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## A Global Crisis for Seagrass Ecosystems

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### ABSTRACT

Seagrasses, marine flowering plants, have a long evolutionary history but are now challenged with rapid environmental changes as a result of coastal human population pressures. Seagrasses provide key ecological services, including organic carbon production and export, nutrient cycling, sediment stabilization, enhanced biodiversity, and trophic transfers to adjacent habitats in tropical and temperate regions. They also serve as “coastal canaries,” global biological sentinels of increasing anthropogenic influences in coastal ecosystems, with large-scale losses reported worldwide. Multiple stressors, including sediment and nutrient runoff, physical disturbance, invasive species, disease, commercial fishing practices, aquaculture, overgrazing, algal blooms, and global warming, cause seagrass declines at scales of square meters to hundreds of square kilometers. Reported seagrass losses have led to increased awareness of the need for seagrass protection, monitoring, management, and restoration. However, seagrass science, which has rapidly grown, is disconnected from public awareness of seagrasses, which has lagged behind awareness of other coastal ecosystems. There is a critical need for a targeted global conservation effort that includes a reduction of watershed nutrient and sediment inputs to seagrass habitats and a targeted educational program informing regulators and the public of the value of seagrass meadows.

**Keywords:** [seagrass](#), [decline](#), [sentinels](#), [ecological services](#), [monitoring](#)

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### References cited

- Abal, E. G. and W. C. Dennison. 1996. Seagrass depth range and water quality in Southern Moreton Bay, Queensland, Australia. *Marine and Freshwater Research* 47:763–771. [CrossRef](#)
- Beck, M. W. et al 2001. The identification, conservation, and management of estuarine and marine nurseries for fish and invertebrates. *BioScience* 51:633–641. [BioOne](#)
- Beer, S. and E. W. Koch. 1996. Photosynthesis of seagrasses vs. marine macroalgae in globally changing CO<sub>2</sub> environments. *Marine Ecology Progress Series* 141:199–204. [CrossRef](#)
- Berner, R. A. and Z. Kothavala. 2001. GEOCARB III: A revised model of atmospheric CO<sub>2</sub> over Phanerozoic time. *American Journal of Science* 301:182–204. [CrossRef](#)
- Bricker, S. B., J. G. Ferreira, and T. Simas. 2003. An integrated methodology for assessment of estuarine trophic status. *Ecological*

*Modelling* 169:39–60. [CrossRef](#)

Bulthuis, D. A. 1983. Effects of *in situ* light reduction on density and growth of the seagrass *Heterozostera tasmanica* (Martens ex Aschers.) den Hartog in Western Port, Victoria, Australia. *Journal of Experimental Marine Biology and Ecology* 67:91–103. [CrossRef](#)

Cambridge, M. L. and A. J. McComb. 1984. The loss of seagrasses in Cockburn Sound, Western Australia, 1: The time course and magnitude of seagrass decline in relation to industrial development. *Aquatic Botany* 20:229–243. [CrossRef](#)

Carlton, J. T. 1989. Man's role in changing the face of the ocean: Biological invasions and implications for conservation of near-shore environments. *Conservation Biology* 3:265–273. [CrossRef](#)

Carlton, J. T., G. Vermeij, D. R. Lindberg, D. A. Carlton, and E. C. Dudley. 1991. The first historical extinction of a marine invertebrate in an ocean basin: The demise of the eelgrass limpet, *Lottia alveus*. *Biological Bulletin* 180:72–80. [CrossRef](#)

Carruthers, T. J. B., W. C. Dennison, B. J. Longstaff, M. Waycott, E. G. Abal, L. J. McKenzie, and W. J. L. Long. 2002. Seagrass habitats of Northeast Australia: Models of key processes and controls. *Bulletin of Marine Science* 71:1153–1169.

Cohen, J. E. 1995. How Many People Can the Earth Support?. New York Norton.

