

# RIVER CLEANING SYSTEM

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**Abstract:** Millions of tons of trash end up in our nation's rivers and streams every year which can contaminate water by polluting it and threaten the life of all who depend on it. Major part of the trash is insoluble and floating type which is more dangerous as it forms a partition between water and air. In order to clean the water debris or to have a cleaner environment the design of ocean cleaner is proposed. This system has ability to remove this floating trash from the water surface. The system has a conveyor belt type arrangement driven by electric motor which continuously moves in upward direction and collects trash with the help of spike arrangement provided on the conveyor belt. At the end of which the trash collecting tank is provided which stores the same temporarily. The advantage of such system is that it can be made floating so that it continuously collect the floating trash by moving on water surface. For electrical power supply we can use solar power cell on the roof top as well. In the future, trash level indicator assembly can be providing on the river cleaning system.

## 1. INTRODUCTION

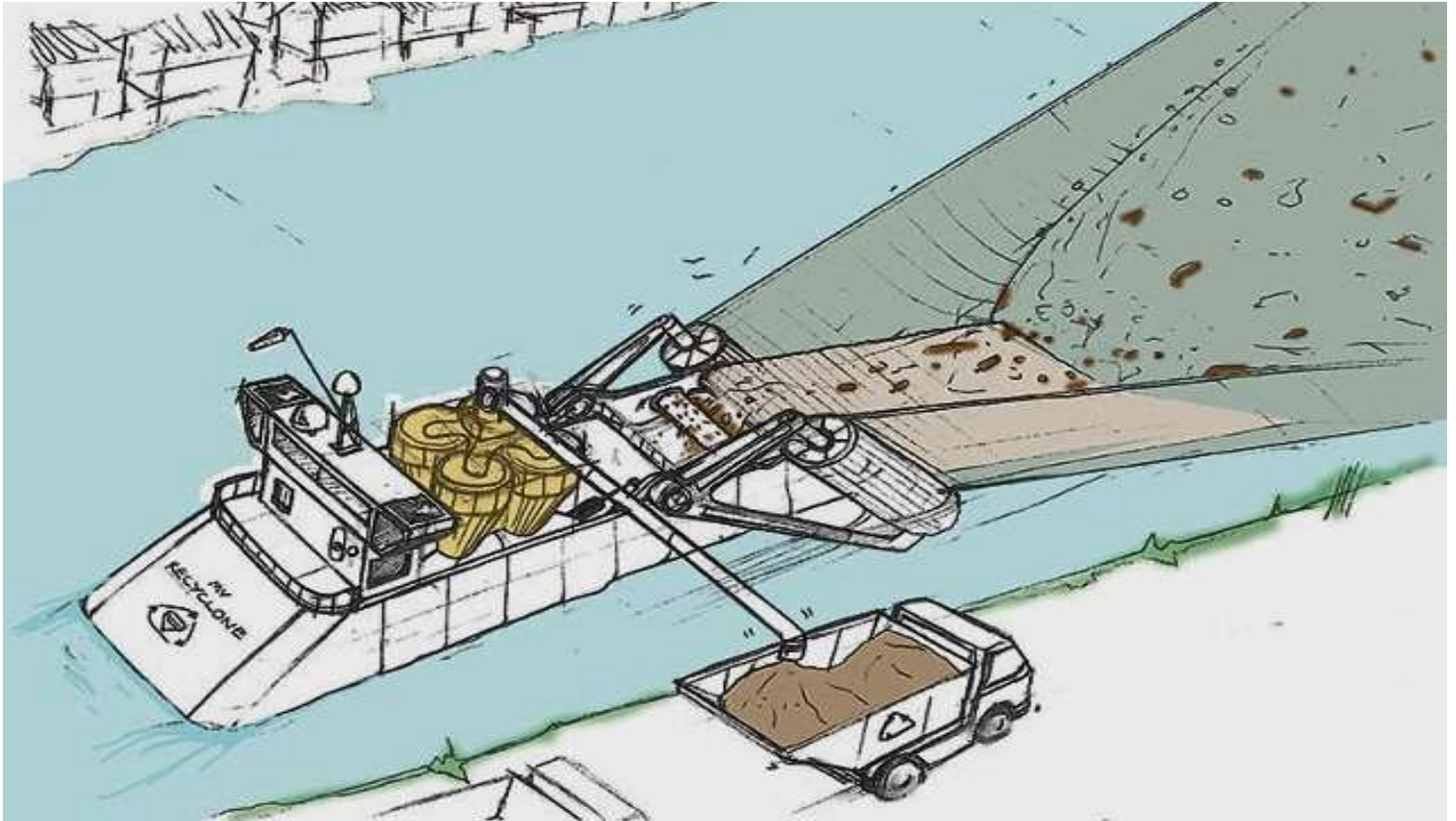
Nowadays, the environment problem arises everywhere in the world and our country is not exceptional. These environments problems come along by developing activities such as construction of houses, offices, and other business areas. The Environment problems occur due to several reasons, they are the low budget allocation on environment management and public awareness in protecting the environment. The Environment issue which comes up from year to year and still cannot be solved is about garbage and waste from various places dispose into rivers. Those floating garbage pollute the water debris and can clog water flow, induce the water become dirty, smelly, and often over flow so then give effect floods. Minister of

