machine learning can enhance the dynamic monitoring and management of forestry resources.

Forestry resources are widely distributed, with diverse data sources including satellite remote sensing images, ground meteorological station data, and drone aerial images. The large volume and variety of these data make efficient integration a significant challenge. Traditional data processing methods, often reliant on manual operations, are inefficient and error-prone, especially with large datasets. Additionally, the lack of real-time data processing capabilities hinders timely and accurate decision-making.