

Oceanological and Hydrobiological Studies
Vol. XXXII, No. 3

Institute of Oceanography

(73-81)
2003

University of Gdańsk

Short Communication

**MARINE DEBRIS AND THREATS TO THE POLISH COAST IN 2001 –
SOURCES AND TYPES**

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INTRODUCTION

This short communication presents results obtained within the framework of the pan-European project Coastwatch Europe which is conducted under the auspices of the European Parliament in Brussels (DG XI). The aim of this project is to monitor the amount of debris and groups of plants and animals on the sea coast. The idea of this project was established in Ireland in 1987 and coordinated by Trinity College, Dublin. The first results obtained in autumn 1987 in Ireland were so interesting that the European Commission for the Natural Environment provided funding to expand the project to include other European countries. The project was awarded the right to use the “Environment for Europe” logo and the DG XI of the European Parliament was named the official patron.

Eight countries conducted experimental studies in 1988, and the program was named Coastwatch Europe. In 1989 simultaneous observations were conducted in six countries - Denmark, Ireland, the Netherlands, Norway, Portugal and the United Kingdom, and the first European report was published following the survey. In the same year the project was conducted on a pilot scale in four more countries - Belgium, Germany, Iceland and Italy. In 1990 the survey area was further increased by the pilot participation of Latvia, Spain and

Sweden. In 1991 Estonia, Greece, Lithuania and Poland were included. In 1992 Bulgaria, France, Latvia, Ukraine and a small corner of Finland were added, and in 1993 Russia joined the program. The aims of the Coastwatch Europe Network are as follow:

1. to raise public awareness of coastal resources at all levels;
2. to designate problems and threats to the coastline and to instigate and advise on remedial and protective follow up work and to help coastal communities become actively involved in protecting their coastal environment;
3. to gather a large amount of baseline data within a short time on the state of the European coastline in a form which is directly comparable between countries and to store and analyze data in an easily retrievable format for use in coastal management and monitoring policy;
4. to act as an international framework which can be adopted for the collection of other environmental data for use in environmental follow-up work;
5. to aid interdisciplinary environmental education in and out of schools.

The first Polish survey was done on a pilot scale of 52 km of the Gulf of Gdańsk in 1991 under the Polish name of *Obserwator Wybrzeża Europy*. In 1992 the program encompassed the whole of the Polish coast. Since then, the Coastwatch Europe program has been conducted annually along the Polish coast. The regional specifics of the studied coast, the existence of threats, differences in the occurrence of marine flora and fauna and estimations of the degree of pollution along the coasts were identified through national questionnaires.

The aim of this communication is to present the main results of data sampled during 2001 within the framework of the Polish part of the Coastwatch Europe program.

MATERIAL AND METHODS

Questionnaires were used throughout Europe as the basis for sampling the data. The monitoring of coasts is conducted throughout Europe simultaneously at the end of September and the beginning of October over the course of four to five weeks. The coordinator from each country is responsible for establishing the exact date of monitoring as soon as possible after the summer season. The reason for this is two-fold. Firstly, autumn winds wash off beaches and can alter litter charging. Secondly, the participants, which are mostly students, are just returning from the summer holidays.

The coast is divided into parts, blocks and segments. A part is 500 m long and is the smallest measurement unit. The data retrieved from one part are included in one questionnaire. Ten parts make a block (5 km) and ten blocks

comprise a segment (50 km). Each part of the coast is investigated by surveyor teams of 2 – 3 people who are responsible for watching this area and recording in writing the items and features designated in the questionnaire. The completed questionnaires are returned to the national Coastwatch office (Sopocki Instytut Ekologiczny) where they are sorted and statistically analyzed. In 2001, 420 questionnaires which described 210 km of coast were analyzed. Almost half of the participants had taken part in the program previously and were already familiar with the surveyed coast; 30% of them were newcomers to the program.

