

# COVER PHOTOGRAPH AND FRONT MATTER: SOUTH AFRICAN KELP FOREST

Source: Journal of Coastal Research, 30(5)

Published By: Coastal Education and Research Foundation

URL: https://doi.org/10.2112/1551-5036-30.5.ii

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at <u>www.bioone.org/terms-of-use</u>.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.



# **COVER PHOTOGRAPH**





**South African Kelp Forest.** Protected by small rocky promontories south of the harbor of Simon's Town, South Africa, this kelp forest occurs in a cove located on the shores of False Bay on the eastern side of the Cape Peninsula. Simon's Town (also referred to as Simonstown) was originally named Simon's Vlek after Simon van der Stel, the Dutch governor of the Cape Colony between 1677 and 1699, who surveyed the bay east of Cape Town in 1687. This section of coast, characteristic of much of the shore in the vicinity of Cape Town, contains small coves with white sandy beaches and calm shallow waters that are interspersed between boulders of Cape Granite. Kelps common to the Cape Peninsula and the west coast of South Africa include Sea Bamboo (*Ecklonia maxima*), Split Fan Kelp (*Laminaria pallida*), and Bladder Kelp (*Macrocystis angustifolia*). The kelp canopy provides a complex, three-dimensional habitat for thousands of species of fish, invertebrates, and other seaweeds. Because kelp beds, sometimes referred to as forests of the sea, support high primary production levels, they are among the most productive ecosystems on earth. This high productivity forms the base of many coastal food webs in cool water environments worldwide. (Photograph taken in April 2014 by Charles W. Finkl, Coastal Education and Research Foundation */CERF/*, Fletcher, North Carolina, U.S.A.)

# JOURNAL OF COASTAL RESEARCH

### An International Forum for the Littoral Sciences **EDITOR-IN-CHIEF**

**Charles W. Finkl** Coastal Education and Research Foundation, Inc. [CERF] **Editorial Offices:** 

5130 NW 54th Street

33073, U.S.A.

EDITORIAL ASSISTANT

Barbara Russell

Coastal Education and Research

Foundation, Inc. [CERF]

5130 NW 54th Street

Coconut Creek, FL 33073, U.S.A.

barbara@cerf-jcr.com

PUBLISHING MANAGER

Christopher Makowski

Coastal Education and Research

Foundation, Inc. [CERF]

5130 NW 54th Street

Coconut Creek, FL 33073, U.S.A.

cmakowski@cerf-jcr.com

CHEF-HERAUSGEBER

25 Jake Ridge Trail Fletcher, NC 28732, Ú.S.A.

BOOK REVIEW EDITOR J. Andrew G. Cooper School of Environmental Sciences University of Ulster Coleraine, N. Ireland jag.cooper@ulster.ac.uk

# MITHERAUSGEBER

Edward J. Anthony Coastal Geomorphology Dunkerque, France Cecile Baeteman Holocene Coastal Dynamics Brussels, Belgium Kenneth Banks Coral Reef Geomorphology Plantation, Florida Patrick Barnard Coastal Geomorphology Santa Cruz, California Lindino Benedet Oceanography, Modeling Florianopolis, SC, Brazil David M. Bush Coastal Geology & Hazards Carrollton, Georgia Ilya V. Buynevich Coastal Geology Philadelphia, Pennsylvania Javier A. Carrió Sediment Processes Valencia, Spain Mark Crowell Coastal Zone Management McLean, Virginia **Robert Dean** Coastal Engineering & Processes Gainesville, Florida **Omar Defeo** Sandy Beach Ecology Montevideo, Uruguay J. Javier Diez Coastal Geomorphology Madrid, Spain Joseph F. Donoghue Coastal Morphology & Hazards Tallahassee, Florida Jean Ellis Aeolian Sediment Transport Columbia, South Carolina Luciana Esteves Coastal Flooding & Erosion Bournemouth, United Kingdom **Oscar Manuel Ferreira** Storm Impacts Faro, Portugal Duncan M. FitzGerald Sediment Transport Boston, Massachusetts