Coles, R. C. and M. Fortes. 2001. Protecting seagrass—approaches and methods. Pages 445–463. in Short, F. T. and R. G. Coles, editors. eds. *Global Seagrass Research Methods* Amsterdam Elsevier.

Costanza, R., et al 1997. The value of the world's ecosystem services and natural capital. *Nature* 387:253–260. [CrossRef](#)

Crowley, T. J. 1990. Are there any satisfactory geologic analogs for a future greenhouse warming? . *Journal of Climate* 3:1282–1292. [CrossRef](#)

Delgado, O., J. Ruiz, M. Perez, R. Romero, and E. Ballesteros. 1999. Effects of fish farming on seagrass (*Posidonia oceanica*) in a Mediterranean bay: Seagrass decline after organic loading cessation. *Oceanologica Acta* 22:109–117. [CrossRef](#)

den Hartog, C. 1970. *The Seagrasses of the World* Amsterdam North-Holland.

Dennison, W. C., R. J. Orth, K. A. Moore, J. C. Stevenson, V. Carter, S. Kollar, P. W. Bergstrom, and R. A. Batiuk. 1993. Assessing water quality with submersed aquatic vegetation. *BioScience* 43:86–94. [CrossRef](#)

Dietz, R. S. and J. C. Holden. 1970. Reconstruction of Pangea: Breakup and dispersion of continents, Permian to present. *Journal of Geophysical Research* 75:4939–4956. [CrossRef](#)

Duarte, C. M. 1999. Seagrass ecology at the turn of the millennium: Challenges for the new century. *Aquatic Botany* 65:7–20. [CrossRef](#)

Duarte, C. M. 2002. The future of seagrass meadows. *Environmental Conservation* 29:192–206. [CrossRef](#)

Duarte, C. M. and C. L. Chiscano. 1999. Seagrass biomass and

production: A reassessment. *Aquatic Botany* 65:159–174. [CrossRef](#)

Duarte, C. M., E. Alvarez, A. Grau, and D. Krause-Jensen. 2004. Which monitoring strategy should be chosen?. Pages 41–44. in Borum, J., C. M. Duarte, D. Krause-Jensen, and T. M. Greve, editors. eds. *European Seagrasses: An Introduction to Monitoring and Management*. (13 November 2006; [www.seagrasses.org/handbook/european\\_seagrasses\\_high.pdf](http://www.seagrasses.org/handbook/european_seagrasses_high.pdf)).

Duarte, C. M., J. Middelburg, and N. Caraco. 2005. Major role of marine vegetation on the oceanic carbon cycle. *Biogeosciences* 2:1–8. [CrossRef](#)

Duarte, C. M., J. Borum, F. T. Short, and D. I. Walker. Seagrass ecosystems: Their global status and prospects. In Polunin, N. V. C., editor. ed. *Aquatic Ecosystems: Trends and Global Prospects* Cambridge (United Kingdom) Cambridge University Press. Forthcoming.

Environment Agency of Japan 2000. *Threatened Wildlife of Japan: Red Data Book*. 2nd ed. vol. 8. Vascular Plants Tokyo Japan Wildlife Research Center.

Fleming, K., P. Johnston, D. Zwart, Y. Yokoyama, K. Lambeck, and J. Chappell. 1998. Refining the eustatic sea-level curve since the last glacial maximum using far- and intermediate-field sites. *Earth and Planetary Science Letters* 163:327–342. [CrossRef](#)

Fonseca, M. S., W. J. Kenworthy, and G. W. Thayer. 1998. Guidelines for the conservation and restoration of seagrasses in the United States and adjacent waters. Silver Spring (MD) National Oceanic and Atmospheric Administration (NOAA) Coastal Ocean Office. NOAA Coastal Ocean Program Decision Analysis Series no. 12.

Fonseca, M. S., W. J. Kenworthy, and P. E. Whitfield. 2000. Temporal dynamics of seagrass landscapes: A preliminary comparison of chronic and extreme disturbance events. *Biologia Marina Mediterranea* 7:373–376.

