

Manual beach cleaning in Belgium: an ecological alternative

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In the municipalities of Koksijde (Belgium), an pilot project on sustainable beach management was set up in 2004. This included the manual cleaning of 2 km of beach, and a questionnaire to examine the beach visitor's perception of beach cleanness and on the acceptability of organic material on the beach. The time needed to manually clean the beach was less than expected: 1 man-day per month per km. Following the results of the public perception study, beach users were mostly satisfied with beach cleanness (82%), and the manually cleaned beach was just as visited as the mechanically cleaned one. Results showed that it is in fact the artificial material that the majority of beach users regard as garbage that should be removed from the beach. There was wide support for manual beach cleaning by beach users. Thanks to these results, Koksijde now supports this environmental friendly way of beach cleaning.

INTRODUCTION

Clean beaches are a priority for all coastal municipalities. This cleaning happens mostly by using a mechanical beach cleaner. In Belgium, all 10 coastal municipalities possess their own mechanical beach cleaner. By using such a device it is indeed possible to achieve an acceptable result in a quick and efficient way. However, a mechanical beach cleaner not only removes most of the man-produced waste, but unfortunately also takes away organic material. The organic material in the drift-line has numerous natural functions in the coastal ecosystem, in terms of coastal defence, as feeding ground, as a biotope for pioneer plants, etc. It is also a rich exploring ground and provides educational material for tourists and children. On the other hand, manual cleaning undoubtedly has several positive effects: less waste is produced, less cost for the treatment of the waste, less fuel cost as the cleaner is used less, bigger chance for the beach visitor to explore the natural material, and, moreover, the profit the natural ecosystem will take of it.

In close collaboration with the coastal municipalities, an initiative "sustainable beach management" was set up by the Co-ordination centre on Integrated Coastal Zone management in 2003. Workshops with the technicians, a brochure and yearly spring clean-up actions were the first outputs of this. Koksijde was the first municipality collaborating in a pilot project on manual beach cleaning. In order to know the beach visitor's perception of beach cleanness and on the acceptability of organic material remaining on the beach, a questionnaire was conducted during the summer and autumn of 2004. The results are presented in this paper. The information thus assembled is of capital importance to evaluate the feasibility of ecological beach cleaning in Belgium. A different way of managing the beach, more manual cleaning and less mechanical, can lead to a win-win situation, for nature and for the local authorities.

MATERIALS AND METHODS

A pilot project for manual beach cleaning was conducted in the municipality of Koksijde during the summer months of 2004. This opportunity was taken to assess the amount and type of waste collected. The Administratie Milieu-, Natuur-, Land- en Waterbeheer (AMINAL), cleaned a stretch of beach 1 Km long and about 100 m wide at Zeebermduinen and Schipgatduinen on the 6th of July, August and September. The beach was cleaned twice a month, once by AMINAL and once by the municipality, with two week intervals. Only artificial, man-made items were removed and classified in eight fractions: plastic, textile, paper, glass, metal, rubber, wood and other. The total weight of the waste collected and the weight of each fraction was determined for each beach. Information was also gathered on the time, the frequency and the personnel needed for cleaning, as well as an approximation of the costs of cleaning.

A public perception study was also conducted to obtain the beach user's opinion on beach cleanness and on the contents of the drift-line material at Koksijde. It was based on a questionnaire designed following the principals used in opinion surveys (Van Vracem & Gauthy-Sinéchal, 1996). Sampling was made both in the high and low tourist season (August and October 2004, respectively), in the same mechanically and manually cleaned stretches of beach. Two interviewers chose beach users according to their gender and age, following statistics on the Belgian population as described by the Institute National de Statistique (INS, 2004ab).

RESULTS AND DISCUSSION

Manual beach cleaning at Koksijde

At Zeebermduinen, the average time needed for two employees to manually clean 1 Km of beach from July to September 2004 was 1 h 38 minutes \pm 37 minutes, and the average total amount of waste collected was 28,5 \pm 13,2 kg. At Schipgatduinen, it was 1 h \pm 19 minutes, and 19,6 \pm 3,8 kg respectively. The average percentages of each waste fraction collected at both sites during summer are shown in Figure 1. For a monthly estimate, these results should be approximately doubled, since the beaches were manually cleaned twice a month: once by AMINAL and once by the community of Koksijde.

Plastic and textile together represented more than 70% of the waste collected at both beaches. These results were higher than expected from previous manual cleaning experiments performed in March 2004 (Belpaeme et al., 2004), where they represented 50%, and plastic alone represented only 29%. The plastic fraction consisted mainly of plastic bottles (for water and soft drinks) and plastic bags, while the textile fraction consisted mainly of fishing nets and nylon. The least important fractions were rubber, paper and other. These results indicate that if strict measures are taken only regarding the disposal of plastic, more than half of the waste would be already removed from the beach, which would in turn reduce the time and costs of manual cleaning.

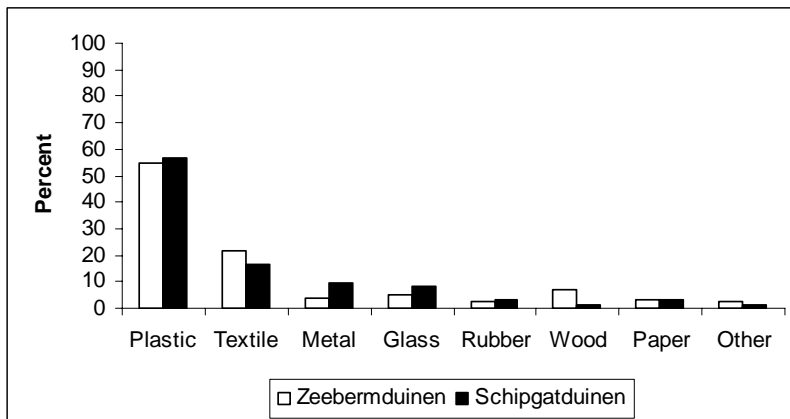


Figure 1. Average percentages of the waste fractions collected by manual beach cleaning at Zeebermduinen and Schipgatduinen during summer, 2004.

