PROCESS TO OBTAIN (IMPLEMENT AND MAINTAIN) WATER BODIES LARGER THAN 15,000 M^3 FOR RECREATIONAL USE WITH COLOR, TRANSPARENCY AND CLEANNESS CHARACTERISTICS SIMILAR TO SWIMMING POOLS OR TROPICAL SEAS AT LOW COST

FIELD OF THE INVENTION

This invention discloses a process to obtain (i.e., to implement and maintain) large water bodies or volumes for recreational use, such as lakes or ponds with excellent color, high transparency and cleanness characteristics similar to swimming pools or tropical seas at low cost, in particular for water bodies larger than 15,000 m^3. The invention also comprises a device to extract a particulate material decanted from the water by using the aforementioned process. Furthermore, the present invention discloses a structure to contain large water bodies or volumes, which is specially designed to carry out said process. The decantation process together with the device to extract a decanted material from the water, plus the arrangement of the large volume structure with its functional characteristics of water surface displacement, allow replacing traditional filtration as used in conventional swimming pools that would be very onerous and inefficient in systems having large bodies or volumes.

BACKGROUND OF THE INVENTION

When a nutrient enters into water, aerobic organisms consume dissolved oxygen as a result of the induced metabolic activity. Thus, the nutrient exerts a demand on dissolved oxygen availability, which is called biological oxygen demand (BOD). If the amount of organic material in the medium is very high, it can lead to a decrease in dissolved oxygen concentration. At low oxygen levels, aquatic environment promote the growth of anaerobic species.

Anaerobic metabolism is much slower than aerobic processes (typically more than one order of magnitude) have lower efficiency, and generates various intermediate organic compounds (e.g. organic acids, alcohols, methane). As a result of the lower rate of dissolved organic matter consumption, this will accumulate in the aquatic environment.

CLAIMS

1. A suction device for thoroughly cleaning the bottom of a structure, covered with a non-porous plastic liner, that contains a water body larger than 15,000 m^3, for recreational use with excellent color, transparency and cleanness properties at low cost, said device operating by suctioning impurities from the bottom surface by a pumping system of said structure, wherein said device comprises:

    a. a structural frame (10),
    b. a cover (6) comprising one or more suction connection pipes (8) that couple to the pumping system,
    c. A propelling device to move the suction device around the bottom surface of the structure,
    d. Rollers (11) or wheels (12) for continuous movement of the suction device over the bottom surface to be cleaned,
    e. A fixed brush line (16) to remove precipitated impurities from the bottom surface of the structure, and
    f. Bottom suction pipes (27) to allow suctioning said impurities from the bottom surface of the structure.

2. A suction device according to claim 1, wherein the cover comprises a resin material (6) that covers the structural frame (10), the rollers or wheels, the bottom suction pipes, and the brush line; wherein the structural frame includes one or more supporting plates (1) at its top for coupling with pulling rods or tensors, one or more handles for pulling, handling and lifting the suction device, and a lateral membrane flap (7) extending downwards from the periphery of the cover.

3. A suction device according to claim 2, wherein the cover (6) further includes one or more suction connection pipes (8) extending through corresponding reinforcing collars along the top length of the cover, each suction connection pipe connected at one end to the pumping system through a hose, and at the other end to the bottom suction pipes.

4. A suction device according to claim 1, wherein the structural frame comprises a series of supporting plates (19a) and a perforated or slotted platen (21) at its bottom section

5. A suction device according to claim 4, wherein the supporting plates are used for supporting axles (19b) which serve as guides for the rollers or wheels.

6. A suction device according to claim 4, wherein the perforated or slotted platen (21) is used to support the brush line (16), where the brushes include a plastic base and synthetic polyethylene bristles.

7. A suction device according to claim 1, wherein the rollers (11) are high density polyurethane rollers and the wheels (12) are auto-lubricated plastic wheels.

8. A suction device according to claim 1, wherein the bottom suction pipes (27) comprise vertical PVC tubes, horizontal PVC tubes, and one or more T-shaped PVC tubes, where the T-shaped PVC tubes consist of one leg and two side legs.

9. A suction device according to claim 8, wherein the vertical PVC tubes are connected at one end to the one or more suction connection pipes (8), and at the other end to the down leg of the one or more T-shaped PVC tubes (9); and the horizontal PVC tubes are coupled by at least one end to each side leg of the one or more T-shaped PVC tubes, wherein the horizontal PVC tubes have suction openings (14) facing downward through which the suctioned water carrying removed impurities enters, to be suctioned and taken out of the pond or swimming pool.

10. A suction device according to claim 9, wherein the horizontal PVC tubes include closing caps (17) at their ends.

11. A suction device according to Claim 1, wherein the propelling device is a floating device on the water surface of the tank.

12. A suction device according to Claim 11, wherein the floating device is a boat (31).

13. A suction device according to Claim 12, wherein the boat (31) has an engine.

14. A suction device according to Claim 13, wherein the engine is a four-stroke engine.

15. A suction device according to Claim 12, wherein the boat (31) has a propeller.

16. A suction device according to Claim 15, wherein the propeller has a protection.

17. A suction device according to claim 1, wherein the device cleans the bottom of the surface at a rate of at least 0.69 m^2/s.

