

CHAPTER XXVI

THE SOIL IN JEOPARDY

THE decks of ships are scrubbed by a process called holystoning. The holystone—called so, perhaps, because the use of it was once a regular Sunday function on sailing ships—is a block of soft sandstone, with ropes attached, which is pulled and hauled back and forth by the sailors, over the wet deck.

The decks of the good ship *Earth* are holystoned all the time—Sundays and week-days. The Alps and the Rocky Mountains are rough spots which have not been scrubbed very long, as time is measured by earth conditions. They are rough and rugged—but the holystoning is going on all the time, and one day they will be low and some day they will be level with the plain. The Appalachian Mountains are rounded and lower and covered with trees—

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they are old, old mountains, and have been holystoned by nature for many more centuries. The plains are pretty well smoothed down by the sailors—wind and sun and frost and water.

This process of wearing down is a thing which we passengers on the good ship *Earth* may do much to accelerate or to retard. That is we may make the process of erosion either more or less rapid.

Let us imagine a court room in America in the year 2000. A farmer is brought into court by an officer.

“What is the charge against this man, Mr. Officer?” asks the court.

“He is charged with a violation of the erosion laws, your Honor,” replies the officer.

“What is the evidence against him?”

“There was rain yesterday, your Honor,” testifies the officer, “and on inspecting the fields below his farm, I found muddy water flowing. I traced it to its source, and I find that he is so cultivating his farm that the soil is actually flowing down into the brook in

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turbid streams. It is clearly a violation of the statutes.”

The farmer protests that the rain was torrential, or the cover crop failed, or he urges some other excuse for letting muddy water run from his fields; but never for a moment does he suggest to the court that the muddy water is *his* affair, not the state's, that it is *his* soil, not the state's, or that he has a right to farm *his own land* as he will. For remember, this is the year 2000, and it has become a truism on the good ship *Earth* that the old ship herself belongs to the passengers in common, and that the soil is the people's. The farmer, like the town dweller, simply has the right to the home he has built upon it—the right to a home forever; but he must treat the soil which belongs to all in such a way as to keep intact the most precious heritage of the race—that black crust of dark earth, only a few inches thick, which it has taken so many years to accumulate, and which once destroyed can scarcely be replaced.

Does this sound like a dream—a Utopian

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'dream? Not so fast! I read only a few weeks ago in a report of a Japanese experiment station that the Japanese government had forbidden the use of lime in a certain way on certain lands. "This soil belongs to the people of Japan," says the law, in effect. "We have tried experiments and found that the use of lime on that soil is bad for it. You must stop it!" You see, the Japanese are doing it now!

In Japan a man who owns a tree may not cut it down at will. He must get permission of the public officials, and when he cuts the tree after receiving permission, he must plant young trees to the number called for by the rules. A similar policy prevails in Germany.

What has this to do with erosion? It has this to do. Erosion is merely muddy water flowing from lands. No muddy water flows from a prairie in a state of nature, or from a forest. The process is going on all the time, but it is by the slipping of a few grains per year per square foot to a point an inch or so lower—it is so slow that the soil is not carried

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away any faster than the subsoil is turned to soil. Erosion of this sort does no harm—it does great good. It has made the *Earth* habitable. The richest lands have been made by it. But when man plows the prairie or clears the forest, erosion starts up fiercely and destructively. Thousands of square miles of the Appalachian Mountains and of those of California have been destroyed for human use by it. We dare not build the reservoirs for flood prevention and water-power now if we would or they will silt up with mud. We may not make our rivers the great waterways they should be until erosion is stopped, because they are filling up with the mud from the hills, the valleys are being ruined by gravel and sterile detritus spread over the once fertile bottoms. We are criminally ruining the decks of the good ship *Earth* for the use of our own descendants.

Destructive erosion of mountains and hills can be stopped by national systems of forests. Destructive erosion of farms can be stopped by various well-understood methods. Hills

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too steep for farming should not be plowed; but they often make good pastures—and they will not wash away when in sod. Good hilly land may be farmed in such a way as to prevent washing. The southern plantations before the war were laid out in terraced fields to be plowed and planted according to the contour of the hills—no matter how steep the hill, the furrows and rows ran level. This hinders erosion when properly done. Every farmer in a hilly region should be shown how and obliged by law to adopt the plan. Hillsides may be terraced, so that they become a succession of levels which will not wash—for the steep slopes will be grassed over. Hillsides should never be cultivated with long exposed slopes of plowed earth—the slopes should be broken by strips or balks of grass which will catch the wash and hold the melted soil in place.

