Study on the Countermeasures of the Impact of Alien Invasive Organisms in Agriculture and Forestry on Biodiversity and Ecological Security

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Abstract: Invasion of alien species into new habitats may cause serious ecological disasters to the local area, lead to the loss of biodiversity, and then threaten the living environment of human beings, which has become one of the serious global environmental problems. This paper analyzes alien invasive species and their hazards, the way of invasion, and the impacts and causes on our country, and also introduces the influence and management of alien invasive species, and puts forward countermeasures and suggestions on the impact of alien invasive species on biodiversity and ecological security.

1. Introduction

For a specific ecosystem and habitat, any non-native organism is called an alien organism. It is a process in which organisms invade into another new environment through natural or man-made way from the original living place, causing economic loss or ecological disaster to the biological diversity, the production of agriculture, forestry, animal husbandry and fishery, and the health of human beings[1]. Generally speaking, it is that alien species “invade and defeat” local species, “anti-guest oriented” leads to local ecological imbalances, which in turn leads to a series of problems. Biodiversity is the material basis for maintaining basic ecological processes and living systems, and it is also the basis for bio-safety[2]. Internationally, the International Union for Conservation of Nature (IUCN) has listed alien invasive species as the second largest threat to global biodiversity, second only to habitat destruction[3].

At present, although the management and control of alien invasive organism have achieved certain results, there are still a series of problems and obstacles in the management and control of alien invasion[4]. Therefore, based on the summary of the characteristics of alien species in the invasive area, and from the perspective of the natural-society-economic complex system, the investigation of alien invasive species is carried out, and the risk assessment index systems and risks for alien species that threaten ecosystems, ecological environments or species Evaluation methods and risk management procedures to explore the mode of biological invasion in Kunming; on this basis, establish and improve relevant regulations, strengthen the safety management of unintentional and intentional introduction of alien species, and put forward management strategies and legislative proposals for biological invasion. It is of great significance for the development and utilization of biological resources and tourism resources, the implementation of sustainable development strategies, and the promotion of the protection of biodiversity in our province and even in the world.

2. Invasion of Alien Organism and Ecological Security

For a specific ecosystem and habitat, any non-native organisms are called alien organisms, which refers to a species, subspecies or low-level taxon that appears outside its natural distribution range and distribution location (i.e. those that are naturalized outside the original distribution range or are not introduced directly or indirectly “or cannot be colonized without human activities), including those that can survive and any part, gamete, or propagule of reproduction[5]. Alien invasive species

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refer to the alien species that threaten the ecosystem, habitat, species and human health. Alien invasive species include plants, animals, and microorganisms. Biological invasion refers to the process in which organisms invade into another new environment through natural or man-made way from the original living place, causing economic loss or ecological disaster to the biodiversity, agriculture, forestry, animal husbandry and fishery production and human health of the invasive area. Ecological security refers to whether the structure of an ecosystem is damaged and its ecological function is damaged. When the quantity and quality of services provided by an ecosystem are abnormal, it indicates that the ecological security of the ecosystem is threatened and in the state of ecological insecurity. Ecological damage will make people lose a large number of living space, and thus produce a large number of ecological victims and impact the stability of the surrounding society. Ensuring the national ecological security is the primary task of ecological protection. Therefore, developing the ability of prevention and control of alien pest species is not only fulfill the commitments to international conventions, the more important reason is that alien species threaten the national ecological security[6].

The so-called biological invasion mainly refers to the damage and destruction of the structure and ecological function of the original ecosystem caused by the entry of alien species, resulting in the structural imbalance and functional degradation of the ecosystem, mainly manifested in the destruction of the structure of the food chain of the original ecosystem by the introduced species, and the change of the site balance of the long-term stable ecosystem.

3. The Way of Alien Biological Invasion

Biological invasion occurs when a creature (no matter what type of creature) arrives an area beyond its origin. It has two meanings, first, the species must be alien, non-native, and second, the alien species can settle, reproduce and spread in the local natural or artificial ecosystem, and ultimately significantly affect the local ecological environment, damage the local biodiversity. Alien species can be successfully invaded through three ways: One is the introduction of species used for agriculture, forestry, animal husbandry and fishery production, landscape beautification, ecological environment reconstruction and restoration, and ornamental purposes, and then “evolves” into invasive species. At present, there are 107 species of exotic weeds in 75 genera in China, of which 62 kinds of weeds were intentionally introduced; the second is the species introduced along with trade, transportation, tourism and other activities[7].

