STREAM POLLUTION, A GROWING MENACE TO WATER SUPPLIES

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The pollution of the streams of Illinois by sewage and factory waste has reached a point where a statewide protest should be formulated and a campaign organized to reduce the present evil and to prevent further increase. The public must be informed and positive action must be taken. We seem to have ample law and no fault is found on this score; we have a State Board with power to act, and we have no desire to criticize the Board. Stream pollution is largely the result of indolence and ignorance, which do not take into account the effects, and which seek the easiest way of getting rid of waste and sewage. A late report of the Illinois Department of Health says: "Contaminated water is a mighty dangerous enemy." It is time that attention be given in every institution and every commercial body of the State to the menace that this indiscriminate practice constitutes.

First I will emphasize the fact that the time is approaching when as much as possible of the water that falls from the clouds must be conserved for animal and vegetable and industrial consumption.

In my own county last year a great railroad company was forced to haul water from an artificial reservoir forty miles away; an electric light and power company was reduced to an extremity to procure an adequate supply of the right kind of water; farmers were compelled to haul water for stock, streams were so dry that one could walk on their beds, and municipalities were at their wits' ends to obtain water fit to use and in ample quantity. The procuring of unspoiled supplies is each year becoming more difficult.

The source of our supplies is the rain. Is it possible to formulate a policy by which a larger quantity of this may be made available before it is contaminated with organic, animal or mineral impurities? Authorities give the average annual rainfall for the State at thirty-five inches. In years of maximum rainfall, a total of fifty

inches or more may be precipitated, while in years of least rainfall the total may not be more than twenty-four inches or even less. It is in these years of least rainfall that the need of conservation of water becomes most apparent, and when the effects of pollution become most acute and dangerous.

Drift formations of various depths cover most of our State and the yellow clays, sands and gravels absorb water which is diffused through their layers. Below the yellow clay lies a blue or bowlder clay that as a rule is impervious to water. Part of the rain sinks through the soil and subsoil into this yellow clay, which thus over a large area is a water bearing stratum. Water is retained in it because of blue clay underneath. This underground reservoir is not by any means inexhaustible, although our State report properly calls it our largest and most valuable supply, and surface wells over much of the State extend into it. The level in this formation has been lowered, and it can no longer be relied upon, as in pioneer days, to meet the increasing demands. Professor J. A. Udden in one of the early Bulletins says: "The general level of the ground water is being lowered." As early as 1908, the Bulletin spoke of the insufficiency of the yellow clay supply.

Another important consideration is that the widespread tile drainage of the surface has accelerated the run off so that not so large a quantity of water as formerly reaches the yellow clay. In a general way one can figure this run off at nearly one-third of the precipitation. It is estimated that nearly one-third is evaporated and at some seasons the proportion is greater. This leaves about a third to sink into the water bearing clays, sands and gravels, and a portion of this seeps out along the edges of the blue clay into the streams or breaks out in springs. Or very great economic importance, therefore, is what becomes of the portion that seeps into the clays or runs into the streams. It is on this that man and all other animal and even vegetable life must depend for most convenient supplies.

In the State Bulletin of 1913 it is stated that "With very few exceptions there are no sources of water supply

in Illinois that are free from possible contamination." Again it is declared that "all running streams are in danger of pollution." To this it can be added that many of our streams are now polluted.

The report of 1917 listed 433 municipalities with water supplies, of which 189 are from rock wells; 149 from drift wells; 67 from streams; 22 from Lake Michigan, and 10 from springs. To these must be added the tens of thousands of drift wells on private premises. One must also consider the hundreds of municipalities that do not yet have public supplies and whose needs must be kept in view.

Let us take first the pollution of the run off as exhibited in our streams. This is accomplished by the contamination of watersheds as well as by the discharge of waste and sewage into the channels. Cedar Fork, a small stream that flows through Galesburg, furnishes an illustration. Untreated sewage and much waste go into this and render the water foul and exceedingly offensive. These putrid discharges poison the water for eight to ten miles below the city. Estimating the watershed of the creek at seven square miles, when it crosses the west city limits, this creek would have in a year of average rainfall a run off of 1,500,000,000 gallons of water, with seepage of possibly a quarter of a billion more. Sewage renders all this absolutely unfit for use. If this water were conserved and impounded the gas company and other industries along its banks would have an ample supply. As it is, not a frog will venture into it for miles below the city and fish life was long since extinguished. Live stock will not drink the water and the stream, which might be an asset, is changed into a liability to the farmers.

This is not an isolated case by any means. Because it is easiest and cheapest, cities and factories all over the the State are using streams as open sewers and receptacles for waste. Neither lake, river or creek is spared. When we are discussing this, we naturally think of Chicago, but after an investigation I am convinced that most of the cities of the State, little and big, are equally guilty

and that poisoning of the water that falls pure from the clouds is nearly a general practice.

