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SpiritBSB Online

Black Sea CROSS BORDER COOPERATION

PROCEEDING INTERNATIONAL CONFERENCE: NOT JUST EIGHT COUNTRIES USE BLACK SEA

Joint Operational Programme Black Sea Basin 2014 - 2020

19-20 May 2022

Constanța, Romania

Common borders. Common solutions

CROSS BORDER COOPERATION

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The project:

Leave your Environmentalist Spirit Online for the Black Sea Basin – Spirit BSB online

Association for the Protection of Human Being and the Environment for a Sustainable Development in the World-ECOM, Constanta, Romania - as Coordinator (LP)

Sinop University - Sinop, Turkey

Of Chamber of Agriculture - Trabzon, Turkey

International Centre for Social Research and Policy Analysis - ICSRPA - Tbilisi, Georgia, Georgia

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JOINT OPERATIONAL PROGRAMME BLACK SEA BASIN 2014-2020

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Project: Joint Operational Programme Black Sea Basin 2014-2020

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12. Water surface debris collection technologies

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Abstract: Plastic pollution of rivers and oceans is one of the most acute issues of environmental protection along with the effects of global climate change. Ecosystems are affected, as well as human health. To solve this environmental problem, the research is studying a way to collect debris from the surface of the water. The early collection of plastic waste prevents its decomposition into microscopic components that are rapidly transmitted through the food chain to humans. The first phase of the project involved the design and construction of a special surface debris collection vessel at a price appropriate to the local market. Its normal operation by the Buzău-Ialomița Water Basin Administration will also indicate the operating costs (fuel, personnel, permits) and will generate a cost per ton of waste collected. Thus, it is desired to highlight the technical and economic characteristics of the equipment built in order to equip the national water management network.

Keywords: debris, plastics, collection, skimmer

1. Introduction

Plastic is a material that has been used more and more in the last century. It is estimated that in the European Union (EU-27) about 25 million tons (Mt) of plastic waste was generated in 2008. Of these, 12.1 Mt (48.7%) were transported to landfills, 12.8 Mt (51.3%) were recovered and only 5.3 Mt (21.3%) were recycled (Pretting G., Werner Boote W., 2010; CE, 2013).

Plastic is not an inert material. Conventional plastic contains a large number and sometimes a large proportion of chemical additives, which can be endocrine disruptors or carcinogens or cause other toxic reactions and which can, in principle, migrate to the environment, but in limited quantities. Once in the environment, especially in the aquatic environment, plastic waste can persist for hundreds of years (Rios et al., 2007).

Plastic pollution is a global problem, both in the world's oceans and on rivers (Lebreton et al., 2017; Schmidt et al., 2017; Blettler and Wantzen, 2019). This time, rivers have become an important route for the transfer of plastic waste from the population to the aquatic environment (Schmidt et al., 2017; Blettler and Wantzen, 2019). Between 1980 and 2018, research on plastics in freshwater environments accounted for 13% of all studies in aquatic systems, with the vast majority of 87% of research being in the field of plastics related to marine environments (NOAA, 2016; Al-Zawaidah et al. 2020).

In this context, the Buzău Ialomița Basin Administration, benefiting from the funds allocated through the Black Sea program (BSB963), proposed to purchase specialized naval equipment, produced according to its own specifications at national level.

Its operation under the specific conditions will highlight the quantities of plastics that are transported on rivers to the reservoirs and to the sea basins but also the operating costs, the reliability of the equipment and the

possible needs for improvement. The aim is to provide a real picture of the need to equip the national network with such equipment produced in Romania.

2. Materials and methods

Starting from the analysis of such equipment used internationally, a specification was prepared with the technical characteristics of the equipment that would correspond to the local conditions (riverbed morphometry, debris characteristics, personal service, consumption, equipment mobility, versatility, reliability, cost of acquisition).

In particular, the aim was to ensure that the equipment could be transported on public roads without the need for special permits (maximum load exceeding), that loading and unloading of collected waste should be easy and that is easily serviced by a small number of staff. It has to be able to be registered by the naval authority, be reliable over time and have a minimum maintenance schedule and low fuel consumption. In order for the equipment to be used and financially covered quickly, it was hoped that it could be used for other specific water quality monitoring measures carried out by the Buzău-Ialomița Water Basin Administration.

