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SATURDAY, JANUARY 23, 1909.

IT MEANS MUCH.

Missoula does not seem to realize fully what great significance there is to her in the approaching opening of the Flathead reservation. Other cities which are concerned in the matter are more wide awake than this; Kalispell has been pushing forward a publicity campaign that has advertised her advantages to a great extent and in this work she has been ably assisted by the Great Northern railway. Missoula is taking too much for granted in this connection; she should make preparations for the event more in detail than anything that has yet been considered here. Last year the reservation opening in Dakota, where the number of homesteads was approximately the same as in the case of the Flathead, brought to the town of Dallas visitors to the number of 114,000. Missoula has a great opportunity to do herself a wondeful lot of good if she will but take advantage of the chance. There will not be homesteads enough on the reservation to supply all who come; many of these people will be attracted by the advantages which this region offers and will turn to the Bitter Root and elsewhere to make their investments. Now is the time for Missoula to put her best foot forward.

ONE O'CLOCK.

Elsewhere in The Missoulian this morning is a little interview with Chief of Police Smith regarding the early closing of saloons. There has been a noticeable failure lately on the part of the clocks in some of the saloons in the city to keep accurate time after midnight. Some of these clocks utterly fail to register the hour of one and the result has been that the closing of some of the saloons has been postponed considerably beyond the hour fixed by city law. Chief Smith says that his officers will hereafter regulate the time; when it is a hour past midnight it will be 1 o'clock all over the city. The fact that a clock is wrong will not be accepted as an excuse for failure to comply with the terms of the ordinance. The saloon men of the city have complained recently about the injustice of certain proposed regulations which will, if enacted, affect them and their business. These men, themselves, are responsible for the agitation of the propositions against which they protest. They are wilfully disregarding present ordinances and are not manifesting a disposition to conduct their places properly; it is this attitude which has brought about the agitation for the removal of the saloons from Higgins avenue. There are many strong arguments against the proposed action, but all of these arguments are nullified by the saloon men who persistently violate existing laws. If the saloons are moved from the avenue, it will be the saloon men who bring it about.

LONG LIVE THE KING.

His Most Excellent Majesty, King Edward VII., by the Grace of God, of the United Kingdom of Great Britain and Ireland and the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India, has for eight years borne the resonant array of titles which are the attributes of the monarch of the realm upon which the sun never sets. Today is the eighth anniversary of his ascension to the throne which he has so ably occupied and which it is the wish of his devoted subjects that he will continue to grace for many years to come. Edward is a popular ruler, a fact which is in direct opposition to the predictions of those who had watched the course of his life as prince; he is an able monarch, as well, which further upsets the calculations of those who confidently expected him to cut loose as soon as he came into his inheritance. No ruler of Great Britain has been in closer touch with the affairs of state than the present king, who has manifested from the day of his coronation an active concern in the matters which affect his people and his country. His diplomacy has contributed vastly to England's influence in world affairs and his farsightedness has been a matter of great satisfaction to his people and their friends. That he may be spared for many years is the hope of the civilized world. Long live the king.

CHILLY MEMORIES.

In New York tonight will be held a reunion banquet by survivors of expeditions into the Arctic region. These heroes of the frozen north will indulge in reminiscence and, incidentally, will perfect the annual organization of the association which they have formed. The Arctic Club of America was organized fifteen years ago by the men who survived the famous expedition which went to Lady Franklin bay under the leadership of General Greeley, then a lieutenant. Of that party there are now five survivors, General Greeley, Colonel Brainerd, Francis Long, Henry Biederbick and Maurice Connell. The club has received accessions to its membership from the ranks of later expeditions and one of the features of this meeting will be the election of Admiral Schley to the presidency of the organization. Admiral Schley, it will be remembered, commanded the expedition which went to the relief and rescue of the Greeley expedition. Such instances as this meeting emphasize the extent of the suffering that has been entailed in these expeditions and also serve to give force to the inquiry as to whether or not they are worth what they cost. If we find the North Pole, what good will it do us and would not the energy and money expended in this quest accomplish vastly greater benefits if expended in other directions?

All over town, the blinds come down when the hour is 1 o'clock. Should the barman fail, he'll go to jail and there remain in hock.

The construction of the electric railway and the prevalence of slush make the paving of Higgins avenue a live topic once more.

When you step into an artfully concealed puddle and sink to your ankles, be thankful that you didn't get in over your knees.

