THE FOLLOWING SECTION HAS BEEN EXCERPTED FROM A LARGER DOCUMENT.

marine science

volume 4

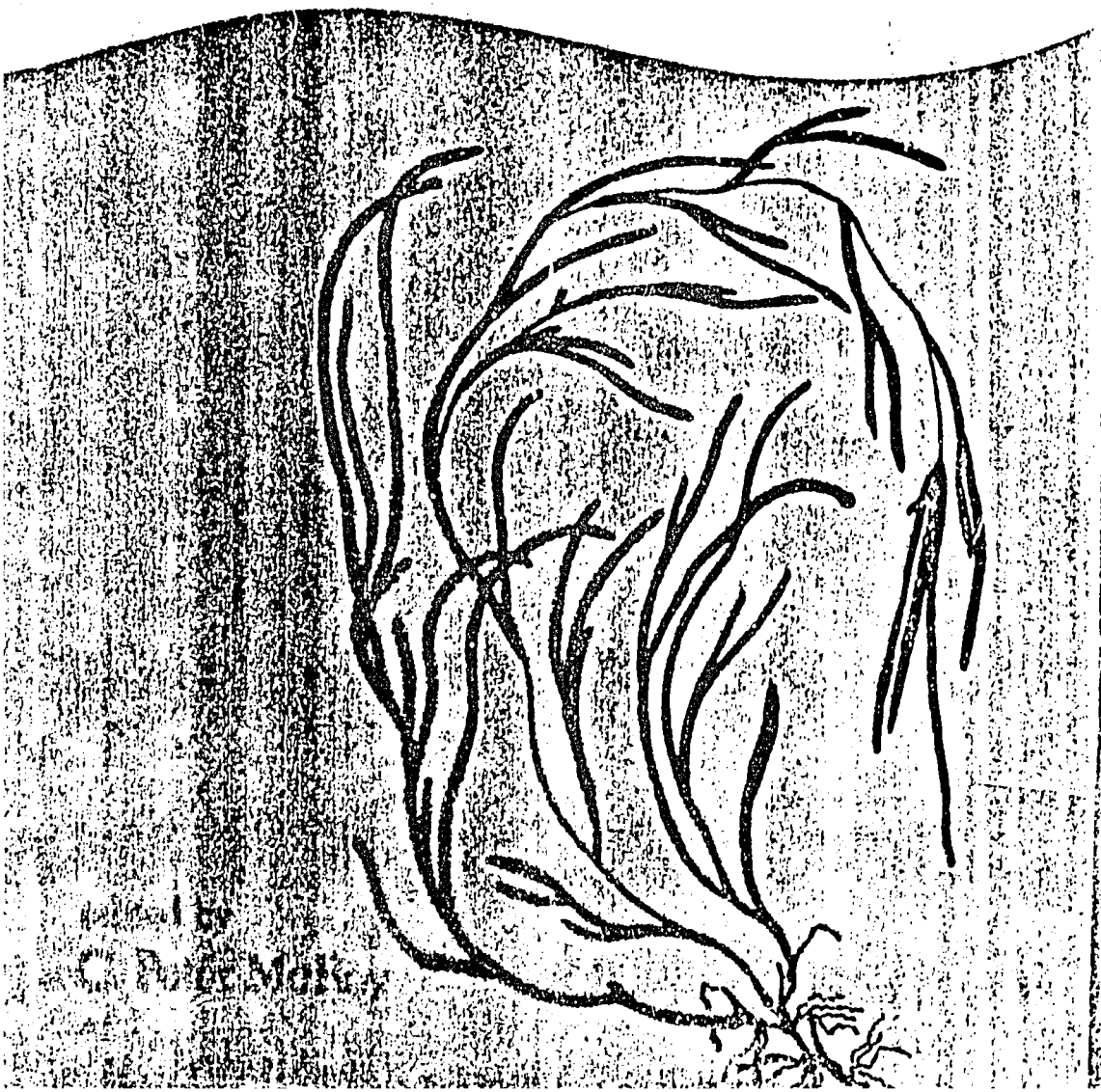
PN-AAM-543
LSN=217848

1977

Marcel Dekker Inc.

Seagrass Ecosystems

A SCIENTIFIC PERSPECTIVE



about the book . . .

Seagrass Ecosystems: A Scientific Perspective consists of a review and summation of research to date in the field, as initially presented at the International Seagrass Workshop held in Leiden, the Netherlands, and revised and expanded in accord with criticism and information provided by workshop participants. Five general research aspects of seagrass ecosystems are covered: productivity/physiology, systematics, decomposition, consumers, and system oceanography. Additional papers, covering such topics as the wasting disease and geographic reviews of areas whose seagrass ecosystems have been little reported until now, including Mexico, Israel, and Australia, have also been incorporated into the book at the suggestion of those involved.

The only book available that addresses the ecosystems of seagrasses rather than their biology alone, *Seagrass Ecosystems: A Scientific Perspective* is a valuable source of information on the nearshore sea for students, scientists, and coastal managers.

about the editors . . .