Chip Fletcher Coastal Geology Honolulu, Hawaii Kazimierz K. Furmańczyk Marine Cartography Szczecin, Poland Gary B. Griggs Coastal Engineering & Hazards Santa Cruz, California Pramod Hanamgond Coastal Geomorphology Belgaum, India Hans Hanson Coastal Protection Lund, Sweden Simon Haslett Paleoceanography Wales, United Kingdom David Hill Nearshore Hydrodynamics Corvallis, Oregon Michael Hilton Dune Geomorphology & Ecology Dunedin, New Zealand Carl H. Hobbs, III Coastal Geology, Sand Mining Gloucester Point, Virginia James R. Houston Sea-Level Change Vicksburg, Mississippi Wenrui Huang Coastal Hydrodynamics Tallahassee, Florida Michael G. Hughes Coastal Morphodynamics Canberra, ACT, Australia Federico I. Isla Sea-Level Change Mar Del Plata, Argentina Nancy L. Jackson Coastal Geomorphology Newark, New Jersey Markes E. Johnson

Paleoshores, Coastal Sand Dunes Williamstown, Massachusetts

FOUND

Waves & Circulation Stennis Space Center, Mississippi Dieter H. Kelletat Coastal Geomorphology Essen / Cologne, Germany Joseph T. Kelley Sea-Level Change Orono, Maine Syed Khalil Coastal Geology & Geophysics Baton Rouge, Louisiana Jack Kindinger Oceanography St. Petersburg, Florida Vic Klemas Remote Sensing Newark, Delaware Nobuhisa Kobayashi Coastal Engineering Newark, Delaware Vladimir N. Kosmynin Coral Reefs, Coastal Ecology Tallahassee, Florida Joseph L. Kowalski Estuarine Plant Ecology Edinburg, Texas Michael J. Lace Coastal Landforms & Processes West Branch, Iowa Stephen P. Leatherman Barrier Islands, Beach Erosion Miami, Florida **Charles Lemckert** Environmental Fluid Dynamics Queensland, Australia Ioannis Liritzis Geophysical Proxy Data Rhodes, Greece Jeffrey H. List Shoreline Change Processes Woods Hole, Massachusetts Michel M. de Mahiques Sediment Processes São Paulo, Brazil Gonzalo C. Malvárez-Garcia Beach Morphodynamics Seville, Spain

Coastal Engineering Gainesville, Florida Nobuo Mimura Environmental Engineering Ibaraki, Japan Karl F. Nordstrom Coastal Geomorphology New Brunswick, New Jersey Julian Orford Phil D. Osborne Sediment Dynamics Shoreline, Washington Hugh Parker Airborne Lidar Bathymetry Adelaide, SA, Australia Charitha B. Pattiaratchi Chartha B. Pattaratchi Physical Oceanography Crawley, WA, Australia Carlos Pereira da Silva Coastal Zone Management Lisbon, Portugal **Michael Phillips** Coastal Geomorphology Swansea, Wales, UK Orrin H. Pilkey, Jr. Coastal Geology Durham, North Carolina Paolo A. Pirazzoli Sea-Level Changes Paris, France Nobert P. Psuty Coastal Geomorphology New Brunswick, New Jersey Ulrich Radtke Coastal Geomorphology Duisburg-Essen, Germany Elijah W. Ramsey, III Coastal Image Processing Lafayette, Louisiana Kirt Rusenko **Anja Scheffers** Coastal Evolution Lismore, NSW, Australia



**RÉDACTEUR-EN-CHEF** 

(Editorial Office, Coconut Creek) Coconut Creek, FL CERF/JCR Website: http://www.CERF-JCR.org e-mail: cfinkl@cerf-jcr.com

> WEB DESIGN & DEVELOPMENT Jon Finkl Media Mine 111 W Washington, Suite 1100 Chicago, IL 60602, U.S.A. jon@mediamine.net

> > **COMITÉ DE REDACTION**

## ASSOCIATE EDITORS Timothy R. Keen

Ashish J. Mehta Robert Nicholls Global Climate Change Southampton, United Kingdom Gravel Beaches, Storm Events Belfast, Northern Ireland, UK Sea Turtles, Dune Restoration Boca Raton, Florida

Andrew D. Short Coastal Geomorphology Sydney, NSW, Australia Pravi Shrestha Coastal Engineering Irvine, California Alejandro J. Souza Coastal & Sediment Processes Liverpool, United Kingdom Tom Spencer Biogeomorphology Cambridge, United Kingdom Marcel Stive Coastal Hydrodynamics Delft, The Netherlands **Vallam Sundar** Coastal Engineering Chennai, India Adam D. Switzer Coastal Hazards, Sea-Level Change NTU, Singapore E. Robert Thieler Marine Geology Woods Hole, Massachusetts Arthur C. Trembanis Coastal Morphodynamics Newark, Delaware Frank Van Der Meulen Coastal Zone Management Delft, The Netherlands Ping Wang Beach Morphodynamics Tampa, Florida Allan Williams Coastal Geology Swansea, Wales, UK Harry F. Williams Paleotempestology Denton, Texas Colin D. Woodroffe Coastal Geomorphology Wollongong, Australia Robert S. Young Coastal Processes Cullowhee, North Carolina **Guoliang Yu** Sediment Transport Shangai, China