One bill which should receive the unqualified support of the lawmakers is the one which prohibits the intermarriage of races.

The early bird catches the worm, which proves that it is better to be a bird than a worm. Get into the booster class.

Some of the saloon clocks in Missoula are getting very slow. It takes them a long time to get around to 1 o'clock.

Other railways are in worse shape than the Northern Pacific and other towns are much wetter than Missoula.

Amongst Mayor McClellan's good traits may be mentioned his persistent opposition to municipal ownership.

Now, will somebody please come forward and irrigate the prairie between the city and the fort?

Senator Carter's proposed Lincoln highway would be a better memorial than a bronze statue.

Senator Bailey continues to object, but his objections no longer attract much attention.

If the poolroom is to be continued we might as well let other gambling run wide open.

Western Montana land is in good demand; its products are its best advertisement.

A new big hotel is not least among the good things which Missoula has in sight.

The electric line will unite Missoula and the Bitter Root more closely than ever.

Any real estate investment is good if it is in the Land of the McIntosh Red.

Montana will yield to none in her tribute to the memory of Lincoln.

Look on the bright side of things; it's better for your eyesight.

When it is 1 o'clock by the police watches it is 1 o'clock.

The defiance of courts will not win friends for any cause.

A boost for Missoula is a help to your own business.

The poolroom is about to make its exit from Montana.

Are you lined up with the boosters? You should be.

The committee on drainage will please report.

PRESIDENT TRANSMITS COMMISSION'S REPORT

(Continued From Page Three.)

fire, waste and improvident use, or protected and improved in such way as to meet human necessities. Together the lands and the forests are improvable resources.

The minerals are limited in quantity and cannot be increased or improved by anything which man may do. They are expendable resources.

The fresh waters are limited in quantity, though the supply is permanent. They form a naturally renewable resource which man may do nothing to increase, but may do much in the way of conservation.

The treatment applied to each class should be adapted to its own fullest development and best utilization and to those of the other classes of resources.

The waste which most urgently requires checking varies widely in character and amount. The most reprehensible waste is that of destruction, as in forest fires, uncontrolled flow of gas and oil, soil wash and abandonment of coal in the mines. This is attributable, for the most part, to ignorance, indifference or false notions of economy, to rectify which is the business of the people collectively.

Nearly as reprehensible is the waste arising from misuse, as in the consumption of fuel in furnaces and engines of low efficiency, the loss of water in floods, the employment of ill-adapted structural materials, the growing of ill-chosen crops, and the perpetuation of inferior stocks of plants and animals, all of which may be remedied.

Waste From Nonuse.

Reprehensible in less degree is the waste arising from nonuse. Since the utilization of any one resource is necessarily progressive and dependent on social and industrial conditions and the concurrent development of other resources, nonuse is sometimes unavoidable. It becomes reprehensible when it affects the common welfare and entails future injury. Then it should be rectified in the general interest.

For the prevention of waste the most effective means will be found in the increase and diffusion of knowledge, from which is sure to result an aroused public sentiment demanding prevention. The people have the matter in their own hands. They may prevent or limit the destruction of resources and restrain misuse through the enactment and enforcement of appropriate state and federal laws.

The Chief Glory.

At every stage in the growth of our country, strong men grew stronger through the exercise of nation building, and their intelligence and patriotism grew with their struggle. The spirit and vigor of our people are the chief glory of the republic. Yet even as we have neglected our natural resources, so have we been thoughtless of life and health. Too long have we overlooked that grandest of our resources, human life. Natural resources are of no avail without men and women to develop them, and only a strong and sound citizenship can make a nation permanently great. We can not too soon enter on the duty of conserving our chief source of strength by the prevention of disease and the prolongation of life.

Waste reduced and resources saved are the first but not the last object of conservation. The material resources have an additional value when their preservation adds to the beauty and habitability of the land. Ours is a pleasant land in which to dwell. To increase its beauty and augment its fitness can not but multiply our pleasure in it and strengthen the bonds of our attachment.

In the conservation of all the resources of the country the interest of the present and all future generations is concerned, and in this great work—involving the welfare of the citizen, the family, the community, the state and the nation—our dual system of government, state and federal, should be brought into harmonious co-operation and collaboration.

Minerals.

The mineral production of the States for 1907 exceeded $2,000,000,000, and contributed 65 per cent of the total freight traffic of the country. The waste in the extraction and treatment of mineral products during the same year was equivalent to more than $300,000,000.