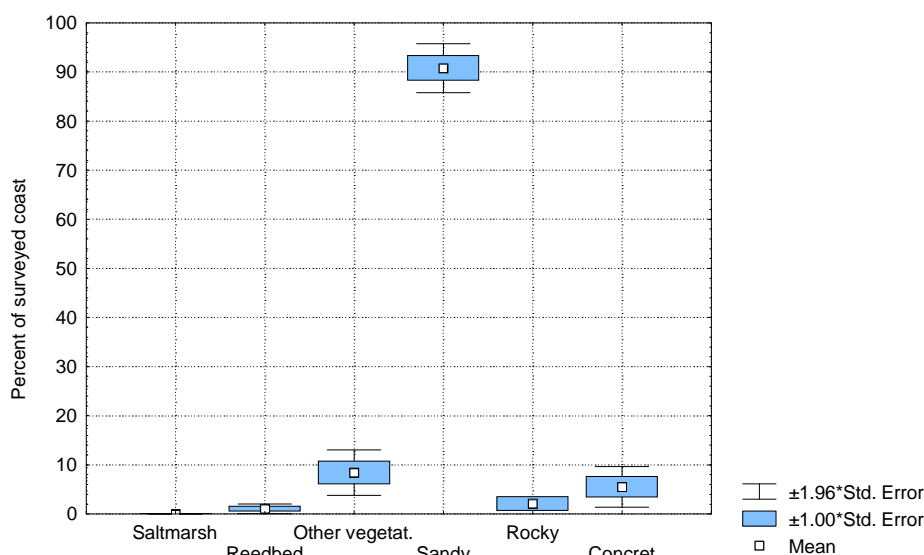


Fig. 1. Type of coastline within the surveyed area.

RESULTS AND DISCUSSION

The geomorphological character of the Polish coastal zone is defined as a sandy beach area with dunes. The beaches comprise about 90% of all the surveyed coastline (Fig. 1). There are also short segments of cliffs and bulrushes. The general state of littering is not highly varied. More than half of the surveyors indicated that the coast is moderately littered, while 12% of them defined the observed coast as grossly littered (Fig. 2). The amount of surveyed area described as grossly littered has oscillated around 10% in recent years (Jóźwiak 1996, Jóźwiak 1997, Jóźwiak 2000). In comparison with results from other European countries, the Polish coast can be classified as one of the cleaner

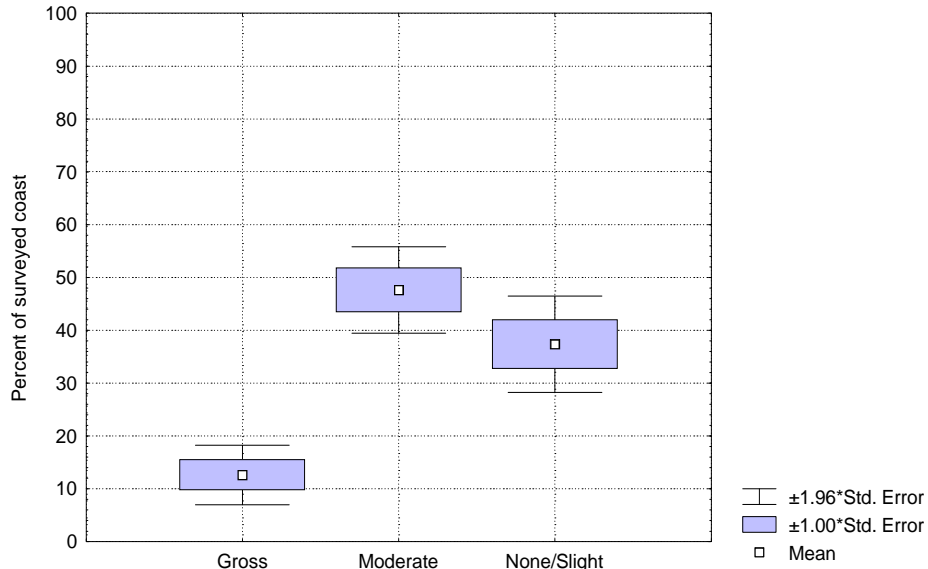


Fig. 2. Level of litter cover on the surveyed coast.