An approximation of the costs of manual cleaning includes the costs of transport of the employees and the waste sacs, and the equivalent of the salaries of two employees for an average of 3 hours of work, twice a month. The beach vehicle used to carry the waste sacs spent about 1 liter of gasoline per hour, and a second vehicle equipped with a platform to transport the beach vehicle spent less than 5 euros per day of cleaning.

Public perception study

A total of 184 questionnaires were filled: 49% in the high tourist season and 51% in the low tourist season, also 47% in the manually cleaned beach and 53% in the mechanically cleaned beach. In general outlines, the sample had about equal numbers of men and women, and the majority was between 25 and 49 years old. They had a high level of education, either undergraduate or postgraduate (67%) and were mostly employed (70%).

Out of 184 respondents 65% visit the beach at any time of the year, 14% only in autumn, 13% only in summer and the remaining 8% either in summer or autumn. Also 56% of beach users always come to the same beach, mainly because it is close to accommodations (55%) and secondly for aesthetic reasons (26%). Results showed that there was a high level of satisfaction about beach cleanness (81%), and most importantly, they were just as well satisfied in the manually than in the mechanically cleaned beach.

Beach users were asked to choose from a list of natural and artificial items present in a drift-line the ones they would like to be removed from the beach during cleaning (Figure 2, left). There was a clear differentiation between artificial and natural items. More than 95% of respondents wanted metal, plastic, glass, rubber and polystyrene to be removed, more than 80% also wanted textiles and paper to be removed. Except for wood (35%), and dead jellyfish (20%), all other natural materials were chosen by less than 10% of respondents. Algae, which are the main target of mechanical beach cleaning machines, were only chosen by 4% out of 184 people.

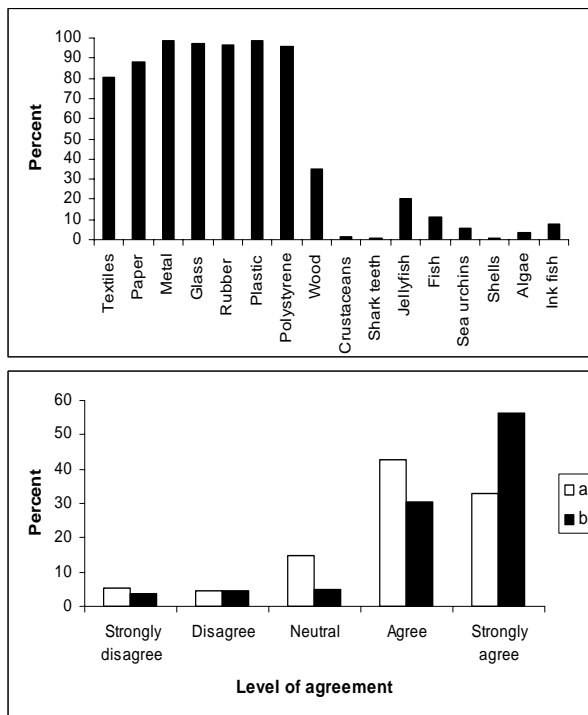


Figure 2. Left: Items that should be removed from the beach while cleaning according to the respondents. Right: Level of agreement with the following statements: a) The natural drift-line material is interesting to me, for exploration and observation of nature, amusement or for finding curious objects; b) Only artificial drift-line material should be removed during beach cleaning.

Respondents were asked to give their level of agreement with some statements regarding beach cleaning and the drift-line material (Figure 2, right). From the results 43% agreed and 33% strongly agreed that the natural drift-line material was interesting for them. When it was stated that only artificial material should be removed from the beach during cleaning, 31% of respondents agreed and 56% even strongly agreed.

CONCLUSIONS

The pilot project at Koksijde helped demonstrate that manual beach cleaning can be successfully implemented in delimited stretches of beach, and that some coastal communities might be over estimating the staff and time needed for this task. In Koksijde, the time needed to manually clean 2,1 km of beach was approximately 2 man-day per month. Apart from ecological and morphological interests, manual beach cleaning has the advantage that it can be done in places where mechanical beach cleaning machines cannot access, for example on the dunes, and that the costs involved are low. The most important waste items collected during manual beach cleaning were plastic (>50%) and textiles (16-20%). More strict measures should be implemented regarding the disposal of these two waste items at the beach to facilitate cleaning.

Following the results of the public perception study, beach users were mostly satisfied with beach cleanness at the moment of the interview (82%), and the manually cleaned beach was

just as visited as the mechanically cleaned one. Results also showed that it is in fact the artificial material that the majority of beach users regard as garbage that should be removed from the beach: metal, plastic, glass, rubber, polystyrene, paper and textiles were all selected by more than 80% of respondents. Algae were only chosen as items to be removed by 4% of the respondents.

There was wide support for manual beach cleaning by beach users since 75% of them agreed that the natural drift-line material was interesting, for exploration and observation of nature, amusement, or for finding curious objects. Furthermore, 87% agreed that only artificial drift-line material should be removed during beach cleaning.

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