Fourqurean, J. W. and M. B. Robblee. 1999. Florida Bay: A recent history of ecological changes. *Estuaries* 22:345–357. [CrossRef](#)

Fourqurean, J. W., J. N. Boyer, M. J. Durako, L. N. Hefty, and B. J. Peterson. 2003. Forecasting responses of seagrass distributions to changing water quality using monitoring data. *Ecological Applications* 13:474–489. [CrossRef](#)

Frink, C. R., P. E. Waggoner, and J. H. Ausubel. 1999. Nitrogen fertilizer: Retrospect and prospect. *Proceedings of the National Academy of Sciences* 96:1175–1180. [CrossRef](#), [PubMed](#)

Green, E. P. and F. T. Short. eds. 2003. *World Atlas of Seagrasses* Berkeley University of California Press.

Heck, K. L. and R. J. Orth. 2006. Predation in seagrass beds. Pages 537–550. in Larkum, A. W. D., R. J. Orth, and C. M. Duarte, editors. eds. *Seagrasses: Biology, Ecology, and Conservation* Dordrecht (The Netherlands) Springer.

Heck, K. L., J. Pennock, J. Valentine, L. Coen, and S. S. Sklenar. 2000. Effects of nutrient enrichment and large predator removal on seagrass nursery habitats: An experimental assessment. *Limnology and Oceanography* 45:1041–1057. [CrossRef](#)

Heck, K. L., C. Hays, and R. J. Orth. 2003. A critical evaluation of the nursery role hypothesis for seagrass meadows. *Marine Ecology Progress Series* 253:123–136. [CrossRef](#)

Hemminga, M. and C. M. Duarte. 2000. *Seagrass Ecology* Cambridge (United Kingdom) Cambridge University Press.

Jackson, J. B. C., et al 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293:629–638. [CrossRef](#), [PubMed](#)

Kemp, W. M., et al 2005. Eutrophication of Chesapeake Bay: Historical trends and ecological interactions. *Marine Ecology Progress Series* 303:1–19. [CrossRef](#)

Kendrick, G. A., B. J. Hegge, A. Wyllie, A. Davidson, and D. A. Lord. 2000. Changes in seagrass cover on Success and Parmelia Banks, Western Australia between 1965 and 1995. *Estuarine, Coastal and Shelf Science* 50:341–353. [CrossRef](#)

Kenworthy, W. J. 2000. The role of sexual reproduction in maintaining populations of *Halophila decipiens*: Implications for the biodiversity and conservation of tropical seagrass ecosystems. *Pacific Conservation Biology* 5:260–268.

Kenworthy, W. J., S. Wyllie-Echeverria, R. G. Coles, G. Pergent, and C. Pergent-Martini. 2006. Seagrass conservation biology: An interdisciplinary science for protection of the seagrass biome. Pages 595–623. in Larkum, A. W. D., R. J. Orth, and C. M. Duarte, editors. eds. *Seagrasses: Biology, Ecology and Conservation* Dordrecht (The Netherlands) Springer.

Larkum, W. D., R. J. Orth, and C. M. Duarte. eds. 2006. *Seagrasses: Biology, Ecology and Conservation* Dordrecht (The Netherlands) Springer.

Les, D. H., M. A. Cleland, and M. Waycott. 1997. Phylogenetic studies in the Alismatidae, II: Evolution of the marine angiosperms (seagrasses) and hydrophily. *Systematic Botany* 22:443–463. [CrossRef](#)

Levine, J. M. and C. M. D'Antonio. 2003. Forecasting biological invasions with increasing international trade. *Conservation Biology* 17:322–326. [CrossRef](#)

Lodge, D. M. et al 2006. Biological invasions: Recommendations for U.S. policy and management. Position paper, Ecological Society of America. (13 October 2006; [http://weblogs.nal.usda.gov/invasivespecies/archives/2006/06/biological\\_inva.shtml](http://weblogs.nal.usda.gov/invasivespecies/archives/2006/06/biological_inva.shtml)).