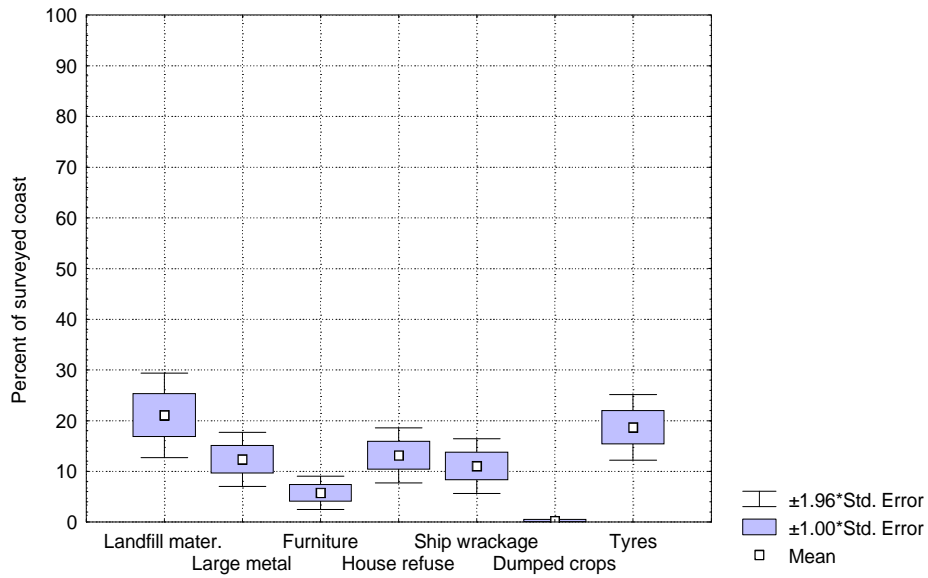


Fig. 3. Large litter items on the Polish coast.

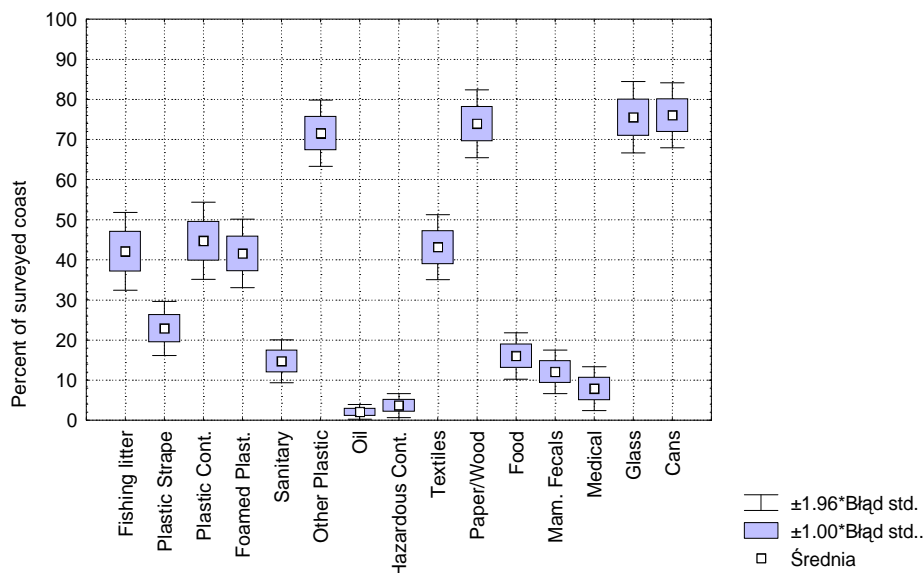


Fig. 4. General litter and pollution types on the surveyed coast.

