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WASTEWATER RECLAMATION IN FISHERY WATER BODIES

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Annotation. *The article discusses the purification of wastewater from organic compounds in aquaculture ponds and intensive fish farming using hydromechanical and hydrobiological methods with a hydrocyclone device and a multi-stage simple complex, enriching it with an oxygenator and returning it to the reservoir using nozzles. Information is provided on the efficient use of water in this complex.*

Key words: *intensive, flow, purification, filter, centrifuge, oxygenator, settler, bacteria, woven material, section, sediment.*

INTRODUCTION

Any natural reservoir is a whole balanced biological ecosystem, and the biological balance of the pool flora can be disrupted due to heavy pollution by organic matter (leaves, branches, waste from fish and waterfowl, aquatic plants). Organic substances that fall on the surface of a reservoir partially dissolve in water, and the rest turns into sediment, at the bottom of which clay or mud is formed. When organic substances decompose in water, dissolved oxygen is replaced by food decomposition products - these are the elements of nitrogen and phosphorus [1]. The abundance of these substances and elements contributes to the disruption of the biological balance and a gradual decrease in the natural biological self-purification of the reservoir, which subsequently leads to its swamping.

Each natural water source is unique. Many external and internal factors affect its safety and purity. Climate change, environmental change and, of course, human impact directly affect the composition of water in natural reservoirs. Pollution of natural waters is a global environmental problem. Enormous resources have been directed to water purification.

In order to constantly improve the ecological situation in water, it is necessary to purify water from organic impurities at a certain time, since “after using water, its properties somehow change and at some point, it becomes completely unsuitable for further use”. Such water is waste water and must be purified from organic (viruses, fungi, bacteria) and mineral (carbonates, sulfates, phosphates, chlorides, ammonium salts) [2]. Purification of water from mechanical impurities does not lead to great difficulties - for this, filtration, centrifugation and sedimentation processes are used.

To carry out these processes, special devices can be used - filters, hydrocyclones, centrifuges, septic irritants, tongs and nets.

In fishery reservoirs, wastewater contains various chemicals that are harmful to humans and living organisms: acids, phenols, hydrogen sulfate, ammonia, heavy metals and other toxic substances, which, together with wastewater used in industrial enterprises, are added to rivers, lakes and reservoirs, polluting [3].

Since natural water bodies contain bacteria, heavy metals and dangerous chemical pollutants, this water is not suitable for drinking, baking or technical use without prior purification. We know that aerators are designed to enrich water with oxygen. Due to the vital activity of fish and the rotting of algae in the pond, the balance between the required amount of oxygen and the gases produced is disrupted. With the help of aerators, this balance is maintained at any time of the year and creates an ideal environment for fish growth [4].

MATERIALS AND METHODS

Water disinfection devices based on ultraviolet rays are used in fish farming during the incubation period. They are not used in ordinary water bodies where large fish species live, since the effect of ultraviolet radiation is most effective only in transparent, completely purified water.

Carbon filters are widely used to purify water from finely dispersed mixtures and molten petroleum products. They are suitable for filtering open natural reservoirs of fisheries.

In these cases, various types of large and fine mechanical filters are used to clean the fish from excesses that affect the fish's body in the water during its life. Self-cleaning devices filter the mass of crushed particles, and then release the sediment into a special channel or outside. Today, manufacturers offer high-performance filters for fish farms [7].

The main types of pollution in freshwater bodies include:

• Biological pollutants: bacteria, viruses, parasites, algae, mollusks and other living organisms;

• Chemical pollutants: pesticides, herbicides, dust, heavy metals, petroleum products and other chemicals;

• Physical pollutants: mechanical impurities, dust, sand, dirt, mud, stones, etc.

To clean waste and other soil particles in water bodies, mechanical cleaning is the first and very important stage in the water purification process. Mechanical cleaning filters are used to remove small and large sediments of sand, clay, dirt and rust from water [8]. Mechanical filters can be "mesh, cartridge, disk and other

designs". They operate on the basis of various principles such as gravity, pressure, centrifugal or electrostatic force.

Each type of detergent performs its own function. Therefore, it is necessary to rationally combine a set of water treatment systems to ensure the right conditions for fish farming. For fish farming, water purification is carried out by highly efficient professional devices, which is the key to successful business.