Longstaff, B. J. and W. C. Dennison. 1999. Seagrass survival during pulsed turbidity events: The effects of light deprivation on the seagrasses *Halodule pinifolia* and *Halophila ovalis*. *Aquatic Botany* 65:105–121. [CrossRef](#)

Lotze, H. K., et al 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. *Science* 312:1806–1809. [CrossRef](#), [PubMed](#)

Marbà, N., C. M. Duarte, E. Díaz-Almela, J. Terrados, E. Álvarez, R. Martínez, R. Santiago, E. Gacia, and A. M. Grau. 2005. Direct evidence of imbalanced seagrass (*Posidonia oceanica*) shoot population dynamics along the Spanish Mediterranean. *Estuaries* 28:53–62.

[CrossRef](#)

Marbà, N., R. Santiago, E. Díaz-Almela, E. Álvarez, and C. M. Duarte. 2006. Seagrass (*Posidonia oceanica*) vertical growth as an early indicator of fish farm-derived stress. *Estuarine, Coastal and Shelf Science* 67:475–483. [CrossRef](#)

Miller, K. G., M. A. Kominz, J. V. Browning, J. D. Wright, G. S. Mountain, M. E. Katz, P. J. Sugarman, B. S. Cramer, N. Christie-Blick, and S. F. Pekar. 2005. The Phanerozoic record of global sea-level change. *Science* 310:1293–1298. [CrossRef](#), [PubMed](#)

Musick, J. A., et al 2000. Marine, estuarine, and diadromous fish stocks at risk of extinction in North America. *Fisheries* 25:6–30.

Naylor, R., S. L. Williams, and D. R. Strong. 2001. Aquaculture—a gateway for exotic species. *Science* 294:1655–1656. [CrossRef](#), [PubMed](#)

Orth, R. J. and K. A. Moore. 1983. Chesapeake Bay: An unprecedented decline in submerged aquatic vegetation. *Science* 222:51–53. [CrossRef](#), [PubMed](#)

Orth, R. J., R. A. Batiuk, P. W. Bergstrom, and K. A. Moore. 2002. A perspective on two decades of policies and regulations influencing the protection and restoration of submerged aquatic vegetation in Chesapeake Bay, USA. *Bulletin of Marine Science* 71:1391–1403.

Orth, R. J., M. L. Luckenbach, S. R. Marion, K. A. Moore, and D. J. Wilcox. 2006. Seagrass recovery in the Delmarva coastal bays. *Aquatic Botany* 84:26–36. [CrossRef](#)

Padilla, D. K. and S. L. Williams. 2004. Beyond ballast water: Aquarium and ornamental trades as sources of invasive species in aquatic ecosystems. *Frontiers in Ecology and the Environment* 2:131–138. [CrossRef](#)

Petit, J. R., et al 1999. Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica. *Nature* 399:429–436. [CrossRef](#)

Preen, A. R. and H. Marsh. 1995. Responses of dugongs to large-scale loss of seagrass from Hervey Bay, Queensland, Australia. *Wildlife Research* 22:507–519. [CrossRef](#)

Rasmussen, E. 1977. The wasting disease of eelgrass (*Zostera marina*) and its effects on environmental factors and fauna. Pages 1–51. in McRoy, C. P. and C. Helfferich, editors. eds. *Seagrass Ecosystems* New York Marcel Dekker.

Ruiz, G. M., P. W. Fofonoff, J. T. Carlton, M. J. Wonham, and A. H. Hines. 2000. Invasion of coastal marine communities in North America: Apparent patterns, processes, and biases. *Annual Review of Ecology and Systematics* 31:481–531. [CrossRef](#)

Short, F. T. and D. M. Burdick. 1996. Quantifying eelgrass habitat loss in relation to housing development and nitrogen loading in Waquoit Bay, Massachusetts. *Estuaries* 19:730–739. [CrossRef](#)

Short, F. T. and R. G. Coles. eds. 2001. *Global Seagrass Research Methods* Amsterdam Elsevier.

