In the treatment of water synthesized from the waste of alumina production "red mud" and commercial coagulants in all cases, the coagulant dose was 50 mg Fe_{tot} mg/l of water.

Studies of the wastewater corrosion activity were performed by the express method of polarization resistance [2] by changing the corrosion rate for 60 minutes after treating a water portion with a certain coagulant. The obtained graphical dependences in wastewater and water with coagulants are shown on the figure.

Because coagulants contain iron ions Fe^{3+}, which affect the corrosion process as additional corrosion stimulators, in addition to dissolved oxygen in water, in their presence, the corrosion rate is slightly increased compared to wastewater.

It was found that at pH < 3.0, the aggressiveness of the aquatic environment is very high, the corrosion rate varies between 1.15 - 1.3 mm/year. The water corrosivity is significantly lower with increasing pH, i.e., the corrosion rate is much more affected by the pH of the medium than the concentration of iron ions within the dose of coagulant from 10 to 100 mg Fe_{tot}/l.

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SURFACE WATER MONITORING OF THE S'AN RIVER UKRAINIAN-POLISH BORDER BASIN

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Transboundary water passageways studies require peculiar tracking, as national and regional monitoring methods differ significantly. Therefore, there is an urgent need to systematize monitoring data and compare transboundary water runoff passageways quality indicators.

As such, the S'an river basin surface waters pollution causes, sources and extent determination is of high economic priority, regarded to be urgent environmental problem. The solution is related to the environmental safety of the Vistula river surface waters, used to meet water consumption requirements in Ukraine and Poland.

The study case is aimed at information monitoring provision of the S'an river basin surface waters hydroecological operative conditions within the Ukrainian part of the basin.

The S'an river basin environmental problems analysis and way forward factored into the case studies goal-setting.

Foregoing published Ukrainian-Polish border surface waters analysis settled: the studies pursued mainly in three areas: a natural resource potential, hydrological and hydrochemical

features. The S'an river basin area is cross-bordered, covering the territory of both Ukraine and Poland, so there is a need to study the hydrographic network of it, applying water bodies typologies used in the EU Water Framework Directive (2000), to perform a certain audit of these basins water fund according to European criteria.

The S'an river is the largest Carpathian Vistula tributary. It flows in the Eastern Beskids near the Uzhotsky Pass at the 950 m elevation. The S'an originates on the Verkhovyna ridge northern slopes, flows through a narrow valley and reaches the Sandomierz lowlands in Poland. In Ukraine it flows through the Turkiv district. The S'an flows mostly in Poland – being 444 km length over all, it covers just 56 km of Ukraine at bordering areas. The total area of the S'an Basin is 16,800 km^2 , while the Ukrainian part of it is 2540 km^2. The cities of Przemyśl and Yaroslavl are located at the S'an bassin. The Solinskoe and Mychkovske reservoirs were built in the mountainous part of the S'an, and hydroelectric power stations.

The S'an river basin includes 101 rivers with a total length of 110 km, including 36 rivers over 10 km long. The largest of them are Boberka, Vyar, Vyrva, Vyshnya, Shklo, Gnoyanets, Shchan, Retychin, Zavadivka. The feeding of the rivers of the S'an river basin is mixed, soil-snow-rain. The maximum water rise is observed in spring. The largest settlements in the S'an River basin are Yavoriv, Novoyavorivsk, Mostyska, Nemyriv, Krakovets, Shklo, Sudova Vyshnya, Nyzhankovychi, and Dobromyl.

The ecological status of the surface waters of the S'an river basin is influenced by various factors, which are also closely interrelated. In this basin, the following factors may be identified as those causing surface water pollution:

a) wastewater discharges without proper treatment. This is primarily due to the failure of treatment plants, wornout and outdated equipment, lack of funds for construction activity, restoration and rearrangement. The problem is that wastewater does not undergo a full treatment cycle. Most often, only biological treatment is carried out. The largest polluters discharge to the Shklo River. These are treatment facilities in the cities of Yavoriv and Novoyavorivsk (their share in the total volume of return water entering the S'an river basin is 58.8%.

b) unauthorized wastewater discharge. Today, much of the district centers private sector and urban-type settlements is not covered by a fully centralized sewerage system, and wastewater is discharged directly into water bodies, such as small rivers, without any treatment.

c) non-compliance with the coastal strips and water protection zones relations directly affects the ecological and sanitary condition of rivers. Natural landfills often occur on river banks. The source of river water pollution is waste and landfills on the river banks, which include glass, plastic containers, paints and petroleum products, building materials, scrap metal, household waste - all this falls into landfills disposable by the public, individuals and organizations. Failure to comply with the water protection regime in coastal protection zones and water protection zones of small rivers, in addition to pollution and clogging of water resources, creates a potential risk of coastal destruction at the times of floods. Many rivers in villages and cities have become almost a place for dumping garbage, waste. Village councils do not take measures to clear their riverbeds, it leads to flooding of the territory and deterioration of their sanitary and ecological condition.

d) coastal protection strips are not made in nature. The boundaries of coastal protection strips are set in accordance with current legislation depending on the area of water intake of the river. Today, almost all districts of Lviv region have developed environmental programs, taking into account the establishment, protection and preservation of coastal protection zones, but these measures have not been implemented yet for the lack of funding.

e) floods: small rivers are particularly badly affected by floods: their banks are eroded, and coastal fortifications are disrupted or destroyed.

The anthropogenic factors approve a great impact on the river ecosystems functioning, disrupting the natural water passageways and introducing unusual components that cause changes in the composition and properties of water in the water body, ie cause deterioration of its quality.

Conclusions and prospects for further research include environmental measures aimed at socio-economic and cultural development of the S'an river basin, based on the analysis of the socio-economic situation and technologies for the reconstruction of sewage treatment plants [1]. Measures that will contribute to the improvement of the ecological condition of water resources:

1. reconstruction of existing and construction of new treatment facilities;
2. complete sewerage of cities and towns, stopping the discharge of untreated wastewater into rivers;
3. providing coastal protection strips of reservoirs and catchment areas proper sanitary state;
4. implementation of all planned environmental protection measures at ecologically dangerous objects;
5. clearing of channels and rivers bank strengthening;
6. implementation of current water protection legislation by water users.

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INFLUENCE OF GREEN ARCHITECTURE AND PERMEABLE PAVEMENTS ON POLLUTION LOADS IN SURFACE RUNOFF – MODELING STUDY

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Devolvement of urbanization, related to increase in sealed surfaces area in urbanized regions, affects the natural balance of catchments causing increase in surface runoff and decrease in infiltration and groundwater aquifer supply. The elevated volume of surface rainwater in urbanized catchments, in relation to the recent climate changes, may result in frequent flooding endangering local development. On the other hand, the commonly observed direct discharge of untreated rainwater straight to the surface waterbodies, including rivers or lakes, causes serious anthropopressure. Application of low impact development (LID) rainwater management methods, including green architecture and permeable sealing surfaces, may significantly improve the distorted water balance of urbanized regions. It is possible due to reduced surface rainwater runoff as well as increased infiltration, interception and retention volume, allowing also the decrease in loads of pollutants delivered to rainwater receivers. This paper presents results of numerical studies concerning influence of green architecture and permeable pavements application in urbanized catchment on quality of runoff water. The simulations in EPA SWMM were performed for a selected object, school complex, of total area 4.42 ha, covering roofs, pavements, parking lots,