THE JOURNAL OF COASTAL RESEARCH (JCR) (ISSN 0749-0208) IS PUBLISHED BIMONTHLY FOR \$115.00 FOR INDIVIDUAL US CERF MEMBERS, \$125.00 FOR INDIVIDUAL OF COASTAL RESEARCH (ISSEARCH (ISSEARCH, S19-00) IS FOR USING THE BIND BINON THE FOR \$10.00 FOR INDIVIDUAL OS CERF MEMBERS, \$125.00 FOR INDIVIDUAL INTERNATIONAL CERF MEMBERS, \$519.00 FOR USINSTITUTIONS, AND \$541.00 FOR INTERNATIONAL INSTITUTIONS BY THE COASTAL EDUCATION AND RESEARCH FOUNDATION, INC. (CERF), 5130 NW 54TH STREET, COCONUT CREEK, FL 33073–3713. PERIODICALS POST-AGE PAID AT FORT LAUDERDALE, FL AND ADDITIONAL MAILING OFFICES. **POSTMASTER:** SEND ADDRESS CHANGES TO JOURNAL OF COASTAL RESEARCH, ALLEN PRESS ASSOCIATION MANAGEMENT, P.O. BOX 1897, LAWRENCE, KS 66044–3018.

© 2014 The Coastal Education & Research Foundation [CERF].

### THE COASTAL EDUCATION AND RESEARCH FOUNDATION

5130 NW 54th Street

Coconut Creek, FL 33073, U.S.A.

#### **Officers of the Foundation**

Founded in 1983 by: Charles W. Finkl, Sr., Charles W. Finkl, Jnr., Rhodes W. Fairbridge, and Maurice L. Schwartz

President &	Senior Vice President &
<b>Executive Director:</b>	Assistant Director:
Charles W. Finkl	Christopher Makowski

Secretary: Heather M. Vollmer **Executive Assistant:** Barbara Russell

#### **Board of Directors (Trustees)**

J. Andrew G. Cooper	Victor Klemas	Andrew D. Short
Robert Dean	Charles Lemckert	Carlos Pereira da Silva
Charles W. Finkl	Chris Makowski	Daniel J. Stanley
Gary B. Griggs	Michael Phillips	Marcel Stive
James R. Houston	Orrin H. Pilkey, Jr.	Allan Williams
Robert Huff	Norbert P. Psuty	
Joseph T. Kelley	Elijah W. Ramsey, III	

#### **Lifetime Members**

Yong-Sik Cho	Hany Elwany	Charles Lemckert
Nicholas K. Coch	Björn Kjerfve	Ya Ping Wang

#### **Patron Members**

Luis Antonio	Norbert P. Psuty	Robert S. Young
Buenfil-Lopez	Giovanni Randazzo	
Carl H. Hobbs, III	Yung Tseng	

The Coastal Education and Research Foundation [CERF] is a nonprofit society dedicated to the advancement of the coastal sciences. The Foundation is devoted to the multi-disciplinary study of the complex problems of the coastal zone. The purpose of CERF is to help translate and interpret coastal issues for the public and to assist professional research and public information programs. The Foundation specifically supports and encourages field and laboratory studies on a local, national, and international basis. Through the medium of scientific publications, television, and radio CERF brings accurate information to the public and coastal specialists on all aspects of coastal issues in an effort to maintain or improve the quality of shoreline resources.

Because CERF is concerned with broad environmental issues, our efforts concentrate on significant problems such as maintenance of good quality (potable) water with adequate supply, and hazards associated with potential beach erosion, flooding, and susceptibility of developed shorelines to storm surge and wave attack. By focusing attention on these potential man-made and natural hazards, it is hoped that our research efforts will help others improve the quality of life in diverse coastal areas. CERF thus aims to stimulate awareness of coastal (marine and freshwater shorelines) land and water problems; initiate and foster research and innovation to promote long-term coastal productivity; establish an educational forum for the debate of contentious coastal issues; and develop new principles and approaches for enlightened coastal management, and encourage their adoption and use.