Let us take the pollution of the Illinois river, a stream once renowned for its beauty and charms. Through the drainage canal it receives much of the sewage of Chicago, and is so befouled by this that even the bottom of Lake Peoria, far down the river, has its blanket of filth. The main tributaries of the Illinois are the Kankakee, DesPlaines, Fox, Vermillion, Mackinaw, Sangamon, and Spoon rivers and Crooked creek. The report of 1921-2 says: "The conditions of the sewage of the Illinois river are more pronounced than ever before."

The Fox river valley is quite thickly populated. The large cities of Elgin, Aurora and Ottawa use this as a sewage channel, not to mention smaller towns that find it a convenient depository. The discharges of twelve Elgin sewers pass into the river. Elgin is, however, building a sanitary sewer system. Aurora has nine sewers connected with the channel and there are sewer outlets from various private and manufacturing plants along the river, without treatment. Aurora is said now to be agitating a drainage district. An effort was made by the Rivers and Lakes Commission several years ago to abate the nuisance but the war interfered.

The DesPlaines river is polluted by the sewage of Joliet and by its factory waste. The corrupt condition of the Sangamon river is in the reports deemed a special object of concern. The sewage of Springfield and Decatur goes into it. The report of 1918-19 declares that Sangamon river is greatly polluted below Decatur. Decatur now has a million dollar sanitary sewer system, just completed, and that will take care of raw sewage and waste save in times of flood. Jacksonville and Bloomington empty their sewage into creeks but it finds its way into the Illinois river. The Kankakee river receives the sewage of Kankakee and there are other towns along it that may contribute toward fouling it.

Both Streator and Pontiac on the Vermillion river use it for sewage and waste purposes. In the State report of 1920-21 special mention is made of the foul condition of the river at Pontiac. Another comment is that "Dur-

ing a large part of the time, the Vermillion river below Streator consists only of sewage, industrial waste and mine water." We understand that Pontiac has built a disposal plant and that Streator is considering one.

Peoria is on the Illinois river, and its sewage and waste go into it. We have the authority of a fish and game official, familiar with the condition of the river there, that when the water is low the stream is in a foul condition and that the fish are liable to be affected injuriously.

It seems unnecessary to multiply instances, for this is enough to indicate the extent to which the Illinois river system is being used for sewage purposes. Practically all the large streams that flow into it receive more or less sewage. Although a state wide, detailed survey has not been made there is reason to believe smaller municipalities also are polluting the tributaries, so that from all parts of the river basin filth and industrial waste are being conveyed to the main streams and thence to the river itself. In its 1921 report the Commission says: "During the last year complaints have been received from numerous farm organizations, where streams have been so polluted by industrial waste or city sewage as to prevent their natural and lawful use for agricultural or other legitimate purposes."

Specific mention is made of conditions at Joliet, Ottawa, Seneca, Morris and Elgin. It is stated that the Desplaines and Illinois rivers are badly polluted and for years have been unfit for bathing or domestic uses, or for stock, and the fish industry has been completely destroyed as far down as Peoria. The stench at times in the summer is offensive and also a damage to navigation. Several States have laws regarding sewage treatment to avoid stream pollution. Such a law would be a progressive step in Illinois of a great public benefit."

The Mississippi river we have heard referred to as an open sewer. One will not allude to what other States are doing to it. It is enough to speak of the offenses against it in our own commonwealth. The Father of Waters must forsooth be forced to hold his nose when a whiff comes his way.

At Quincy, the sewage is emptied into the river above the city water intake, which, however, is far out in the channel. The sewage and factory waste of Moline, partially treated, go into the tail race and then into the Mississippi river channel at Rock Island. Rock Island pours the contents of its sewers into the Mississippi. The sewage and waste of the large city of East St. Louis are conveyed into the Mississippi river below the city. Alton finds the river a convenient receptacle for its waste and sewage. Cairo's sewage and waste pour into the Ohio and then into the Mississippi river. Other cities along both sides of the river from the north end of the State are abusing this magnificent waterway and contributing to its contamination. In low water the river is for weeks and even months likely to be a foul and filthy stream.

Tributaries that flow into the Mississippi river are polluted also. Take Rock River, one of the most picturesque rivers in the state, whose banks have been noted as picnic grounds. One of its tributaries is the Pecatonica river, and within the city limits of Freeport raw sewage flows into it in five places. This includes factory waste. Rockford, the main city on the river, known for the extent of its industries, turns its sewage into the river, and the report for Sterling, another good sized city, is of the same nature. All this sewage must tend to make the river less desirable and a menace. Belleville, not far from the Mississippi, uses a small creek for sewage in part, although it has a disposal plant. Shelbyville reported, "We are emptying everything into the Kaskaskia", and a similar answer came from Vandalia. On the other side of the State one finds Danville emptying its sewage into the Big Vermillion.