C. PETER MCROY is an Associate Professor at the Institute of Marine Science, the University of Alaska, and is on the Editorial Advisory Board of *Aquatic Botany*. He was Chairman of the International Seagrass Workshop and has published more than thirty articles on various aspects of oceanography and marine science. He received his Ph.D. in Marine Science from the University of Alaska (1970), and is a member of nine professional associations, including the American Society of Limnology and Oceanography; the Marine Biological Association, United Kingdom; and the American Association for the Advancement of Science.

CARLA HELFFERICH is Project Assistant, Processes and Resources of the Bering Sea Shelf Program, the Institute of Marine Science, the University of Alaska. She was coordinator of both the International Seagrass Workshop and the 21st Alaska AAAS Conference. Ms. Helfferich has edited several scientific books and reports, and has published numerous articles on conference coordination and other subjects.

Printed in the United States of America ISBN: 0-8247-6459-5

marcel dekker inc./new york • basel

3.

STRUCTURE, FUNCTION, AND CLASSIFICATION IN SEAGRASS COMMUNITIES

C. den Hartog

Laboratory of Aquatic Ecology
Catholic University
Nijmegen, The Netherlands

I. INTRODUCTION 90

II. STRUCTURE OF SEAGRASS COMMUNITIES: SPATIAL AND DYNAMIC ASPECTS 92

A. Growth Forms of Seagrasses 92
B. Zonation 94
C. Succession 99
D. Community Structure 104

III. FUNCTIONS OF SEAGRASS COMMUNITIES 107

A. Stabilization of the Bottom 108
B. Food Resource 108
C. Nurseries and Shelter 109
D. Accumulation of Material from Seawater in the Plants 109

IV. CLASSIFICATION OF SEAGRASS COMMUNITIES 110

A. System of the Higher Vegetation Units 110
B. Seagrass Formation 111
C. Contacts with Other Vegetation Units 116

V. DESCRIPTION OF SEAGRASS COMMUNITIES: A PROGRAM 116

REFERENCES 119

I. INTRODUCTION

Seagrasses are aquatic angiosperms which are completely adapted to life in the marine environment. According to Arber (1920) and den Hartog (1967, 1970, in press) they need the following faculties to be able to colonize the sea successfully:

1. Ability to live in a saline medium
2. Ability to function normally when fully submerged
3. A well-developed anchoring system
4. Ability to complete the generative cycle when fully submerged
5. Ability to compete with other organisms under the more or less stable conditions of the marine environment

The number of species which indeed have these properties is extremely small, viz. 50. They are grouped in 12 genera, 9 of which belong to the Potamogetonaceae and the other 3 to the Hydrocharitaceae, both families being classified into the monocotyledonous order of the Helobiae. The taxonomic composition of the group is shown in Table 1. For the nomenclature of the seagrasses, refer to the recent monograph (den Hartog, 1970).

TABLE 1

Taxonomical Composition of the Group of the Seagrasses

Families and subfamilies	Genera	Number of species
Potamogetonaceae		
Zosteroideae	*Zostera*	11
	Phyllospadix	5
	Heterozostera	1
Posidonioideae	*Posidonia*	3
Cymodoceoideae	*Halodule*	8
	Cymodocea	4
	Syringodium	2
	Amphibolis	2
	Thalassodendron	2
Hydrocharitaceae		
Hydrocharitoideae	*Enhalus*	1
Thalassioideae	*Thalassia*	2
Halophiloideae	*Halophila*	8

The number of seagrass species is by no means proportional to their ecological importance. The seagrasses usually occur in enormous quantities and form dense beds which cover immense areas in the coastal waters of both temperate and tropical seas, and are in fact one of the most conspicuous communities of the shore. The true importance of the seagrass beds to the ecosystems of marine coastal waters is not yet fully understood, and is therefore generally underestimated, if not minimized. It is obvious that seagrasses as primary producers hold a key position in these ecosystems, but there is little insight about the energy transfer from seagrasses to the next trophic level. It is known only that a very restricted number of animal species consume seagrasses directly. It is, however, highly improbable that the enormous quantity of energy stored by seagrasses does not serve a function and has to be regarded as a mere waste. It is known that the seagrass beds indeed fulfill several other functions, e.g., stabilizing the bottom, providing a substrate for epiphytes and epizoa on bottoms otherwise unsuitable for these species, and providing shelter and nursery grounds for fish, shrimps, and other invertebrates, but the importance of these functions bears not the slightest relation in terms of energy to the enormous quantity of matter stocked in the seagrasses. Could this be a folly of nature? It is more likely that the energy contained by seagrasses comes at the disposal of the consumers during and after decomposition of the material, thus entering other trophic levels via the "detritus cycle," as advocated by Petersen (1891, 1918). Regrettably the number of investigations in the field of decomposition of seagrasses is very small (see Chapter 4).

As a contribution to a better understanding of the seagrass ecosystem, I will present a survey of the structural and functional features of the seagrass communities, as well as an attempt to classify the various communities. Finally, I will discuss some desiderata for further ecological research.