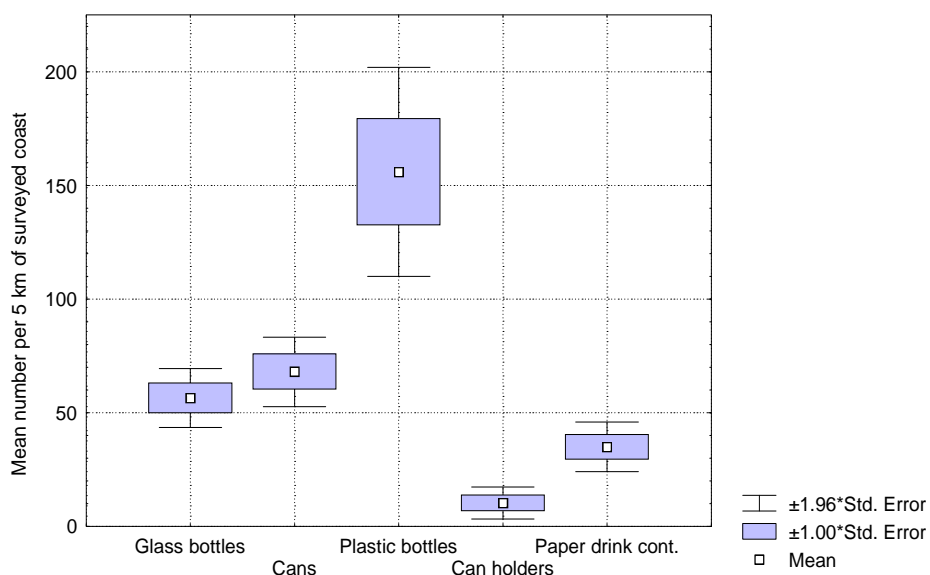


Fig. 5. Mean number of drink containers and can holders per 5 km of surveyed coast.

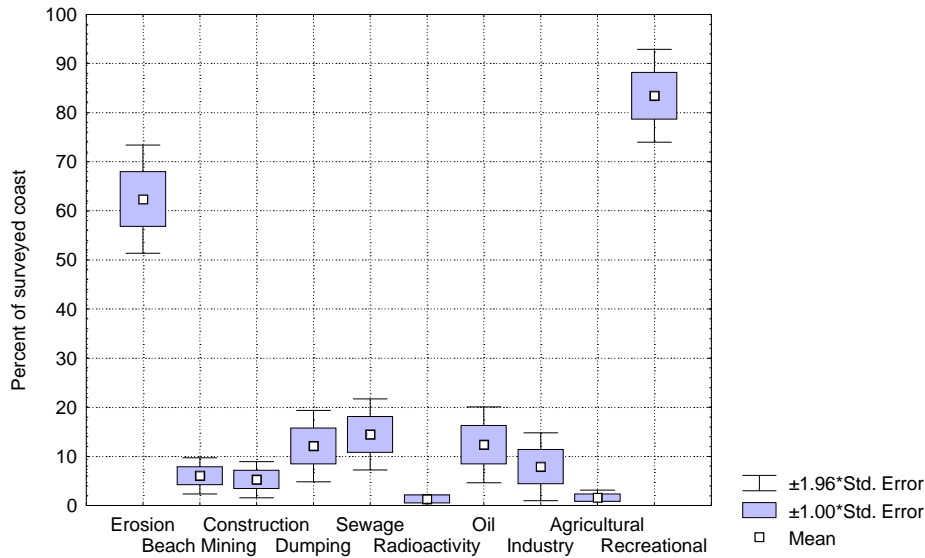


Fig. 6. Threats to the surveyed coast.

ones. In contrast, 61% of the Spanish coast and 37% of Portuguese and 17% of French beaches are described as grossly littered (Dubsky *et al.* 1995).

