
D. Kelletat and B. Kelletat

Department of Physiogeography
University of Essen
4300 Essen 1
West Germany

ABSTRACT


This short note provides quantitative interpretations of papers published worldwide on coastal geomorphology since 1960. Particular emphasis is given to the development of amounts of papers, to their regional distribution, and to the contributions of the different authors. Numbers of different general subjects are also analysed.

ADDITIONAL INDEX WORDS: Bibliography, coastal geomorphology, statistics of publications.

INTRODUCTION

In the course of the last years, a very large number of publications, including regional and general bibliographies edited by various IGU and INQUA Committees, was used to compile and edit the International Bibliography on Regional and General Coastal Geomorphology (since 1960) (KELLETAT, 1983, 1985). This publication contains more than 13,000 items, which comprise most works on coastal geomorphology in English, French, German, Italian, Spanish, Portuguese, Dutch and the Scandinavian languages (Finnish excluded). Papers in east European and Asian languages were only included if they had detailed abstracts in one of the above-mentioned languages. Asian regions are under-represented in our bibliography (see Figure 1). This figure also indicates an under-representation of publications issued since 1983, due to the difficulty of receiving information on recent publications from abroad in rather short time. All items of our bibliography are classified by 98 regional and 35 general sections; some could not be classified correctly without difficulties because I was not able to review them personally. However, the statistical error so induced is estimated to be about 1 percent. This paper gives some valid statistics for a regional and general interpretation of the publications on coastal geomorphology of the world issued since 1960.

THE FREQUENCY OF PUBLICATIONS ON COASTAL GEOMORPHOLOGY SINCE 1960

The period from 1960 to 1982 (Figure 1) summarizes 12,253 titles, indicating some significant trends of development. Prior to 1964, about 300 papers were published yearly, but the annual average since 1980 has risen to more than 700. The numbers of publications differ from year to year by about 25 percent, possibly due to the stimulating effects of international congresses of IGU or INQUA as well as their working groups dealing with coastal environments. The remarkable decrease in the number of publications since 1983 (see Figure 1), however, may be an artifact due to the representation of very recent papers.
ANALYSIS OF THE REGIONAL DISTRIBUTION OF PUBLICATIONS ON COASTAL GEOMORPHOLOGY SINCE 1960

More detailed information concerning worldwide trends for the period 1960–1985 is shown in Figure 2, with the average of publications per year oriented to coastal sections of the world (based on natural or political boundaries). Numbers of publications per coastal sections range from less than 1 publication per year (parts of the west coast of South America, Portugal, Albania, Atlantic and Indian Ocean islands) to more than 20 publications per year (east coast of the USA, the French Atlantic coast, German North Sea coast, east coast of Australia). For most parts of Asia a larger number of publications is assumed but were neglected in our analysis.

The percentage of publications on coastal geomorphology since 1960 is exhibited in Figure 3 by continents: Europe (excluding the U.S.S.R.) is followed by North America, Australia, Africa, Central and South America. The section designated as "others" represents Asia and all the larger and smaller islands of the oceans, including Antarctica. A more detailed analysis is given for Europe in Figure 4 which shows a dominance of research in the British Isles and along adjacent coasts of the...
Figure 2. Regional distribution of papers on coastal geomorphology: average number of publications/year since 1960, by natural or political sectors of the world.

Atlantic Ocean and the North Sea, whereas the research impact on parts of the eastern Mediterranean is noticeably lower. By comparing the numbers of papers with the lengths of coastal sections, it becomes apparent that the German North Sea coast is by far the most studied area in Europe, at least as far as coastal geomorphology is concerned. For the whole Mediterranean, about 75 per cent of all publications deal with the European sector sensu stricto which comprises less than 50 per cent of the total coastline.

A similar analysis for the North American continent is given in Figure 5. For this coastal segment, about 75 per cent of the 2,524 publications compiled since 1960 deal with the United States, the balance with Canadian territory. The eastern coastal sections of both countries are more frequently investigated than west coasts.

Perusal of the map in Figure 2 as well as Figures 3, 4 and 5 discloses the regions which are still poorly investigated in terms of coastal geomorphology. These sites suggest that in densely populated parts of the world with a long tradition of scientific and technical development, nearly all research on their
own coasts has been conducted by native scientists. In contrast, along the periphery of Europe and in many developing countries most coastal research is promoted by foreign scientists, the total numbers of publications depending on the natural diversity and attractiveness of the coastal regions (and on some political restrictions, too). In Greece (Figure 6), for example, from a total of 170 papers only 31 were published by Greek authors or co-authors.

Furthermore, large parts of the world have never been investigated by native scientists, thus indicating the need to encourage and possibly assist these countries to conduct coastal research themselves. Several international organisations, e.g., the IGCP programs of the UNESCO, strive for these aims.

