

陕西秦岭退化林修复目标林分

魏琨¹

(1.西北农林科技大学 陕西杨凌 712100)

摘要:【目的】由于过度采伐,外来物种引种、火灾、雪灾和风灾等自然因素、人为因素及二者的不利影响,全球森林面积锐少,退化现象严重。森林退化导致林分生产力下降,生物多样性减少,森林生态系统服务功能失调,严重制约了社会和经济可持续发展,由于森林退化原因的复杂性、退化类型和经营目的多样,目前关于退化林的认识不统一,修复成功无统一衡量标准,限制了退化林修复工作的快速推进。旨在给退化林修复成功提供参照,构建一个科学合理的森林健康评价体系。【方法】陕西秦岭林区尚存在一定的干扰程度较轻的天然林,本研究以此为研究对象,基于 Vigour-Organization-Resilience (VOR) 模型,以森林健康为目标层,遵循科学性与可获取性相结合的原则,使用活力(V)、组织力(O)和恢复力(R)三个指标作为准则层,选定蓄积量、郁闭度、森林密度、林龄、树种丰富度、灌木及草本丰富度及盖度 10 个指标为指标层,构建森林健康评价指标体系,采用层次分析法确定评价指标权重和综合得分值,对选定林分进行评价。【结果】所选林分单位面积蓄积量在 137.98-583.46 $\text{m}^3 \cdot \text{hm}^{-2}$ 间,高于陕西省单位面积森林平均蓄积量 53.97 $\text{m}^3 \cdot \text{hm}^{-2}$,并且高于全国森林平均单位蓄积量 86.22 $\text{m}^3 \cdot \text{ha}^{-2}$,林分郁闭度在 0.6-0.85 间,林分密度在 700-1667 株 $\cdot \text{hm}^{-2}$;除油松锐齿栎天然混交林外,其余 7 个林分均为幼、中龄林;7 个林分树种丰富度在 3-14 种间,林下植被种类丰富、灌、草盖度较高;除红桦天然林和油松锐齿栎天然混交林外,其余林分均有一定的更新能力。巴山冷杉天然林、巴山冷杉铁杉杂木天然混交林、铁杉天然林、锐齿栎天然林以及油松锐齿栎天然混交林健康等级为良,其余林分健康等级为中。【结论】尽管退化林蓄积量较高,显示出修复潜力,但质量多集中在中等至良好水平,需要通过抚育管理等措施提升森林质量。此外,研究提供了评估退化森林健康的结构化框架,并提出了清除地被物、扰动枯枝落叶层、精细抚育促使珍贵用材树种特用经济树种和药用植物种群扩增等管理建议,促进退化森林向正向演替方向发展。除油松锐齿栎天然混交林为过熟林外,其余林分均可作为陕西秦岭退化林修复的参照林分,可以为退化林的修复提供科学依据和具体指导,促进秦岭林区森林生态系统的健康和可持续发展。

关键词: 退化林修复; 森林健康评价; AHP 层次分析法; VOR 模型

Quality assessment of degraded forests in major stand types in the Qinling region

Wei Kun¹

(1. Northwest A&F University, Yangling 712100)

Abstract: 【Objective】 Due to over-harvesting, introduction of exotic species, fires, snowstorms and windstorms, and other natural and anthropogenic factors, and the adverse effects of both, the global forest area has been drastically reduced and degradation is serious. Forest degradation has led to the decline of forest productivity, the reduction of biodiversity, and the dysfunction of forest ecosystem services, which has seriously constrained the sustainable development of society and economy. Due to the complexity of the causes of forest degradation, the

variety of degradation types and management purposes, the current understanding of degraded forests is not uniform, and there is no uniform measurement of the success of restoration, which has restricted the rapid advancement of the restoration of degraded forests. The purpose is to provide a reference for the success of restoration of degraded forests and to construct a scientific and reasonable forest health evaluation system. **【Method】** Based on the Vigour-Organization-Resilience (VOR) model, we used forest health as the target layer, followed the principle of combining science and accessibility, and used the three indexes of vitality (V), organization (O), and recovery (R) as the criterion layer, and selected the volume of stocking as the criterion layer. As the criterion layer, 10 indicators were selected as the indicator layer, including stocking, closure, forest density, forest age, tree species richness, shrub and herb richness and cover, to construct the forest health evaluation index system, and the hierarchical analysis method was used to determine the weights of the evaluation indexes and the comprehensive score value to evaluate the selected forest stands. **【Result】** The selected forest stands had a stock volume per unit area of 137.98-583.46 $\text{m}^3\cdot\text{hm}^{-2}$, which was higher than the average stock volume per unit area of forests in Shaanxi Province (53.97 $\text{m}^3\cdot\text{hm}^{-2}$) and higher than the national average stock volume per unit of forests (86.22 $\text{m}^3\cdot\text{hm}^{-2}$), a stand closure degree of 0.6-0.85, and a stand density of 700-1667 plants $\cdot\text{hm}^{-2}$; except for the oleander pine, the sharp-toothed oak, the oak tree, the oak plantation, the oak tree, the oak tree, the oak tree, the oak tree, the oak tree, the oak tree, the oak tree, the oak tree, the oak tree, and the oak tree. The density of the forest stands ranged from 700-1667 plants $\cdot\text{hm}^{-2}$; except for the natural mixed forests of *Pinus sylvestris* and *Pinus sylvestris*, the other seven forest stands were young and middle-aged forests; the richness of the tree species in the seven forest stands ranged from 3-14 species, with a rich understory vegetation, and a high cover of shrubs and grasses; except for the natural forests of *Betula angustifolia* and *Pinus sylvestris* natural mixed forests, the rest of the forests had a certain degree of regeneration capacity. The health grade of Bashan fir natural forest, Bashan fir-hemlock natural mixed forest, hemlock natural forest, sharp-toothed oak natural forest and creosote bush sharp-toothed oak natural mixed forest is good, and the health grade of the rest of the forest stands is medium. **【Conclusion】** Although degraded forests have high stock levels and show potential for restoration, the quality is mostly concentrated at moderate to good levels, and it is necessary to improve the quality of forests through conservation management and other measures. In addition, the study provided a structured framework for assessing the health of degraded forests, and made management recommendations such as removing ground cover, disturbing the deadwood layer, and promoting the expansion of populations of valuable timber species, special economic trees and medicinal plants through fine conservation, so as to promote the development of degraded forests towards positive succession. Except for the natural mixed forest of *Pinus sylvestris* and *Quercus serrata*, which are over-matured forests, the other forest stands can be used as reference forests for the restoration of degraded forests in the Qinling Mountains of Shaanxi Province, which can provide a scientific basis and specific guidance for the restoration of degraded forests, and promote the health and sustainable development of forest ecosystems in the forested areas of the Qinling Mountains.

Key words: Restoration of degraded forest; Forest health assessment; AHP hierarchical analysis; VOR modeling