The most common effective method of water purification in aquaculture facilities in closed water cycle installations is the use of biofilters [5]. However, the standard indicators for ammonium when water leaves the biofilter during circulation are not ensured. Such liquid does not always meet sanitary and chemical standards and its indicators are normal. On a regular water supply, these measures are achieved through modern disinfection and purification devices. In the worst case, bacteria and organic substances can be found in it [6].

Water pollution can be physical, chemical and biological. If the water is of poor quality, its use can be dangerous for any living creature and affect its habitat. The process of physical pollution is accompanied by an increase in the amount of solid particles in the water. These can be sand, clay, dirt and other insoluble impurities. They can get into the reservoir due to heavy rain, wind, emissions from mining enterprises. In this case, the water does not become transparent, and the conditions for the development of aquatic plants worsen. Small pieces can be asked from fish and animals. In addition, such water has an unpleasant taste and cannot be used. To eliminate physical pollution, a mechanical method of water purification is used: filtering, protecting, separating mixtures by centrifugation, etc. Such methods allow removing 95 percent of insoluble particles [8]. In such cases, it is effective to use various types of hydrocyclones.

The sedimentary residues accumulated in the source of contamination are mainly the remains of the mass formed as a result of harmful pollution formed by various types of fish, their waste and various anthropogenic factors. Such water can cause various diseases in living beings. Such water can cause various diseases in living creatures. This can lead to the death of fish. They have a negative impact on the aquatic world of animals and plants, as well as on changes in the temperature of the habitat. The biological method of water purification involves placing microorganisms in a body of water that perform “sanitary” functions, since in their presence biological pollutants decompose into substances that are safe for living organisms.

The occurrence and prevention of technical failures in mechanical filters during mechanical wastewater treatment is aimed at increasing the efficiency of using simple

lining materials and the efficiency factor and increasing the demand for drinking water. It is necessary to conduct research on reservoirs on other types of mechanical wastewater treatment and technologies aimed at the economically rational use of water and increasing the efficiency of intensive fish farming. For these purposes, fish farms are recommended to use a hydrocyclone unit to clean polluted water from various pests in intensive and artificial reservoirs. A properly selected hydrocyclone can separate from 50 to 80% of sturgeon particles from the fish farming system [12]. On a hydrocyclone unit:

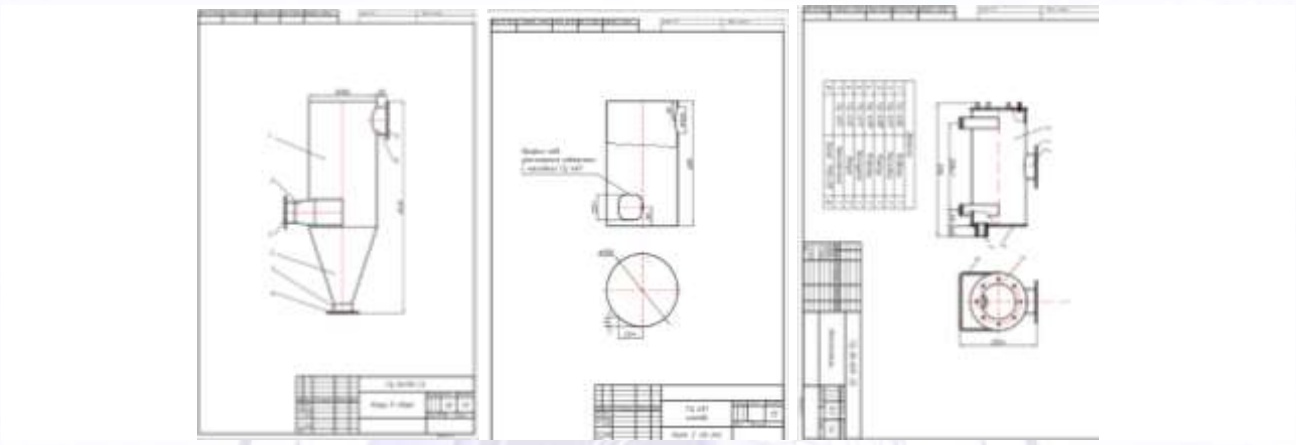

Fig. 1. Hydrocyclone device designs

- no moving parts - these are monolithic structures, unlike hydrocyclones, centrifuges, which make filters more reliable and resistant to the level of water comparability;
- permissible concentration up to 300 grams per liter;
- productivity - from 10 m3 / h (in small versions) to 400 m3 / h (in large versions);
- average efficiency of fraction collection and separation ≈ 90% (with mesh filter ≈ 100%);
- dispersity of the obtained fraction is 50 microns and less (the efficiency of the hydrocyclone in filtering mechanical particles up to 5000 microns in size remains unchanged).