In nearly every case the reports make the statement that the rivers and streams are too foul to use as sources of supplies without treatment. In the state department report for 1919-20 we find this strong statement: "Stream pollution is depriving the public of the legitimate use of the water therein. For years streams not only in Illinois but in many states have been accepted as a natural means of sewage disposal. Increased develop-

ment and growth of population have resulted in a load of sewage or industrial waste that the streams can no longer carry with due regard to public health or to the use of the streams for stock on the farm''. It is but simple justice to say that several of these cities are taking steps that may lead to the installation of disposal plants. Decatur and Elgin are leading the way, and my own city is agitating this question. One of the chief difficulties is in getting the people to vote the necessary funds.

In the 1923 report of the proceedings of the annual meeting of the civil engineers of the State is found an address by Paul Hansen who enumerates 103 disposal plants, and makes the comment that many of the plants are neglected, ten of them abandoned and eleven overloaded, disclosing that efficiency in many instances is far from maintained.

Thus is the run off from practically one-third of the rainfall, expedited by tiling and sewers, seriously affected, and the citizens of our State are being deprived of many billions of gallons of water annually. Cities are finding it increasingly difficult to find a stream of sufficient size to serve as a supply, when impounded, owing to the unsanitary condition which may extend even to the watershed.

Judging from the reports at hand it is the common practice of cities to create a reservoir on a stream and empty the sewage into the stream at some point below the reservoir. The next town below finds itself short of water and becomes aware that the city above is using the river for a sewer. But it builds its dam, and erects an extensive purifying plant, expecting that chlorine and other chemicals will protect the lives of the people, and in turn conveys its sewage to a point below its dam, thus contaminating the water for the next town below. This goes on for the length of the stream. The health of each of these places depends upon the efficacy of the purification plant, and any imperfection in this that causes raw water to get into the distributing system is likely to result in serious epidemics. Some of our Illinois cities have had sad experiences along this line. Pol-

luting a river for the city next below is a great deal like poisoning your neighbor's well. Cities that have deep wells or spring supplies are likely to show least responsibility. One might cite Rockford, Freeport, Peoria, Aurora and Joliet.

Illinois is not all equally favored. South of a line running east and west through Champaign, water, according to the 1914 Bulletin, is seldom obtained in large quantities either from deep rock or the drift, and such ground water usually is very hard. Some exceptions exist in Southern Illinois; but it is frequently the case that there is no choice but to adopt a surface supply in the south half of our State. This means the impounding of water, and this enhances the importance of maintaining the streams in an uncontaminated condition.

On the other hand many of the cities in the north half of the State are not obliged to resort to ground water due to the accessibility of deep rock supplies. These waters, as a rule, while fit for domestic uses, are not adapted to industrial purposes without treatment, due to the mineral content. Impounded surface water is generally much preferred and hence the large use of impounded water for boiler and other mechanical uses.

In the north part of the State two formations are recognized as fairly sure sources of supplies, and water may be found in others but not with the same degree of certainty. Sometimes it may be too heavily charged with minerals even for domestic uses. These two formations are the St. Peters and the Pottsdam. The former underlies much of six states and is regarded as one of the most remarkable water rocks in the world. Scores of municipalities procure their supplies from this formation, but the State reports indicate that constant pumping is gradually lowering the water level. The Pottsdam formation lies below the St. Peter's and is separated from it by the Lower Magnesium. Observation, however, indicates that the water level in this is also being slowly lowered.

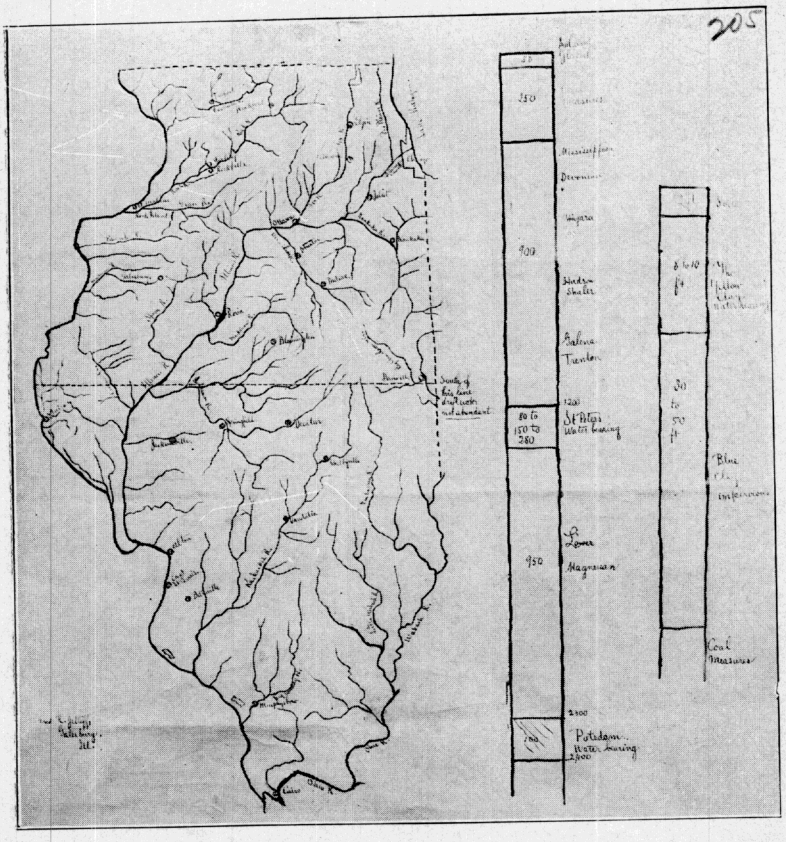
Thus there is raised the question whether these rock supplies are inexhaustible and whether finally a dense population will not even in the north part of the State