18. A suction device according to Claim 1, wherein the propelling device is a remote mechanical traction system.

SUCTION DEVICE FOR THOROUGHLY CLEANING THE BOTTOM SURFACE OF A STRUCTURE, COVERED WITH A NON-POROUS PLASTIC LINER, WHICH CONTAINS A BODY OF WATER FOR RECREATIONAL USE

FIELD OF THE INVENTION

This invention discloses a process to obtain (i.e., to implement and maintain) large water bodies or volumes for recreational use, such as lakes or ponds with excellent color, high transparency and cleanness characteristics similar to swimming pools or tropical seas at low cost, in particular for water bodies larger than 15,000 m^3. The invention also comprises a device to extract a particulate material decanted from the water by using the aforementioned process. Furthermore, the present invention discloses a structure to contain large water bodies or volumes, which is specially designed to carry out said process. The decantation process together with the device to extract a decanted material from the water, plus the arrangement of the large volume structure with its functional characteristics of water surface displacement, allow replacing traditional filtration as used in conventional swimming pools that would be very onerous and inefficient in systems having large bodies or volumes.

BACKGROUND OF THE INVENTION

When a nutrient enters into water, aerobic organisms consume dissolved oxygen as a result of the induced metabolic activity. Thus, the nutrient exerts a demand on dissolved oxygen availability, which is called biological oxygen demand (BOD). If the amount of organic material in the medium is very high, it can lead to a decrease in dissolved oxygen concentration. At low oxygen levels, aquatic environment promote the growth of anaerobic species.

Anaerobic metabolism is much slower than aerobic processes (typically more than one order of magnitude) have lower efficiency, and generates various intermediate organic compounds (e.g. organic acids, alcohols, methane). As a result of the lower rate of dissolved organic matter consumption, this will accumulate in the aquatic environment.

CLAIMS

1. A suction device for thoroughly cleaning a bottom surface of a structure, covered with a non-porous plastic liner, that contains a body of water larger than 15,000 m.sup.3 for recreational use with color, transparency and cleanness characteristics similar to swimming pools or tropical seas at low cost, the device operating by suctioning impurities from the bottom surface by a pumping system of the structure, wherein the device comprises: a structural frame, a cover covering the structural frame and including at least one suction connection in fluid communication with the pumping system, a propelling device to move the suction device around the bottom surface of the structure, rollers or wheels operatively coupled to the structural frame for movement of the suction device over the bottom surface to be cleaned, a fixed brush line operatively coupled to the structural frame to remove precipitated impurities from the bottom surface of the structure, and bottom suction pipes, in fluid communication with the at least one suction connection, and arranged and configured to suction the impurities from the bottom surface of the structure.

2. A suction device according to claim 1, wherein the cover comprises a resin material, and covers the structural frame, the rollers or wheels, the bottom suction pipes, and the brush line, and wherein the structural frame includes one or more supporting plates at its top for coupling with pulling rods or tensors, one or more handles for pulling, handling and lifting the suction device, and a lateral membrane flap extending downwards from the periphery of the cover.

3. A suction device according to claim 2, wherein the cover further includes one or more suction connection pipes extending through corresponding reinforcing collars along the top length of the cover, each suction connection pipe connected at one end to the at least one suction connection, and at the other end to the bottom suction pipes.

4. A suction device according to claim 1, wherein the structural frame comprises a series of supporting plates and a perforated or slotted platen at a bottom section.

5. A suction device according to claim 1, wherein the rollers are high density polyurethane rollers, and the wheels are auto-lubricated plastic wheels.

6. A suction device according to claim 4, wherein the supporting plates are used for supporting axles that serve as guide for the rollers or wheels.

7. A suction device according to claim 4, wherein the perforated or slotted platen is used to support the brush line that includes brushes having a plastic base and synthetic polyethylene bristles.

8. A suction device according to claim 7, further comprising end horizontal PVC tubes including closing caps at ends.

9. A suction device according to claim 1, wherein the bottom suction pipes comprise vertical PVC tubes and at least one T-shaped PVC tube that includes a down leg and two side legs.

10. A suction device according to claim 9, wherein the at least one vertical PVC tube is connected at one end to the at least one suction connection pipe, and at another end to the down leg of the at least one T-shaped PVC tube; and horizontal PVC tubes are coupled by at least one end to each side leg of the at least one T-shaped PVC tubes, wherein the horizontal PVC tubes have suction openings facing downward through which the suctioned water carrying removed impurities enters, to be suctioned and taken out of the structure.

11. A suction device according to claim 1, wherein the propelling device is a floating device on a water surface of the structure.

12. A suction device according to claim 11, wherein the floating device is a boat.

13. A suction device according to claim 12, wherein the boat has an engine.

14. A suction device according to claim 13, wherein the engine is a four-stroke engine.

15. A suction device according to claim 12, wherein the boat has a propeller.

16. A suction device according to claim 15, wherein the propeller has a protection.

17. A suction device according to claim 1, wherein the suction device cleans the bottom of the surface at a rate of 0.69 m.sup.2/s.

18. A suction device according to claim 1, wherein the propelling device is a remote mechanical traction system.

19. A suction device according to claim 1, wherein the propelling device moves the suction device around the bottom surface of the structure continuously.

20. A suction device according to claim 1, wherein the at least one suction connection is in fluid communication with the pumping system with a hose.