Short, F. T. and H. Neckles. 1999. The effects of global climate change

on seagrasses. *Aquatic Botany* 63:169–196. [CrossRef](#)

Short, F. T. and S. Wyllie-Echeverria. 1996. Natural and human-induced disturbance of seagrasses. *Environmental Conservation* 23:17–27. [CrossRef](#)

Spalding, M., M. Taylor, C. Ravilious, F. Short, and E. Green. 2003. Global overview: The distribution and status of seagrasses. Pages 5–26. in Green, E. P. and F. T. Short, editors. eds. *World Atlas of Seagrasses: Present Status and Future Conservation* Berkeley University of California Press.

Suchanek, T. H., S. W. Williams, J. C. Ogden, D. K. Hubbard, and I. P. Gill. 1985. Utilization of shallow-water seagrass detritus by Caribbean deep-sea macrofauna:  $\delta^{13}\text{C}$  evidence. *Deep Sea Research* 32:2201–2214.

Terrados, J., C. M. Duarte, L. Kamp-Nielsen, N. S. R. Agawin, E. Gacia, D. Lacap, M. D. Fortes, J. Borum, M. Lubanski, and T. Greve. 1999. Are seagrass growth and survival affected by reducing conditions in the sediment? . *Aquatic Botany* 65:175–197. [CrossRef](#)

Thoning, K. W., P. P. Tans, and W. D. Komhyr. 1989. Atmospheric carbon dioxide at Mauna Loa observatory, 2: Analysis of the NOAA GMCC data, 1974–1985. *Journal of Geophysical Research* 94:8549–8565. [CrossRef](#)

Tomasko, D. A., C. A. Corbett, H. S. Greening, and G. E. Raulerson. 2005. Spatial and temporal variation in seagrass coverage in southwest Florida: Assessing the relative effects of anthropogenic nutrient load reductions and rainfall in four contiguous estuaries. *Marine Pollution Bulletin* 50:797–805. [PubMed](#)

Valentine, J. F. and K. L. Heck. 2005. Perspective review of the impacts of overfishing on coral reef food web linkages. *Coral Reefs* 24:209–213. [CrossRef](#)

Walker, D. I., G. A. Kendrick, and A. J. McComb. 2006. Decline and recovery of seagrass ecosystems—the dynamics of change. Pages 551–565. in Larkum, A. W. D., R. J. Orth, and C. M. Duarte, editors. eds. *Seagrasses: Biology, Ecology and Conservation* Dordrecht (The Netherlands) Springer.

Williams, S. L. 2001. Reduced genetic diversity in eelgrass transplantations affects both individual and population fitness. *Ecological Applications* 11:1472–1488. [CrossRef](#)

Wright, J. P. and C. G. Jones. 2006. The concept of organisms as ecosystem engineers ten years on: Progress, limitations, and challenges. *BioScience* 56:203–209. [BioOne](#)

## Cited by

Maria Cristina Duarte, Salomão Bandeira, Maria Manuel Romeiras. (2012) Systematics and Ecology of a New Species of Seagrass (*Thalassodendron*, Cymodoceaceae) from Southeast African Coasts. *Novon: A Journal for Botanical Nomenclature* 22:1, 16-24  
Online publication date: 10-Jul-2012.

[Abstract & References](#) : [Full Text](#) : [PDF \(707 KB\)](#)

Paul A. X. Bologna<sup>†</sup> and Michael S. Sinnema<sup>‡</sup>. (2012) Restoration of Seagrass Habitat in New Jersey, United States. *Journal of Coastal Research* 99-104  
Online publication date: 1-Jan-2012.