#### $\Box$ CERF MEMBERSHIP $\Box$

Members are individuals that support the aims of the foundation through personal and group efforts or by donations. Memberships are available in different categories with privileges.

Subscription information is available online at www.cerf-jcr.org. Subscriptions office: Allen Press, Inc., P.O. Box 1897, Lawrence, KS 66044, U.S.A. CERF@allenpress.com

#### **Editor-in-Chief**

Charles W. Finkl Ph.D., CSci, CMarSci, FIMarEST, CPGS, CPSSc. PWS

Dr. Charles W. Finkl is President and Executive Director of the Coastal Education & Research Foundation [CERF], publisher of the JCR. Charlie, a founding editor of the Journal of Coastal Research, has served as Editor-in-Chief for the past 30 years. He is a Research Professor in the Department of Geosciences at Florida Atlantic University in Boca Raton, Florida. He received his Bachelor and Master of Science degrees from Oregon State University and the Ph.D. from the University of Western Australia. He is a member of more than 20 professional societies and has published more than 200 professional papers, books, and reports. He is a Chartered Marine Scientist (CMarSci) [Institute of Marine Engineering, Science and Technology], Certified Professional Geological Scientist (CPGS) [American Institute of Professional Geologists (AIPG),], Certified Professional Soil Scientist (CPSSc) [American Registry of Certified Professionals in Agronomy, Crops, and Soils], and a Professional Wetland Scientist (PWS) [Society of Wetland Scientists]. Charlie has field experience in parts of the USA, Caribbean area, Brazil, Honduras, Russia, South Africa, Western Europe, Australasia, and South Pacific islands. He is also the Series Editor of the Encyclopedia of Earth Sciences Series that is published by Springer (Germany). There are more than twentyeight volumes in the Series and about twenty-five are available online. Charlie also serves on the Editorial Board of the International Journal of Environmental Studies (Routledge) and is an occasional peer reviewer for many other professional journals.

Charlie has interests and expertise in the general areas of surficial geology, coastal and marine geomorphology (including coastal classification), coastal/marine biophysical environments, exploration geochemistry, soils and weathering (regolith geology), coastal zone management and engineering applications or impacts on natural systems (including erosion control and shore protection), coastal hydrology including submarine freshwater and mineralized seeps, subaerial and marine structural geology, natural hazard mitigation in coastal zones, marine environments and coastal wetland protection and restoration, and remote sensing (e.g. land cover classification in coastal wetlands, advection-diffusion turbidity plumes in coastal waters, delineation of bottom types and sand resources), effluent disposal and pollution of wetlands and estuaries, water resources mapping and conservation, time series studies of wetland hydroperiod and soil moisture.

#### **CERF** International Meetings International Coastal Symposium (ICS)

The International Coastal Symposium (ICS) was originally set up by Per Bruun (deceased) and Charlie Finkl as the official meeting of the Coastal Education & Research Foundation (CERF), with one of the first meetings being held in Hilton Head, South Carolina, in 1993. After the repeated success of these meetings, CERF moved the ICS to the international scene holding these conferences in conjunction with local sponsors in Australia, Brazil, Iceland, New Zealand, Northern Ireland, Poland, and Portugal. The ICS brings together delegates from all over the world to collaborate and discuss the most current coastal research studies and projects. During the ICS 2014, which was held in Durban, South Africa, a grand celebration took place to mark the 30th Anniversary of CERF and the JCR. Our next ICS meeting is scheduled for the spring of 2016 in Sydney, New South Wales, Australia. For more information, please visit www.cerf-jcr.org.