The production for 1907 included 395,000,000 tons of bituminous and 85,000,000 tons of anthracite coal, 166,000,000 barrels of petroleum, 45,000,000 tons of high grade and 11,000,000 tons of low grade iron ore, 2,500,000 tons of phosphate rock, and $69,000,000 pounds of copper. The values of other mineral products during the same year included clay products, $162,000,000; stone, $71,000,000; cement, $56,000,000; natural gas, $50,000,000; gold, $90,000,000; silver, $37,000,000; lead, $39,000,000, and zinc, $26,000,000.

The available and easily accessible supplies of coal in the United States aggregate approximately 1,400,000,000,000 tons. At the present increasing rate of production this supply will be so depleted as to approach exhaustion before the middle of the next century.

The known supplies of high grade iron ores in the United States approximates 3,840,000,000 tons, which, at the present increasing rate of consumption cannot be expected to last beyond the middle of the present century. In addition to this there are assumed to be 59,000,000,000 tons of lower grade iron ores, which are not available for use under existing conditions.

Known Supply.

The known supply of petroleum is estimated at 15,000,000,000 to 20,000,000,000 barrels, distributed through six separate fields having an aggregate area of 8,900 square miles. The production is rapidly increasing, while the wastes and the loss through misuse are enormous. The supply can not be expected to last beyond the middle of the present century.

The known natural gas fields aggregate an area of 9,000 square miles, distributed through 22 states. Of the total yield from these fields during 1907, 400,000,000,000 cubic feet, valued at $62,000,000, were utilized, while an equal quantity was allowed to escape into the air. The daily waste of natural gas—the most perfect known fuel—is over 1,000,000,000 cubic feet, or enough to supply every city in the United States of over 100,000 population.

Phosphate rock, used for fertilizer, represents the slow accumulation of organic matter during past ages. In most countries it is scrupulously preserved; in this country it is extensively exported, and largely for this reason its production is increasing rapidly. The original supply can not long withstand the increasing demand.

The consumption of nearly all our mineral products is increasing far more rapidly than our population. In many cases the waste is increasing more rapidly than the number of our people. In 1776 but a few dozen pounds of iron were in use by the average family; now our annuel consumption is over 1,200 pounds per capita. In 1812 no coal was used, now the consumption is over five tons and the waste nearly three tons per capita.

Is Increasing.

While the production of coal is increasing enormously, the waste and loss in mining are diminishing. At the beginning of our mineral development the coal abandoned in the mine was two or three times the amount taken out and used. Now the mine waste averages little more than half the amount saved. The chief waste is in imperfect combustion in furnaces and fire boxes. Steam engines utilize on the average about eight per cent of the thermal energy of the coal. Internal combustion engines utilize less than 20 per cent, and in electric lighting far less than 1 per cent of the thermal energy is rendered available.

With increasing industries new mineral resources become available from time to time. Some lignites and other low grade coals are readily gasified, and, through the development of internal combustion engines, check the consumption of high grade coals. Peat is becoming important; it is estimated that 14,000,000,000 tons are available in the United States. Its value is enhanced because of distribution through states generally remote from the fields of coal, oil and natural gas.

Mineral Resources.

The uses of all our mineral resources are interdependent. This is especially true of coal and iron, of which neither can be produced or used without aid from the other, and in the production or reduction of all other minerals both coal and iron are employed. The same standard minerals are necessary to the development of power, of which the use is increasing more rapidly than that of any other commodity.

The building operations of the country now aggregate about $1,000,000,000 per year. The direct and indirect losses from fire in the United States during 1907 approximated $450,000,000, or one-half of the cost of construction. Of this loss four-fifths, or an average of $1,000,000 per day, could be prevented, as shown by comparison with the standards of construction and the fire losses in the larger European countries.

So far as the ores are taken from the mines and reduced to metals, these resources are capitalized; but after thus being changed to a more valuable form they should be so used as to reduce to a minimum the loss by rust, electrolytic action and other waste.

There is urgent need for greater safety to the miner. The loss of life through mine accidents is appalling, and preventive measures can not be taken too soon.

The national government should exercise such control of the mineral fuels and phosphate rocks now in its possession as to check waste and prolong our supply.

While the distribution and quantity of most of our important mineral substances are known in a general way, there is imperative need for further surveys and investigations and for researches concerning the less-known minerals.

Public Lands.