have to rely upon the surface and ground supplies; in other words on the rainfall. The question in view of the possible decline and the often quick exhaustion of the ground supplies in a dry season relates not merely to the preservation of the purity of the surface water but to its conservation.

Take Knox, my own, county. In it are 440 streams, little and big, enclosed between ranges of hills. Many of these streams could be dammed and the water preserved. We have built up a wonderful system of surface drainage that empties the surface layers of their water, more rapidly than formerly, and hastens exhaustion of the moisture so that crops suffer. Last year the drouth cost Knox county farmers a third of their corn crop. With reservoirs there could be at least partial irrigation. Even Congress has considered means of impounding water so as to prevent destructive floods. It is estimated that in Knox county, an annual rainfall of thirty six inches means the precipitation of four hundred and fifty billion gallons of water on its surface, and the immense run off of 150,000,000,000 gallons, if not more in flood years, goes on its way to the ocean, while during the dry season the beds of the streams may be dry. It goes without our making use of it.

Illinois has some good laws on the subject of stream pollution but in view of existing public sentiment it is difficult to apply them. For instance, the Statute provides that, "It shall be the duty of the Department of Public Works and Buildings to see that all the streams and lakes of the State of Illinois, wherein the State of Illinois or any of its citizens have any rights or interests, are not polluted or defiled.

"It shall be unlawful for any persons, firm or corporation to throw, discharge, dump, or deposit, or cause, suffer or procure to be thrown, discharged , dumped or deposited any acids or chemicals, industrial wastes or refuse, poisonous effluent, or dye stuff, clay or other washings, or any other substance deleterious to fish life, or any refuse matter of any kind or description containing solids, substance discoloring or otherwise polluting any navigable lake, river or stream in this state, or lake,



The state map in a general way shows the drainage system of Illinois and the cities that are the principal sources of stream pollution.

The deep well geological section shows the formations passed through in borings at Galesburg and vicinity that reach to the Potsdam. The other section is of the surface formations in Knox county, and with some variations will apply to much of the State.

river or stream connected with or the waters of which discharge into any navigable lake, river or stream of this State or upon the borders thereof, or any water-course whatsoever." The drainage district for Chicago and the Desplaines river are made exceptions.

It was also provided by the Fifty-second General Assembly that it is necessary to submit plans and obtain a permit from the Division of Waterways before any work can be done legally toward the construction of a sewer outlet for the discharge of sewage into a lake, stream or water course of the State.

In all this I have been trying to show:

First—That under the present methods, ground supplies are not adequate the year around.

Second—That the usability of our surface waters represented by our streams is lessened by their pollution by sewage and factory waste.

Third—That the available supply could be increased by the suppression of such pollution and the enforcement of a law that would compel cities or permit them to provide for the disposal of sewage and waste. For the good of all, municipalities must be taught to observe sanitary law.

Fourth—That sewage and waste pollution of the streams is a menace to health, a source of disease, and renders water unfit for use, and constitutes a public nuisance, besides killing aquatic animal life and making the water a possible source of disease to domestic animals, which may communicate it to man.

Fifth—That conservation, checking flood waste, would probably carry the supply through the heated season and save much expense and trouble.

Sixth—That the uncertainty attending the life of deep well supplies makes the saving of surface supplies all the more important.

It seems to me that it would be well for us to urge the legislature to provide the State Water Board with an appropriation sufficient to enable it to make a comprehensive survey of the extent of pollution of Illinois streams and to formulate the most practical remedies. In the meantime, I believe that the systematic education

of the public should be undertaken and that they should become informed not only of the dangers of the indiscriminate use of our streams as open sewers and waste receptacles, but also of methods of conserving rainfall and making more of it available. It is a subject that could be pursued to advantage in our schools. Our streams should not continue to serve as cess pools, but should be converted back to their original state of wholesomeness.