In ponds of intensive fisheries and aquaculture, the need for water and water resources can be fully satisfied with the help of a hydrocyclone device designed to clean water from various wastes and reuse it. That is, the possibility of cleaning water from large dispersed particles and reusing water has been shown. That is, this shows that it is possible to clean the water in the pool from large dispersed particles and reuse it.

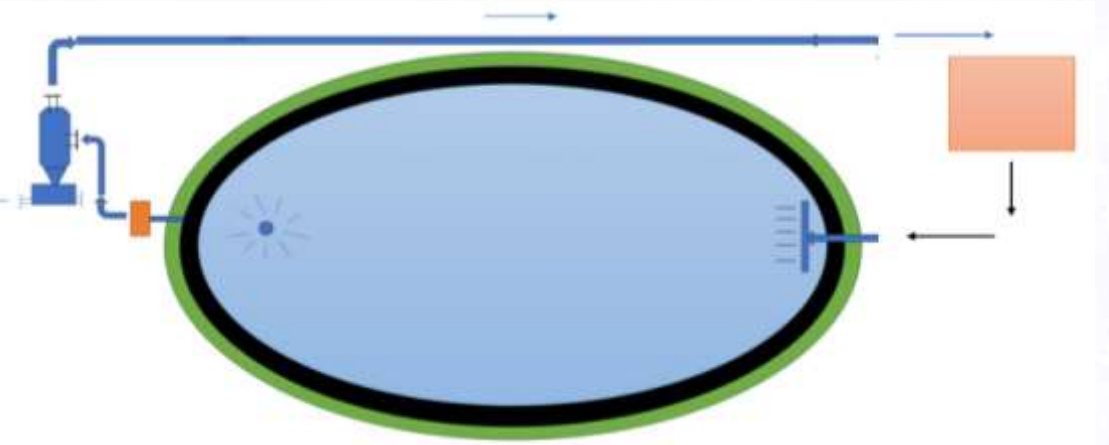

Fig. 2. Overview of the water treatment complex for fishery reservoirs

The operation process of the complex is as follows: water from an open reservoir is fed through a pipe using a pump into a hydrocyclone device. The hydrocyclone operates under pressure, separates substances floating in the water – clay, sand, gypsum and lime (separation of solid fractions – sand, glass, scrap metal) and through a pressure pipeline (slope ε=10) directs partially purified water to a 3-section treatment complex along the length of the pool[1]. In the 1st section, the horizontal type of water purification filter is located in series with a 3-layer material coating that retains particles (up to 50 microns).

Partially purified water in section 1 begins to flow from above through a pipe into section 2. In section 2, the water is purified using an artificial biological method (bio-loading), and is also purified from some of the harmful microelements contained in the water, and begins to flow into section 3 through a gap. Here, too, with the help of a secondary 3-row coating up to 50 μm, purified water is sucked in by a pump under high pressure (pressure up to 2 kW) and fed into the oxygenator through a control valve. Water enriched with oxygen by the oxygenator is fed under pressure into the water pool through a series of nozzles.