**GENERAL SUBJECTS OF RESEARCH ON COASTAL GEOMORPHOLOGY SINCE 1960**

Because many of the papers compiled in our bibliography deal with more than one subject, the statistical basis for this interpretation amounts to a total number of 14,651 items. Their frequencies are presented in Figure 7. A large numbers of papers deal with constructive forms and processes such as beach dynamics, longshore drift, tidal flats, spits, bars and coastal barriers, lagoons, deltas, and so far, including biogenic constructions by coral reefs and other organisms. More than 5,000 publications deal with different kinds of sea level oscillations, only 5.6 per cent with destructive forms and processes, and 5.2 per cent with “drowned” coasts. Another 5 per cent is dedicated to theories, techniques as well as technical and experimental problems, about 40 per cent of them dealing with remote sensing aspects. For the constructional section (Figure 7), about 30 per cent of the papers concern tidal flats, and again half of them with the inner North Sea sector of Europe.

More than 60 per cent of all papers on beach dynamics discuss the problem of beach erosion, 345 papers deal with beachrock and aeolianite,
191 with geomorphological aspects of mangroves and 146 with constructional forms by sea ice. In total, more than 1,400 papers dealing with constructional forms refer to biogenic components such as mangroves, corals, calcareous algae, etc. Within the category of biogenic hardgrounds more than 80 per cent deal with corals. For those that deal with other biogenic influences on coastal geomorphology, about 75% are concerned with mangroves.

The 5,092 publications dealing with sea level fluctuations discuss, by more than 40 per cent (i.e., 2,082 items), Pleistocene terraces (including their fossils and dating problems), 1,835 refer to the Flandrian glacio-eustatic transgression, 603 to the glacio-isostatic rebound of late- and postglacial times in formerly glaciated areas, and 572 to neotectonic events (Figure 8). A total of 600 papers discuss small oscillations recorded by tide gauges in the last 100 years.

With regard to the development of single subjects, it should be noted that those which are poorly represented (e.g. influence of sea-ice, bioerosion or bioconstruction outside coral reefs) show no signifi-
cant increase in number during the last quarter century of research. Other subjects, particularly those dealing with dating problems and neotectonics, show significant increases.

CONTRIBUTIONS OF SINGLE SCIENTISTS TO COASTAL GEOMORPHOLOGY SINCE 1960

More than 5,200 authors have contributed to 13,146 publications dealing with aspects of coastal geomorphology, as compiled in our bibliography, giving an average of about 2.5 titles per author/co-author. Many scientists, however, published more than this average. Of the total, 76 authors published 20 or more papers, i.e., 1.3 per cent of the authors contributed 16.3 per cent (2,149) of all the papers. The number of authors with at least 10 papers is 185 (i.e., 3.6 per cent), but they accounted for 3,804 papers (28.8 per cent) in the bibliography. Although the following list is no doubt incomplete, it does indicate some of the more published scientists in the field of coastal geomorphology for the last 25 years: E.C.F. Bird (140 publications), A. Guilcher (99), R. Paskoff (79), D.R. Stoddard (67), E.D. Gill (65), R.W. Fairbridge (63), R. Battistini (61), J.C. Dionne (61), D.M. Hopley (55), B.C. Thom (55), P. Pirazzoli (44), W.F. Tanner (44), J.M. Coleman (40), H.E. Reineck (39), R. Dolan (37), D. Kelletat (37), C. Kidson (36), P. Sanlaville (36), L.D. Wright (35), J.C. Kraft (32), N.A. Mörner (31), J. Chappel (29), J.H. Hoyt (29), S.B. McCann (29), H.J. Walker (29), R.W.G. Carter (28), C.A.M. King (28), R.J. Russel (28), A.P. Carr (27), A.R. Orme (27), B. Luck (26), L. Martin (26), J.C. Schofield (26), M.L. Schwartz (26), K.O. Emery (25), N.C. Flemming (25), J.R. Hails (25), and V.P. Zenkovich (25).

FINAL REMARKS

Although presented with some reservations, we hope that these figures and brief interpretations give some quantitative impression of the last 25 years of coastal geomorphological research. These observations are remarkable because research on coastal geomorphology lags far behind many other avenues of terrestrial geomorphology. In Europe, for example, coastal geomorphology accounts for only about 2 to 5 per cent of all geomorphological papers. This seems rather astonishing in view of the fact that world population centers tend to concentrate on coastal fringes. Because geomorphological processes affect a variety of human activities, we therefore hope that further stimulation will be given by local or regional agencies, individual scientists, and international organizations.

LITERATURE CITED


RESUMEN

Esta comunicación de interpretaciones cuantitativas de artículos sobre geomorfología costera publicados en el mundo desde 1960. Se pone un énfasis particular en el crecimiento de la cantidad de artículos, su distribución regional, y las contribuciones de los diferentes autores. También se analizan otras diferentes materias.--Miguel A. Losada, Universidad de Santander, Santander, Spain

ZUSAMMENFASSUNG

Dieser kurze Vortrag liefert Auslegungen der Berichte, die seit 1960 weltweit herausgegeben wurden. Hauptpunkte sind die Entwicklung der Berichtszahlen, örtlicher Verteilung und die Beiträge verschiedener Autoren. Die Zahl verschiedener Generalfächer wird auch analysiert.--Stephen A. Murdock, CERF, Charlottesville, Virginia, USA