The specifications were posted in the public procurement system following the specific procurement procedures. During the construction of the equipment by the winning manufacturer, the representatives of the purchaser kept in touch with them in order to clarify some technical aspects and improve the technical design.

3. Model development

The designed equipment has the following dimensional characteristics: maximum length 6.5 m, width 2.6 m, construction height 2.6 m, empty vessel draft 0.17 m, full vessel draft 0.3 m, empty vessel displacement 1.29 tons, maximum displacement 2.29 tons, maximum number of people allowed on board 4, Outhboard engine 20 hp. Dedicated navigation area being inland waters - lakes, canals.

The production technology consists in making a catamaran-type boat (Figure 1), made of fiberglass and steel structures. Between the two floats is placed a stainless steel basket in which the debris from the surface of the water is collected. This basket can be emptied with the help of a mobile crane on board the ship or on land. At the same time, instead of the collection basket, a deck can be installed so that the boat can provide a working platform for 2-3 people.

The service of the boat can be done with 1-3 people, the loading-unloading operation being partially automatic. The design also took into account the equipment generally available by the Romanian Waters National Administration and which can serve the operations of waste collection collected especially in the dam lakes.

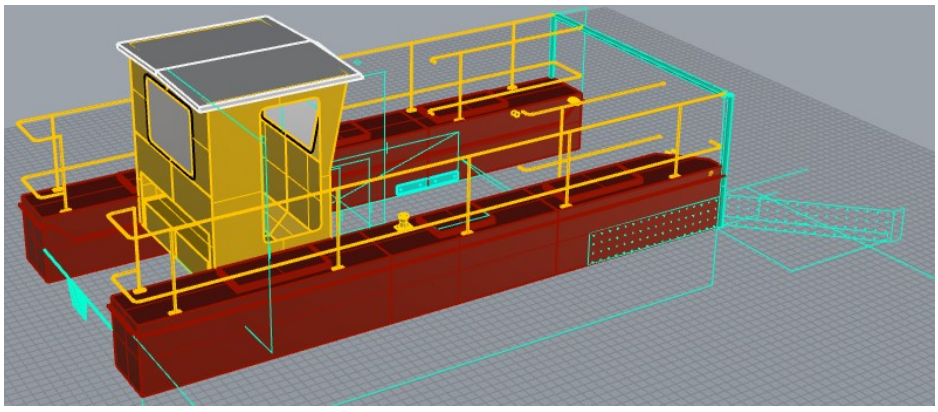

Figure 1. Craft design

Figure 2. Images from the technological stages of boat production

4. Discussions

Identifying the optimal characteristics of such a boat specialized in collecting debris from the surface of the water was difficult.

Scientific publications on this topic are not very numerous compared to the effects of microplastic on the aquatic ecosystem, for example (Goto, T and Shibata, H., 2015; Pasternak, et al., 2017; Schneider et al., 2018). Many publications indicate that especially plastic waste is collected manually from the surface of water or river banks (Law, 2017).

In this context, by implementing the BSB 963 “Protect-Streams-4-Sea” project, the possibility of financing the acquisition of such specialized equipment was identified, the project implementation team establishing the technical construction characteristics of this equipment specialized in collecting floating waste from the surface. water.

5. Conclusions and future work

Every year, more and more plastics are transited by rivers to the seas and oceans. The authorities are aware of this and are taking steps to reduce it. An increasing number of countries and organizations recognize the importance and urgency of disposing of plastic waste, especially in rivers, seas and oceans. The representatives of the Buzău Ialomița Basin Administration carried out an international project, accessing funds through the Black Sea program, for the collection of waste from the accumulation lakes.

The boat was designed and produced in Romania, at the request of the beneficiary. It is expected to be exploited in the future with a view to determining its effectiveness as well as its technical improvement.

The rapid collection and assessment of the annual quantities of waste collected from a given monitoring section can provide information on the management of waste collection within the controlled river basin.

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