Of large litter items, landfill materials, which were found on 22% of the surveyed coast, were the most frequently recorded. The high frequency of this type of litter was also noted on the Italian coast (Golik 1997) and in Ukraine, the Netherlands, Sweden and Iceland (Dubsky *et al.* 1995). Tires were the second most common type of large debris at 18%. Of the European countries, Poland had one of the largest number of tires left on the coast (Dubsky *et al.* 1995). Household refuse was reported at slightly less than 15% (Fig. 3). The occurrence of household refuse is characteristic for poor, developed countries (Faris and Hart 1995). The dominant types of smaller litter recorded on 70-80% of the surveyed coastline were cans, glass and glass bottles, paper or wood and fragments of plastic. This kind of debris is the most frequently observed type on almost every coast in Europe and throughout the world (Moore *et al.* 2001, Moore and Allen 2000, Cahoon 1999, Smith *et al.* 1997, Frost 1997, McGilvary 1995, Holden 1995, McGilvary 1994, Baird D. 1994, Khordagui and Abu-Hilal 1994, Corbin and Singh 1993, Garrity and Levings 1993, Rees and Pond 1993). Oil, hazardous containers and medical waste were observed very rarely (Fig. 4). Within the category of beverage containers, plastic drinks bottles were the most frequent at a mean of approximately 150 for each 5 km block, followed by beverage cans (approximately 78/5 km), glass bottles (approximately 62/5 km)

and paper drinks containers (approximately 34/5 km) (Fig. 5). The frequency of beverage containers on the Polish coast has remained at a stable level and is within the European average (Dubsky *et al.* 1995, Józwiak 1994, Józwiak 1996, Józwiak 1997, Józwiak 1998, Józwiak 1999, Józwiak 2000).

Threats from recreational activities were the most important on the observed coast at more than 80%, followed by erosion at 62%. When combined, these threats are among the highest in the 22 European countries participating in Coastwatch Europe (Dubsky *et al.* 1995). Reports of other threats, such as sewage pollution, flooding and oil, are much rarer (13-15%) (Fig. 6). Pollution which occurs on the coast is a significant danger for the coastal zone ecosystem and for the development of the recreational use of the coast (Hall *et al.* 2000, Inanc *et al.* 1997, Smith *et al.* 1997, Williams and Nelson 1997, Faris and Hart 1995, Fry *et al.* 1986).

CONCLUSIONS

About 12% of the coastline was classified as seriously littered. Landfill materials, tires and household refuse were the most frequently noted large litter items, but the most frequent was small debris such as paper, glass, all types of drink containers and plastic litter. Recreation and tourism were described as the most dangerous of the activities conducted on the surveyed Polish coast.

REFERENCES

- Baird D., 1994. *Sources of Beach Debris: Great Guana Cay Abaco; the Bahamas*. In: J.C. Clary (edit.), Posters, Abstracts and Manuscripts from the Third. Interant. Conf. On Marine Debris, May 8-13, 1994, Miami, Florida. U.S. Dep. Of Comm. NOAA Tech. Memo. NMFS-AFSC-51, 70.
- Cahoon L.B., 1999. *Aluminium cans as marine debris in Masonboro Sound, North Carolina: Insights for debris management*. Elisha Mitchell Scientific Society. Jour., 115, 3, 145-151.
- Corbin C.J., Singh J.G., 1993. *Marine debris contamination of beaches in St. Lucia and Dominica*. Mar. Poll. Bull., 26, 6, 325-328.
- Dubsky K., Carroll M, Larragy J., 1995. *Coastwatch Europe International Results for the Autumn 1994 Survey*. Coastwatch Europe Network, 135 pp.
- Faris J., Hart K., 1995. *Seas of debris: A summary of the Third Intenat. Conf. On Marine Debris*. Alaska Fisheries Center, 54 pp.
- Frost A., Cullen M. 1997. *Marine debris on northern New South Wales beaches (Australia): Sources and the role of beach usage*. Mar. Poll. Bull., 34, 5, 348-352.