In nature, biological invasion is a ubiquitous phenomenon. The species of biological invasions include almost all biological groups. Their invasion has affected every ecosystem and biota everywhere, making hundreds of local species in extinction! Especially in islands and some special phenomenon centers. On the geological time scale, it profoundly affects the biological distribution of the earth. The history of natural invasion coincided with the first biological spread on earth. But most of the modern biological invasions originated from human activities. In agriculture, forestry, animal husbandry and aquaculture! The introduction of species greatly promoted the advancement of human material civilization in the early days. Today, the development of science and technology and the convenience of transportation make the biological invasion caused by human influence particularly unprecedented in number and scope. Environmental pollution and habitat destruction provide favorable conditions for the spread of alien invasive species, and global warming has caused many species that carry pests and diseases. For example, mosquitoes have greatly expanded the ecological scope, emphasizing the economic globalization of free trade and the development of tourism are long-distance migration of alien species to new and destroyed habitats, and become their suitable habitat, thereby forming invasive species.

4. Strategies for the Impact of Invasive Organisms on Biodiversity and Ecological Security

The management of alien invasive species is a hot issue and an important part of the Convention on Biological Diversity, which stipulates that the impact of alien invasive species on biodiversity must be prevented and controlled. The Conference of the Parties to the Convention has formulated

and adopted the “Guiding Principles on the Prevention, Introduction and Mitigation of Impacts of Alien Species That Threat to Biodiversity”, which requires countries to prioritize the issue of alien species and integrate alien invasive species into national biodiversity policies , strategy and action plan. Encourage Parties to strengthen capacity-building and conduct risk assessment and analysis of threats posed by alien invasive species to biodiversity; formulate economic incentives and penalties, as well as other policies and instruments to reduce the activities of alien invasive species threats. The propaganda theme of the “International Biodiversity Day” developed by the United Nations Environment Program is “Alien Species Management and Biodiversity Conservation”[8]. Carry out a comprehensive and systematic investigation of the types, numbers, distribution, impacts, and losses of alien invasive species invasions in our country. Formulate regulations and technical specifications for the prevention, management, and prevention of alien invasive species. Formulate a “ blacklist of alien invasive species”, relevant departments can carry out targeted and designated quarantine according to the “blacklist” to prohibit their entry. For the introduction of alien species beyond the “blacklist”, risk assessment, analysis and follow-up monitoring shall be carried out. Establish an information system and strengthen information exchange. A “alien invasive species database” has been established, and a “Chinese alien species database” is being established based on the survey results. Establish a risk assessment system and set up an interagency and multidisciplinary risk assessment and analysis committee for alien invasive species. Establish an early warning system and a rapid response mechanism, early warning of possible alien species based on information materials, strengthen preventive measures; early warning of alien invasive species to prevent the spread and spread. Establish a supervision system for the alien invasive species-follow up and monitor the introduced species, establish archives, and once it is found to have an impact on biodiversity, immediately start a rapid response mechanism to remove it. Carry out publicity and training, improve public awareness, and provide technical training for relevant personnel on the management methods of prevention, control and removal of alien invasive species, risk and environmental impact assessment, ecosystem restoration, etc., so as to improve management level. Only by conducting research on the issue of alien invasive species can we provide a basis for scientific and correct decision-making. The current research focuses on: alien species (including consciously introduced species) environmental impact and risk assessment technology, prevention basis, technology and methods, prediction model of the impact of the alien species on the ecological and economic costs in the given area, the prediction index system alien invasion species, the restoration of invaded ecosystem, etc. Create a demonstration area for alien invasion organism management. The system of monitoring, management and control of alien organisms should be demonstrated by examples[9].

At present, the key to solve biological invasion in China is to strengthen the research on biological invasion, clarify the species, distribution and mechanism of invasion, evaluate the ecological harm caused by invasion species, and study the control countermeasures and specific technologies. Under the guidance of scientific research results, it is possible to fundamentally solve the threat of invasive alien organisms. Therefore, the establishment of early warning and decision-making by national and local management departments, as well as the practice of prevention and control of invasive alien organisms have prove that it is imperative to accelerate the establishment of pest risk assessment (PRA) system.

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