

OLD-GROWTH FORESTS: AN ECOSYSTEM APPROACH

Monitoring and assessing old-growth forest stands by plot sampling

P. CORONA¹, C. BLASI², G. CHIRICI³, L. FACIONI², L. FATTORINI⁴, & B. FERRARI¹

¹Dipartimento di Scienze dell'Ambiente Forestale e delle sue Risorse, Università della Tuscia, Italy, ²Dipartimento di Biologia Vegetale, "Sapienza" Università di Roma, Roma, ³Dipartimento di Scienze e Tecnologie per l'Ambiente e il Territorio, Università degli Studi del Molise, Isernia, and ⁴Dipartimento di Metodi Quantitativi, Università di Siena, Italy

Abstract

Forest inventories are evolving towards multipurpose resource surveys, broadening their scope by including additional topics such as biodiversity issues. Surprisingly, few quantitative surveys have been devoted to old-growth forests, even if they constitute the most acknowledged forest biodiversity icons. In this framework, the use of probabilistic sampling may provide an effective as well as rigorous support for monitoring and assessing old-growth forests. To this purpose, the present paper proposes a two-phase sampling scheme. In the first phase, a coarse survey of few floristic and stand structural attributes is carried out by means of small plots systematically placed on the study area. Subsequently, in the second phase, a fine assessment of a large number of ecological attributes is performed on a subset of enlarged plots selected among the first-phase ones by means of simple random sampling without replacement. The proposed sampling scheme is implemented for monitoring and assessing the old forests of Cilento National Park (southern Italy). Results and comments are provided as an exemplificative case study.

Keywords: *Forest inventory, probabilistic sampling, species accumulation curve, structural attributes, two-phase sampling*

Introduction

Sound ecosystem management depends on accurate, complete, and concise information regarding the extent, condition, and productivity of natural resources. Determining such properties is commonly an agreed objective of environmental survey programs, at various scale levels. Each of such properties can also be investigated with regard to its change with time. Distinctively, monitoring and assessment programs are valuable for providing broad overviews to help strategic and tactic planning development and allow to place land managers into a perspective that facilitates the prioritization of the limited financial resources usually available for ecosystem management.

The opportunity and feasibility for monitoring and assessment programs focused on an overall survey of forest ecosystem attributes evolving into comprehensive environmental inventory programs have been widely devised and well shared throughout the world (Corona & Marchetti 2007). Forest

inventories are currently evolving towards multipurpose resource surveys, broadening their scope by including additional topics such as biodiversity issues. Surprisingly, few quantitative surveys have been devoted to old-growth forests, even if they actually constitute the most acknowledged forest biodiversity icons. Perhaps, most of the results concerning old-growth forest inventories are not published nor are they accessible.

A favorable combination of environmental factors (e.g., location in remote mountain areas) and historical events (e.g., former ancient royal forests today included in strict forest reserves) let small patches of forests to remain untouched long enough to attain an old-growth condition. These forests are outstanding hotspots of forest biodiversity at regional and continental scales, as they retain diverse groups of plants, fungi, and species associated with the later stages of stand development. In this respect, the monitoring of old-growth forests together with all stands dynamically near to the later stages of forest development is of specific relevance in Europe