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Standardized Hierarchical Vegetation Classification

Mexican and Global Patterns

 Springer

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Apostolado en las Alturas

Ernesto Velázquez Hurtado†

*A quien se esfuerce en subir a la montaña
A quien conoce el aire plácido de las Alturas
A quien sudando entre el hielo, la nieve y las alburas
A quien se encuentre esclavo con la hazaña
A quien practique el sermón en la montaña*

*A quien entienda lo dicho y lo comulgue
A quien a esfuerzo titánico se humille
A quien a esas alturas se arrodille
A quien con valor la verdad divulgue.*

To Jerzy Rzedowski and Graciela Calderón who devoted more than half a century to inspiring generations of emerging naturalists to increase the knowledge of botany worldwide. Jerzy and Graciela planted the seed in the authors of this book by making us understand that botanical studies were unthinkable without remote sensing tools. Their vision was innovative and stimulating and we simply express our appreciation and admiration by means of this humble contribution.

Foreword

During this past decade, there have existed two realities in the study of vegetation. On the one hand, there has been an enormous quantity of information amassed, and, on the other, applying any of the existing classification systems to specific conditions in Mexico can be difficult. This has led to reflection, upon analysis, revision, readjustment, and specification, on a newly proposed vegetation classification system, the adoption or rejection of which will serve as an indication of its success.

The first chapter of this work consists of an historic review of the prevalent approaches to the study of vegetation both in Mexico and in other regions of the world. The second chapter analyses succinctly the existing schools of thought which have led to the development of vegetation classification systems based on physiognomic, structural, and floristic approaches.

The nub of the work is found in the third chapter, in which the proposed—Standardized hierarchical Mexican vegetation classification system|| (SECLAVEMEX—Sistema jerárquico estandarizado para la clasificación de la vegetación de México) is presented. Organizational levels are laid out along with the criteria defining them and the nomenclatural basis for the denomination of each type of vegetation. Also included is a series of tables explaining and defining precisely the meaning of each concept, criterion, character, and element used with a view to assisting the reader in successfully identifying the type of vegetation in a determined area.

The fourth chapter highlights SECLAVEMEX's inclusive character as evidenced through its compatibility with systems currently prevalent in the Western world and in the tropics. The fifth chapter deals with a core current issue regarding the mixed approach to study land cover/land use/vegetation patterns. This chapter clarifies the (dis)similarities among concepts, tools and advantages of studying vegetation from an inclusive approach where these three concepts and used coherently towards a common goal.

There can be little doubt that the danger to plant life has moved on from being an alarming rate of extinction in terms of individual species to being one of an accelerated rate of habitat loss. In both cases, a good stocktaking is increasingly

urgent, while, equally as crucial, is gathering information on vegetation from the perspective of having an adequate knowledge of natural resources. In Europe, for example, thanks to the adoption of the phytosociological approach more than a century ago as a basis for the study of vegetation, today, there are strategies for the management and conservation of habitats. In Canada and in the USA, the task was undertaken only a few decades ago, and, today, there are already promising results.

An additional motive behind this work is the urgent need to define universal criteria with the aim of creating a common tool in the struggle to preserve natural heritage, not only for the sake of knowledge, but also for future generations.

We, the authors, are convinced that this work is not by any means complete and that it will be the task of those who decide to try to use SECLAVEMEX to refine and adjust it to particular situations. This current work is but an effort to contribute to a rigorous yet user-friendly technical–scientific classification and inventory framework for all types of vegetation in Mexico.

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A number of significant people have contributed their special gifts to help accomplish this book. The first author (Alejandro) could have not found greater motivation than from his wife Cecy Salgado and his son Erick Velázquez who in the past decade have supplied endless and warm support. The second author (Consuelo) found her motivation from her nephews. Amador acknowledges his wife Laura Torres and his students for pushing him forward in difficult times. To all of them, our most sincere appreciation and love.

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Prologue

In this volume, Alejandro Velázquez, Consuelo Medina, Elvira Duran, and Alfredo Amador and Luis Fernando Gopar (who work in three research centres of the Universities of Morelia and Oaxaca in Mexico) describe a new system of classification of the vegetation of Mexico, SECLAVEMEX (*Standardized Hierarchical Mexican Vegetation Classification System*).