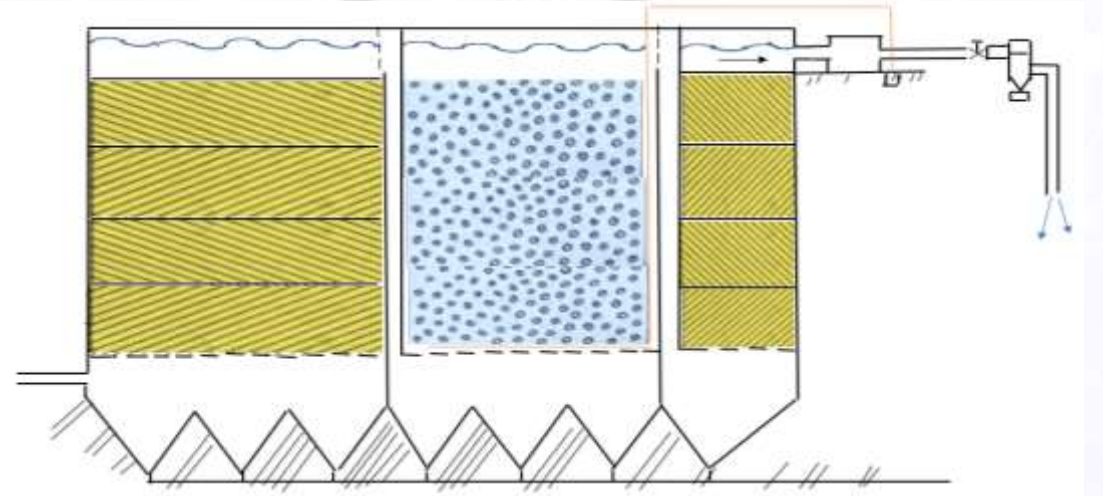

Fig. 3. Section of the treatment facility complex

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The compressor operation solves the problem of full regulation of the operation of the biofilters of the 2nd section. Each section has trays, and the sediment in them is separated through a pipe. Mesh filters use cells of a certain size made of polymer material to remove mechanical impurities.

CONCLUSION

This device has not been used in fisheries at all in local conditions, the device does not have mechanical filters, F.I.K. and economic efficiency are high, its preparation depends on the performance of the hydrocyclone, not much material is required. Efficient use of water is at least 70%. Complex purification can be used mainly in open water bodies of intensive fishing. In such a complex, mechanical filters used in closed-type water supply systems are not used, it is possible to provide oxygen to up to 3500-7000 fish fry weighing 150-300 grams at a high density of 5.5-7.3 mg/l, and reconstruction and repair of the complex do not require special complexity.

The operation of the complex cleaning system does not require a large amount of energy, and solar batteries (power 3.0-3.5 kW) can be used as an energy source.

References:

1. Taufik L. R. Method of water purification and preparation in closed water supply systems for growing aquaculture. edited by A. Yu. Ishlinsky, third ed., Moscow, Soviet Encyclopedia, 1989.
2. Radkevich M., Abdugadirova M. Improvement of technologies for biological treatment of domestic and municipal wastewater. Environmental Notice No. 10/2020. Pages 18-20.
3. Egamberdiev N.B., Abdukodirova M.N. Scientific and practical foundations of biological wastewater treatment // Agronomy No. 2 (52), 2018. P. 78-80.
4. Stolberg V.F., Ladyzhensky V.N., Spirin A.I. Bioplato - an effective low-cost eco-technology for wastewater treatment // Ecology of health and safety of life. - 2003. - No. 3. -P. 32-34.
5. Stroganov N.S., Buzinova N.S. Practical guide to hydrochemistry. M:, Moscow State University Publishing House, 1980. -196 p.
6. Surovaya T.D. Family Pontederiaceae. Life of Plants. vol. – M: Education. 1982. –P. 204-209.
7. Klimukhin I.V. Improvement of the “aeration – sludge separation” unit of small and medium-sized biological wastewater treatment plants. Diss. Cand. Sci. (Eng.). Rostov-on-Don, 2009. 181 p.

ISSN: 2992-8885
VOLUME: 3 ISSUE: 3

8. Meyen V.A. Purification of Wastewater in Ponds and Growing Fish in Them // Scientific and Technical Society of Water Supply and Sanitary Engineering / Moscow: 1932. – 60 p.
9. Subbotina Yu.M., Tereshina A.N. Use of fish-breeding and biological ponds for wastewater treatment // Advanced production scientific and technical experience in land reclamation and water management, recommended for implementation / Information collection No. 7. - M.: 1990. - P.39-49.
10. Merkuriev V.S., Subbotina Yu.M. Method of Wastewater Treatment // A.S. No. 1837050 P. 023/32 dated 30.06.93. Bulletin No. 32.
11. Subbotina Yu.M., Smirnova I.R., Mazur A.V. et al. Improved technology for growing aquaculture objects in bioponds of livestock complexes // Moscow: Russian Academy of Agricultural Sciences, All-Russian Research Institute of Veterinary and Hydrobiological Esthetics. 1999. – 41 p.
12. Fokina V.D. Use of agricultural waste in fish ponds // Animal husbandry and veterinary science. Achievements of agricultural science and practice / Bulletin of the Research Institute of Information and Technical and Economic Research on Agriculture No. 11. Moscow: VASKhNIL. 1984. - P. 33-39.