# JOURNAL OF COASTAL RESEARCH



An International Forum for the Littoral Sciences



### **Supporting Scientific Information**

- AZTI Tecnalia [Pasaia, Spain; www.azti.es/]
- Coastal and Hydraulics Laboratory (CHL), US Army Corps of Engineers [Vicksburg, Mississippi, U.S.A.; http://chl.erdc.usace.army.mil/]
- Coastal and Marine Geology Program (CMGP), U.S. Geologic Survey (USGS) [Reston, Virginia, U.S.A.; http://marine.usgs.gov/]
- Coastal Research Laboratory (CRL), University of South Florida [Tampa, Florida, U.S.A.; http://crl.usf.edu/]
- Commission on Coastal System (CCS), International Geographical Union (IGU) [http://www.igu-ccs.org/]
- Consorzio Nazionale Interuniversitario per le Scienze del Mare (Co.N.I.S.Ma.) [Rome, Italy; www.conisma.it/]
- Deltares Institute [Delft, The Netherlands; http://www.deltares.nl/en/coast-sea]
- Departamento de Geografia e Planeamento Regional, Universidade Nova de Lisboa [Lisbon, Portugal; http://www.fcsh.unl.pt/]
- e-Geo Center for Geographical and Regional Planning Studies [Lisbon, Portugal; http://e-geo.fcsh.unl.pt/]
- Institute of Marine and Coastal Sciences (IMCS), Rutgers University [New Brunswick, New Jersey, U.S.A.; http://marine.rutgers.edu/main/]
- Louisiana Coastal Protection & Restoration Authority (CPRA) [Baton Rouge, Louisiana, U.S.A.; www.coastal. louisiana.gov/]
- Royal Belgian Institute of Natural Sciences: Management Unit of the North Sea Mathematical Models (MUMM). [Brussels, Belgium; www.mumm.ac.be/]
- University of Wales Trinity Saint David (Swansea Metropolitan University) [Mount Pleasant, Swansea, South Wales, U.K.; http://www.uwtsd.ac.uk/]

### Aims and Scope of the Journal

*Journal of Coastal Research*, an International Forum for the Littoral Sciences, is dedicated to all aspects of coastal research. These include geology, biology, geomorphology (physical geography), climate, littoral oceanography, hydrography, coastal hydraulics, environmental (resource) management, engineering, and remote sensing. Although each field functions effectivelywithin itsownpurview, the cross-disciplinarynature of coastal studies requires familiarity with other fields as well. Hence, the scope of topics is necessarily broad in order to address the complexity of coastal biophysical and socio-economic interactions. Because of the wide range of interrelated topics, the journal invites original contributions and manuscripts dealing with theory, methodology, techniques, and field or applied topic studies on interdisciplinary coastal issues.

The journal encourages the dissemination of knowledge and understanding of the coastal zone by promoting cooperation and communication between specialists in different disciplines. Natural scientists, for example, are encouraged to collaborate with professionals in other fields to prepare contributions relating to the coastal zone that foster increased appreciation of coastal environments and processes. By means of this journal, with its scholarly and professional papers, systematic review articles, book and symposia reviews, communications and news, and special topical issues, an international forum for the development of integrated coastal research is provided.

### Advertising, Editorial, and Subscription Information

Advertising and Editorial Office: All advertising and editorial correspondence should be sent to Dr. Charles W. Finkl, Editor-in-Chief, Journal of Coastal Research, 5130 NW 54th Street, Coconut Creek, FL 33073, U.S.A. PHONE: 828-333-2300. E-MAIL: cfinkl@cerf-jcr.com.

**Subscription Information**: The *Journal of Coastal Research* is a bimonthly publication. Calendar-year (2014) print and online subscription prices for the JCR are: \$115.00 for US CERF members / \$125.00 for International CERF members (\$95.00 for online only), and \$519.00 for US institutions / \$541.00 for International institutions (\$437.00 for online only). Additional surface charges may apply to subscribers located outside of the USA. For additional membership and subscription forms and information, please go to www.CERF-JCR.org. To obtain a membership or subscription form by mail, please send request to Journal of Coastal Research, P.O. Box 7065, Lawrence, KS 66044. Back Issues and Special Issues of the JCR, when available, can be directly purchased at www.CERF-JCR.org.

The Journal of Coastal Research is currently surveyed in Applied Science & Technology Abstracts; Applied Science & Technology Index (H.W. Wilson); Aquatic Sciences & Fisheries Abstracts; BIOBASE; Biological Abstracts; BIOSIS Previews (Thomson); CAB International Abstracts (CABI); CSA Civil Engineering Abstracts (ProQuest); Current Awareness in Biological Sciences (Elsevier); Current Contents/Agriculture, Biology, & Environmental Sciences (Thomson); Ecology Abstracts (ProQuest); Environmental Sciences & Pollution Management; GeoAbstracts [Geographical Abstracts: Physical Geography; Ecological Abstracts; Geological Abstracts; GEOBASE] (Elsevier); GeoRef; Meteorological & Geoastrophysical Abstracts (ProQuest); Oceanic Abstracts (ProQuest); Oceanographic Literature Review (Elsevier); Physical Sciences Digest (CSA, Ebsco); Pollution Abstracts (ProQuest); Referativnyi Zhurnal; Science Citation Index; SciSearch (Thomson); SCOPUS; Water Resources Abstracts (Bethesda); Zoological Record (Thomson).