The classification of vegetation cover has always been and remains one of the most important themes in the study of vegetation. The goal of classification was to establish groups, or classes, that cover relatively homogeneous phenomena in wide areas. This goal can be achieved on the basis of various criteria, such as physiognomy and structure, species and ecology, biogeography, dynamism, and genetics, as seen in the proposals of the succession of authors from 1800 to the present, among whom it is well to mention Brockmann-Jerosch, Rübél, Diels, Huguet del Villar, Sukaciov, Sochava, Dansereau, Kùchler, Gaussen, Fosberg, Beard, Ellenberg, and Mueller-Dombois.

Chronologically, the first proposals referred to the physiognomy and structure of the vegetation; over the years as our geobotanical knowledge about the earth advanced, they were substituted by more complex and detailed proposals that also took into consideration ecological and floristic aspects.

Vegetation classification can be done deductively, moving from higher hierarchical units to lower ones, or inductively, when one starts from lower units and progresses towards the higher ones. The typological system of classification of plant formations of Brockmann-Jerosch and Rübél (1912) is deductive, while the floristic ecological (or phytosociological or syntaxonomical) system of Braun-Blanquet (1928) is a typical case of an inductive system.

The map of the natural vegetation of Europe on a scale of 1:2,500,000 (Bohn et al. 2000) was based on 19 formations, 14 of which were considered zonal and extrazonal, depending primarily on climate. They represented the main marocimatic zones and belts, while the other five formations represented azonal vegetation, depending on specific soil and hydrological conditions. Thus, the formations were classified into subgroups according to their species composition, finer climatic

gradations, and variations in habitat conditions, and these were again subdivided according to nutrient levels, altitude, water budget, and geographic location. In practice, every subgroup is comprised of one or more similar plant associations. The classification used for the map of the natural vegetation of Europe was thus obtained starting from lower categories (associations and groups of associations) and grouping them into increasingly broader ones.

The Ellenberg and Mueller-Dombois (1967) physiognomic ecological classification of plant formations of the earth was obtained with a deductive method and comprises the units of formation class, formation subclass, formation group, formation, subformation, and further subdivisions. This system decidedly favours the higher units.

Often the two methods have been contrasted with each other, often because of the different interpretations of the vegetation given by different schools (individualistic, phytocoenotic, etc.), but in fact the opposition is not necessarily true: rather, it could be said that one type of approach complements the other. The vegetation typology obtained with phytosociology is very detailed, but too analytical for a real classification of the vegetation on a global level. However, this limitation is overcome by the large physiognomic categories that are favored by the deductive method.

For the classification of the vegetation of Mexico, which is very complex from the phytogeographic point of view because it developed at the contact between the Neotropical and the Holarctic kingdoms, the authors present a new system called SECLAVEMEX. They drew upon four previous proposals for the classification of the vegetation of Mexico—Miranda and Hernández (1963), Rzedowski (1978), COTECOTA (1994) and González-Medrano (2003)—for criteria, levels and nomenclature to take into consideration for the new proposal, and decided upon nine criteria: physiognomy, climate, phenology of foliage, the presence of spines and vertical spikes, leaf characteristics, succulence, floristic composition, substratum type, and secondary vegetation. The hierarchic levels were identified in great detail, as follows: bioma (4 units), major formation (15 units), formation (28 units), subformation (58 units), series of associations (134 units), association, subassociation, and facies. They also provide numerous tables that compare the SECLAVEMEX terminology with that used in the four systems of classification of the vegetation of Mexico mentioned above.

As the authors state, the SECLAVEMEX system is based on two viewpoints, first *a geographic vision with the definition of major biomes*, and second, *a botanical vision stemming from profound knowledge of species groupings*. The SECLAVEMEX system therefore comprises both higher units, the biomes and formations, and lower ones, the associations, which makes it highly innovative and original, as do the characterizations and names proposed for the various units. This

explains the significance and importance of the new system of classification of the vegetation of Mexico, not only from the theoretical point of view, but also from the applicative one, above all in relation to today's grave environmental problems.

Camerino
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Franco Pedrotti

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