But, after all, these plans are not equal to the occasion. The real need is that the silt of our rivers be saved, and the mineral plant food carried out upon the lands and caught

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in the soil by percolation. The Chinese and Japanese show us how this is done. Their rice paddies, even on hillsides, are graded to a water level, and furnished with a rim of earth all around to keep the water from running off. It is caught thus, so that each field is a lake, the water of which soaks down through the earth, and leaves its mineral plant food in the soil. Sometime we must come to this. When that time comes, the Mississippi floods will be controlled not only by reservoirs in the hills, but by canals spread all over the Atlantic-Gulf coastal plain. Doctor King points out a plan which must be followed if North America ever supports the population of China. A canal like the Grand Canal of China will run from the mouth of the Ohio to the mouth of the Rio Grande, skirting the hills all along, and catching the waters from every stream from the northwest. Another will run from the spot on the left bank of the Mississippi where the bluffs end—near the mouth of the St. Francis—and will follow the base of the hills across the states of Mississippi,

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Alabama, Georgia, the Carolinas and Virginia, to the Chesapeake Bay in Maryland. This canal will catch the waters of all the streams coming down from the mountains east of the Mississippi and south of Pennsylvania. It will be a great waterway; but its main use will be to distribute the waters over the lowland plains, now so inferior in farming value in the main, and make of them another China in fertility. A thousand subsidiary canals will bring all this land under irrigation—which it needs as much as do the lands of China—indeed, the laboriously irrigated lands of the Hwang-Ho Valley have more rainfall than any of these in the south of our own country. The real limit of population, as has been pointed out by McGee, is the water limit—and that limit can be raised in only one way—the conservation of water.

The final center of population of the United States will be in Dixie. When the prairies of Iowa and Illinois shall have been exhausted, the balmy southern lowlands, irrigated by a great system of canals, drained by tiles, graded

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to level fields, its swamps filled by making them settling beds for river silt and drained by pumping, will be the region where our most teeming population will live in plenty. And this without much reference to the sort of land it now is. In a hundred years the farmers of Denmark have made themselves the richest people in average wealth in Europe—by farming a waste of sand-dunes like those of the North Carolina littoral.

Freedom, justice and the exercise of public dominion over the use of the land—these are the essentials to progress, and almost the only ones.

“Boil the water!”

This is the cry all over the land, save in favored localities. Our streams and lakes are polluted. All up and down the Ohio and its branches typhoid rages in recurring epidemics. Chicago used to regard her water supply, coming as it does from a great, cold, clear inland sea, as unimpeachable. It became polluted, and Chicago dug through to the Illinois River and sent her pollution down to

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the Gulf past St. Louis and a dozen other cities. She then thought herself amply protected.

But she is mistaken. The bodies of the Great Lakes themselves are becoming contaminated. Careful studies show that typhoid is unduly prevalent in almost all the cities and towns of the Great Lakes. Those who know say that their waters are "dangerously contaminated."

On the soil of China, where from two to three thousand people live on each square mile, and have done so for thousands of years, one does not expect to find the water of the soil fit for drinking—and does not find it so. But why is it that our lakes and streams are growing so vile at such a rate of speed?

It is owing to a modern invention—the sewer. The excreta of any animal are poisonous to it—and human excreta are poisonous to man. We are pouring this poison into the lakes and streams at a fearful rate.

The pollution of the waters is a serious thing—but it is not the most serious phase of

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the matter of sewage. Sewage is fertility of the soil temporarily rendered unfit for animal sustenance. Let the plants take it up, and they will make it over into fruits, flowers, grains, woods—into every shape of beauty and charm the landscape displays or hides.