- Fry D.M., Fefer S.I., Sileo L., Wolfe D.A., 1986. *Ingestion of plastic debris by Laysan albatrosses and wedge-tailed shearwaters in the Hawaiian Islands*. Mar. Poll. Bull., 18, 6b, 339-343.
- Garrity S.D., Levings S.C., 1993. *Marine Debris along the Caribbean coast of Panama*. Mar. Poll. Bull., 26, 6, 317-324.
- McGilvray F., 1994. *Marine debris on Britain's Coast*. North Sea Monitor, 12, 1, 8-10.
- McGilvray F., 1995. *Marine debris on United Kingdom Beaches*. In: J.C. Clary (edit.), Posters, Abstracts and Manuscripts from the Third. Interant. Conf. On Marine Debris, May 8-13, 1994, Miami, Florida. U.S. Dep. Of Comm. NOAA Tech. Memo. NMFS-AFSC-51, 49-50.
- Golik A., 1997. *Debris in the Mediterranean Sea: Types, Quantities and Behavior*. In: Coe J.M., Rogers D.B. (eds), Marine Debris. Sources, Impacts, and Solutions. Springer-Verlag New York, 5-14.
- Hall K., Nickerson R., Velander K., 2000. *Counting the costs of marine litter*. Marine Conserv., 4(9), 14.
- Holden N., 1995. *Marine Debris Pollution on the Beaches of Trinidad, West Indies*. In: J.C. Clary (edit.), Posters, Abstracts and Manuscripts from the Third. Interant. Conf. On Marine Debris, May 8-13, 1994, Miami, Florida. U.S. Dep. Of Comm. NOAA Tech. Memo. NMFS-AFSC-51, 48-49.
- Inanc B., Kinaci C., Oeztuerk I., Sevimii M.F., Arikan O., Oeztuerk M., Ghosh M.M., Ros M. (eds.), 1997. *Pollution prevention and restoration in the Golden Horn of Istanbul*. Water Sci. and Technol., 37, 8, 255 pp.
- Józwiak T., 1994. *Amounts, types and distribution of Marine Debris on the Polish coast (Europe) in 1992 and 1993*. In: J.C. Clary (eds), Posters, Abstracts and Manuscripts from the Third Internat. Conf. On Marine Debris, May 8-13, 1994, Miami, Florida U.S. Dep. Of Comm. NOAA. Tech. Memo. NMFS-AFSC-51, 17-18.
- Józwiak T., 1996. *Obserwator Wybrzeża Europy*. Raport polski 1996. Wyd. Ocean SIE, 124 pp. (in Polish)
- Józwiak T., 1997. *Obserwator Wybrzeża Europy*. Raport polski 1997. Wyd. Ocean SIE, 112 pp. (in Polish)
- Józwiak T., 1998. *Obserwator Wybrzeża Europy*. Raport polski 1998. Wyd. Ocean SIE, 137 pp. (in Polish)
- Józwiak T., 1999. *Obserwator Wybrzeża Europy*. Raport polski 1999. Wyd. Ocean SIE, 77 pp. (in Polish)
- Józwiak T., 2000. *Obserwator Wybrzeża Europy*. Raport polski 2000. Wyd. Ocean SIE, 71 pp. (in Polish)

- Khordagui H.K., Abu-Hilal, A.H., 1994. *Man-made litter on the shores of the United Arab Emirates on the Arabian Gulf and the Gulf of Oman*. *Water, Air and Soil Pollution*, 75, 3-4, 343-352.
- Moore S.L., Gregorio D., Carreon M., Weisberg S.B., Leecaster M.K., 2001. *Composition and Distribution of Beach Debris in Orange County, California*. *Mar. Poll. Bull.*, 42, 3, 241-245.
- Moore S.L., Allen M.J., 2000. *Distribution of Anthropogenic and Natural Debris on the Mainland Shelf of the Southern California Bight*. *Mar. Poll. Bull.*, 40, 1, 83-88.
- Rees G., Pond K., 1993. *The Norwich Union Coastwatch UK Survey Report 1993*. Farnborough Coll. of Technol., 104 pp.
- Smith V.K., Zhang X., Palmquist R.B., 1997. *Marine debris, beach quality, and non market values*. *Environm. and Res. Econ.*, 10, 3, 223-247.
- Williams A.T., Nelson C., 1997. *The public perception of beach debris*. *Shore and Beach*, 65, 3, 17-20.