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Gary A. Kendrick, Michelle Waycott, Tim J. B. Carruthers, Marion L. Cambridge, Renae Hovey, Siegfried L. Krauss, Paul S. Lavery, Donald H. Les, Ryan J. Lowe, Oriol Mascaró I Vidal, Jillian L. S. Ooi, Robert J. Orth, David O. Rivers, Leonardo Ruiz-Montoya, Elizabeth A. Sinclair, John Statton, Jent Kornelis van Dijk and Jennifer J. Verduin. (2012) The Central Role of Dispersal in the Maintenance and Persistence of Seagrass Populations. *BioScience* **62**:1, 56-65  
Online publication date: 1-Jan-2012.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (371 KB)

Christine Angelini, Andrew H. Altieri, Brian R. Silliman and Mark D. Bertness. (2011) Interactions among Foundation Species and their Consequences for Community Organization, Biodiversity, and Conservation. *BioScience* **61**:10, 782-789  
Online publication date: 1-Oct-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (229 KB)

Brett R. Dumbauld,<sup>1,\*</sup> Bruce E. Kauffman,<sup>2</sup> Alan C. Trimble<sup>3</sup> and Jennifer L. Ruesink<sup>3</sup>. (2011) The Willapa Bay Oyster Reserves in Washington State: Fishery Collapse, Creating a Sustainable Replacement, and the Potential for Habitat Conservation and Restoration. *Journal of Shellfish Research* **30**:1, 71-83  
Online publication date: 1-Apr-2011.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (743 KB)

Matthew W. Johnson,<sup>1\*</sup> Sean P. Powers,<sup>2,1</sup> Joseph Senne<sup>2,1</sup> and Kyeong Park<sup>2,1</sup>. (2009) Assessing *in Situ* Tolerances of Eastern Oysters (*Crassostrea virginica*) Under Moderate Hypoxic Regimes: Implications for Restoration. *Journal of Shellfish Research* **28**:2, 185-192  
Online publication date: 1-Apr-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (308 KB)

Jamie M. P. Vaudrey,<sup>1\*</sup> Tessa Getchis,<sup>2</sup> Kaitlyn Shaw,<sup>1</sup> James Markow,<sup>3</sup> Robert Britton<sup>1</sup> and James N. Kremer<sup>1</sup>. (2009) Effects of Oyster Depuration Gear on Eelgrass (*Zostera marina* L.) in a Low Density Aquaculture Site in Long Island Sound. *Journal of Shellfish Research* **28**:2, 243-250  
Online publication date: 1-Apr-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (322 KB)

Anna Nyqvist, Carl André, Martin Gullström, Susanne Pihl Baden, and Per Åberg. (2009) Dynamics of Seagrass Meadows on the Swedish Skagerrak Coast. *AMBIO: A Journal of the Human Environment* **38**:2, 85-88  
Online publication date: 1-Mar-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (347 KB)

Fares M. Howari<sup>†</sup>, Benjamin R. Jordan<sup>‡</sup>, Naima Bouhouche<sup>§,\*</sup>, and Sandy Wyllie-Echeverria<sup>††</sup>. (2009) Field and Remote-Sensing Assessment of Mangrove Forests and Seagrass Beds in the Northwestern Part of the United Arab Emirates. *Journal of Coastal Research* **48**:48-56  
Online publication date: 1-Jan-2009.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (610 KB)

Scott M. Haag<sup>a</sup>, Michael J. Kennish<sup>b</sup>, and Gregg P. Sakowicz<sup>c</sup>. (2008) Seagrass Habitat Characterization in Estuarine Waters of the Jacques Cousteau National Estuarine Research Reserve Using Underwater Videographic Imaging Techniques. *Journal of Coastal Research* **171**:171-179  
Online publication date: 1-Nov-2008.

[Abstract & References](#) : [Full Text](#) : [PDF](#) (625 KB)

Matthew C. Perry, Alicia M. Wells-Berlin, David M. Kidwell, and Peter C. Osenton. (2007) Temporal Changes of Populations and Trophic Relationships of Wintering Diving Ducks in Chesapeake Bay. *Waterbirds* **30**:sp1, 4-16  
Online publication date: 1-Dec-2007.



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