Environment Dr. Rajesh Luthra has revealed waste production of different cities across India by the Central Bureau of Statistics records in 2007. The recorded waste collection per day was about 250 cubic meters per day. Not all of the waste disposed and transported in landfill, for example a lot of garbage that have not been handled properly are either burned or directly dumped in the river. This phenomenon causes more environment problems and rivers turn into domestic landfill. About 80 percent of river has been polluted by domestic waste. Therefore there is necessity to avoid or to maintain this garbage collection over river or water debris by some method. Some alternative of wasting management have been are presented among others through the trash bank or recollect bank and reprocess them into handmade items that can make profits. In addition, the government also makes effort on Waste Management along with Government Regulation to control the need for a fundamental paradigm shift in the management paradigm that is gathering garbage, transporting, processing waste into a convergent on wasting reduction and waste management. Wasting reduction activities means all levels of society include government, business and society conducting restriction of garbage collection. They recycle and reuse garbage which is known as Reduce, Reuse, and Recycle (3R) through intelligent efforts, efficient, and program.

## 2. ABOUT RIVER CLEANER

After the data collection related to water pollution by floating trash, we are developing a river trash cleaning system which has an ability to collect the floating garbage and also separates the plastic material from the same. It performs this function by conveyor on which the jaws are made to arrest the trash and which is continuously in rotation provided

by the man power. As the nature of boat is floating one it can move everywhere in the lake as the trash also moves in the direction of air flow.



**Figure 1: River Cleaning System**

### 3. Design of River Cleaning System

#### 3.1: Body

The boat base frame is made by SSround pipe of 32mm OD and 28mm ID which is the chassis for whole cleaner. It supports the auxiliary parts of cleaner like conveyor, motors, bearings, sprockets etc. it also provided with the arrangement on structure to hold the HDP drums to make the floating system. The whole body has to be made hollow for floating hence the circular hollow pipe of SS 304 is selected, as circular pipe has hydrodynamic property which allows boat to move freely in water. To handle the load of 600 to 700 kg the 32mm OD and 28mm ID pipe is sufficient. This material has ultimate tensile strength (SUT) 600 MPa and ultimate yielding strength (SYT) 230 MPa. It has low elongation in break per length. This is referred by Design Data Book.

#### 3.2: Conveyor

A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging industries. Many kinds of conveying systems are available, and are used according to the various needs of different industries. There are chain conveyors (floor and overhead) as well. The conveyor belt is provided to transport the trash from water surface to the storage tank. With the help of projections provided on it. It has two shafts provided on either shaft supported in bearing and

rotates by paddle provided. Specifications are as follows. The spike structure is very important to be provided on the conveyor to arrest the trash and to transport. It is to be provided at equal interval on the conveyor and the design of it is much important as the presence of it should not cause any restriction to motion of conveyor.

To support the conveyor from both the side the shaft is provided which are fitted inside the pedestal bearings to allow easy motion of conveyor. The required shafts are to be hollow in order to have low weight to allow floating of system easier.

Material - Galvanized Iron Cylinder

Diameter - 60 mm

Length - 800 mm

As the shaft diameter is larger compare to bearing diameter different types of reducers are used to match the fitting. The galvanized shaft is selected because of its non-corrosive nature and also light weight material. The bottom shaft is also provided with end caps which prevent the entry of water inside the pipe which is again helpful to reduce the whole system weight.

### 3.3: Propel wheel

The boat structure designed is a propelled type of vehicle therefore it is necessary to provide the propel wheel to provide motion to the boat. Generally two wheels are provided which runs by utilizing human energy by pedal operation.