The sewers, therefore, are open veins from which is flowing the life-blood of the race. Never until this age of sewerage did such a danger confront the passengers on the good ship *Earth*. It is a new thing—and a new danger. Sewage contains potash, nitrogen and phosphorus—the precious mineral elements which the plants must have or starve, and in the absence of which no soil can produce crops. These elements come from the fields in the meats, the bread, the vegetables and the fruits which are consumed by the people of our cities. The soil from which they come is poorer for their removal; and when they are flushed into the streams, the waters are poorer in all that goes to make up the riches of the waters, and the fertility is lost—forever.

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This loss amounts in that most precious element of fertility, phosphorus, to not less than two pounds per acre of all the cropped soils of the United States per year. It would take 1,200,000 tons of phosphate rock per year to replace this fertility in the soil. Ground phosphate rock, not so good for crops as this sewage would be, is worth on the average over the United States not less than seven dollars a ton. So in phosphorus alone, it costs us \$8,400,000 a year to pollute the streams and lakes. It costs us the typhoid, too, and the loss of life, and the expense of sewage disposal. This estimate does not include anything for the nitrogen or the potash. It does not include many things in the destruction of the cleanness and purity of our forests and streams, which are beyond all price. And it includes nothing for the cost of boiling the water so as to make the intestinal bacteria harmless for drinking.

The city of Berlin has sewage farms upon which the outflow of the city sewers is allowed to spread. The area of these farms is

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43,009 acres! In 1910, in addition to disposing of the sewage—which is a costly thing for most American cities—this sewage paid the city of Berlin a profit of \$2.66 for every million gallons handled. And the produce of these acres must have decreased the cost of living in Berlin and vicinity. At any rate, the drain of fertility and the pollution of the waters were stopped. This is called “broad irrigation,” and is practised extensively both on the continent and in Great Britain. It is used at Pasadena, California, and was in use at Los Angeles, where the people seem to have been frightened out of the plan by finding that the Chinese truck-gardeners were using the sewage in growing such things as radishes and lettuce, for which it is unfit. With these few exceptions, there has been no attempt in this country to return sewage to the soil from which it is drawn, and to which in economic morals it belongs.

But there are ways of saving the fertilizer in sewage other than by irrigation. At Madison, Wisconsin, it has been found that the

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sludge of the sewage, dried, is worth about \$8.00 a ton for fertilizer. At Columbus the sales of fertilizer and grease from the sewage more than pay for the operation. At Glasgow, the sludge is submitted to pressure, and the liquid, carrying much fertility, no doubt, is wasted in the river; but the dried residue is sold to farmers for \$4.29 a ton. "Yorkshire grease" is extracted from the sewage at Bedford, England, and sold for \$40.00 a ton. The solid residue brings \$2.50 a ton for fertilizer. Similar methods are followed in other British cities, while at Chorley the sludge is used in making gas. The dried sludge at Manchester is readily bought for their land by farmers at \$5.00 a ton. At Kingston-on-Thames the sludge is mixed with other fertilizers by concerns engaged in the business of preparing them, and sent back to the soil. At Norwich the grease is extracted and the residue made into fertilizer. In Leeds ammonia is made from it. In some of these forms sewage is utilized at Oldham, Dublin and many other cities.

The drain on the soil of the United States

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by the exportation of grains, meats and other products of our soil is enormous; but it does not necessarily represent an actual loss to the fertility of the globe. Shipped away from our farms, it may reappear in those of our brethren on the other side of the water. This is not a world question, but a national one. The loss through the sewers, however, is a world question. It represents a weakening of the vital powers of Mother Earth through her abuse by her children.

Van Hise, of Wisconsin, says: "It has been held that in this country it is impracticable to use sewage for fertilizer. The answer is, it is being done in other countries. The phosphorus of sewage can be saved either by direct use of the sewage, or the separation of the phosphorus by some method to be developed. It is certain that one of these must be done, if in the future we are to conserve the fertility of the soil."

When the good ship *Earth* shall pass under the control of the captains who shall wield the power of her peoples' will in the days of

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the federation of the world, no such childish question will be asked as to whether it will pay to keep our streams and lakes pure from human excrement, or to keep up the virtue of our soils.

That will be taken for granted. The rewards will go to those sons of earth who will show how the evil can be cured.

Perhaps it will be done through the abolition of cities. In villages the task would be easy.