Shaft Diameter 26mm

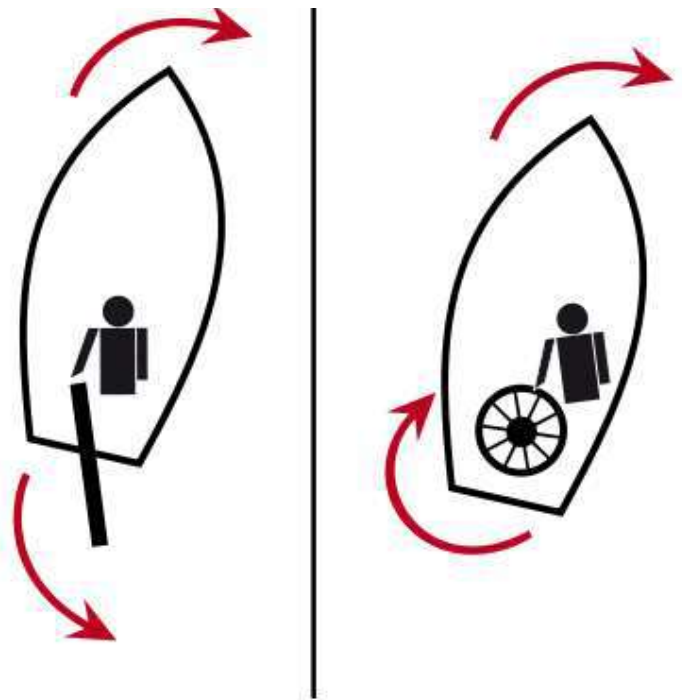
Wheel Diameter 347mm

Flange dimension 100 mm \* 200 mm

Material Galvanized Iron

### 3.4 Rudder and Tiller

A rudder is a primary control surface used to steer a ship, boat, submarine, hovercraft, aircraft, or other conveyance that moves through a fluid medium (generally air or water).



**Figure 2: Tiller Action**

On an aircraft the rudder is used primarily to counter adverse yaw and p-factor and is not the primary control used to turn the airplane. A rudder operates by redirecting the fluid past the hull (watercraft) or fuselage, thus imparting a turning or yawing motion to the craft. In basic form, a rudder is a flat plane or sheet of material attached with hinges to the craft's stern, tail, or after end. Often rudders are shaped so as to minimize hydrodynamic or aerodynamic drag. On simple watercraft, a tiller essentially, a stick or pole acting as a lever arm may be attached to the top of the rudder to allow it to be turned by a helmsman. In larger vessels, cables, pushrods, or hydraulics may be used to link rudders to steering wheels. In typical aircraft, the rudder is operated by pedals via mechanical linkages or hydraulics. Generally, a rudder is "part of the steering apparatus of a boat or ship that is fastened outside the hull", that is denoting all different types of oars, paddles, and rudders.

## 4. WORKING OF RIVER CLEANER

In present scenario every water source is polluted having number of contaminants. One way to limit this pollution is removing floating garbage from the water debris therefore in order to clean the system

the concept of cleaner mechanism is developed which works on the principle of removing floating garbage with the help of moving boat and dumping the same at the shore of water debris. The ocean cleaner has a boat structure provided with one seat seating arrangement. This is also provided with a moving metal conveyor arrangement which is partly below the water level and pickups the floating garbage with the help of spike arrangement on conveyor. This conveyor is generally human powered which is used to collect the trash.

The boat is also provided with the pedal wheel by which it get propel action. The moving of boat consists of two operators for propelling the boat. For manual propel is provided with pedal arrangement which runs the pedal wheel through chain drive which is directly coupled to the pedal with the chain drive. Also the switching connection is provided near the seating arrangement. It has provision to drive the boat in both the direction i.e. forward and reverse also. In addition the boat is provided with rudder and tiller arrangement to steer the boat. As the floating garbage is in any part of the water debris therefore it is necessary to move the same anywhere which require frequent change of direction.

## 5. ADVANTAGES, DISADVANTAGES & APPLICATIONS.

### Advantages

1. The river trash collector is Simple in Design.
2. Can be operated continuously by supplying continuous human efforts.
3. Can be easily made to move anywhere in the river as it has a floating structure.
4. Skilled operators are not required to run this system.
5. Life is more as the very small portion is present inside the water level.
6. Easily separates plastic trash and other trash.

## 7. CONCLUSION

The basic design of ocean trash cleaner gives the idea about cleaning the river or water debris to contribute to the water pollution control. The design and working of r trash cleaner conclude that the

### Disadvantages

1. Requires continuous efforts for continuous working.
2. Every time need to come on shore to unload the collected trash.
3. Maintenance of conveyor required frequently as it is present in water.
4. Costlier metal is used to avoid rusting of parts.

### Application

1. Useful to remove floating trash from any water debris may be small or big
2. Suitable for water cleaning purpose in water dams
3. With some modification can be used for ocean cleaning purpose
4. In can be made stationary in the small canal like structure to separate the trash.

## 6. FUTURE SCOPE

- As the system has limitation to power source so it can be equipped with the solar panel system to use solar energy for electricity generation during day time and uses the stored energy from battery to work in night time.
- It can be made to utilized water flow energy which can reduce the use of other energy like battery electric supply.
- The cleaner can be installed with Electronic system to act as automated vehicles which continuously runs on the programmed path.
- It can be provided the GPS system to have a continuous watch on it and automated system helps to clean the surface by automatic movement toward the trash side.

large scale model can be made for ocean which will help in reducing the water pollution and also with some modification this can be used to river move the underwater weeds and cleans the underwater and overwater surface of water debris.

In addition the design can be modified to deal with small canal where the water is continuously

flowing in that case it can be made stationary to collect the trash from flowing water source.

## 8. REFFERENCES

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