The total area of continental United States is 1,900,000,000 acres. Of this but little more than two-fifths is in farms, and less than one-half of the farm area is improved and made a source of crop production. We have nearly 6,000,000 farms; they average 146 acres each. The value of the farms is nearly one-fourth the wealth of the United States. The large number of persons engaged in agricultural pursuits is more than 10,000,000.

We grow one-fifth of the world's wheat crop, three-fifths of its cotton crop, and four-fifths of its corn crop. We plant nearly 50,000,000 acres of wheat annually, with an average yield of about 14 bushels per acre; 100,000,000 acres of corn, yielding an average of 25 bushels per acre; and 30,000,000 acres of cotton; yielding about 12,000,000 bales.

We had on January 1, 1908, 71,000,000 cattle, worth $1,250,000,000; 54,000,000 sheep, worth $211,000,000, and 56,000,000 swine, worth $339,000,000. The census of 1900 showed $137,000,000 worth of poultry in this country, which produced, in 1899, 293,000,000 dozen eggs.

There has been a slight increase in the average yield of our great staple farm products, but neither the increase in acreage nor the yield per acre has kept pace with our increase in population. Within a century we will probably have to feed three times as many people as now; and the main bulk of our food supply must be grown on our own soil.

Awaiting Plow.

The area of cultivated land may possibly be doubled. In addition to the land awaiting the plow, 75,000,000 acres of swamp land can be reclaimed, 40,000,000 acres of desert land irrigated and millions of acres of brush and wooded land cleared. Our population will increase continuously, but there is a definite limit to the increase of our cultivated acreage. Hence we must greatly increase the yield per acre. The average yield of wheat in the United States is less than 14 bushels per acre, in Germany 28 bushels, and in England 32 bushels. We get 30 bushels of oats per acre, England nearly 45, and Germany more than 47. Our soils are fertile, but our mode of farming neither conserves the soil nor secures full crop returns. Soil fertility need not be diminished, but may be increased. The large yields now obtained from farms in Europe which have been cultivated for a thousand years prove this conclusively. Proper management will double our average yield per acre. The United States can grow the farm products needed by a population more than three times as great as our country now contains.

The greatest unnecessary loss of our soil is preventable erosion. Second only to this is the waste, misuse and nonuse of fertilizer derived from animals and man.

The losses to farm products due to injurious mammals is estimated at $130,000,000 annually; the loss through plant diseases reaches several hundred million dollars; and the loss through insects is reckoned at $659,000,000. The damage by birds is balanced by their beneficent work in destroying noxious insects. Losses due to the elements are large, but no estimate has been made of them. Losses to livestock from these causes are diminishing because of protection and feeding during winter. The annual losses from disease among domestic animals are: Horses, 1.8 per cent; cattle, 2 per cent; sheep, 2.2 per cent, and swine, 5.1 per cent. Most of these farm losses are preventable.

Consolidation.

There is a tendency toward consolidation of farm lands. The estimated area of abandoned farms is 16,000 square miles, or about three per cent of the improved land. The causes of abandonment differ in different parts of the country. Where most prevalent, it is caused principally by erosion and exhaustion of the soil.

The product of the fisheries of the United States has an annual value of $57,000,000. Fish culture is carried on by the nation and the states on an enormous scale. Most of the more important food species are propagated, and several species are maintained in this way. Fish from forest waters furnish $21,000,000 worth of food yearly, a supply dependent on the preservation of the forests.

Our wild game and fur-bearing animals have been largely exterminated. To prevent their complete extinction the states and the United States have taken in hand their protection, and their numbers are now increasing. Forest game yields over $10,000,000 worth of food each year.

With game birds the story is much the same—wanton destruction until the number has been greatly reduced, followed in recent years by wise protection, which in some cases allow the remnant to survive and even to increase.

Each citizen of the United States owns an undivided interest in about 375,000,000 acres of public lands, exclusive of Alaska and the insular possessions. Besides this there are about 235,000,000 acres of national forests, national parks and other lands devoted to public use.

Good business sense demands that a definite land policy be formulated. The national conservation commission believes that the following will serve as a basis therefor:

1. Every part of the public lands should be devoted to the use which will best subserve the interests of the whole people.

2. The classification of all public lands is necessary for their administration in the interests of the people.

3. The timber, the minerals and the surface of the public lands should be disposed of separately.

4. Public lands more valuable for conserving water supply, timber, and natural beauties or wonders than for agriculture should be held for the use of the people from all except mineral entry.

5. Title to the surface of the remaining non-mineral public lands should be granted only to actual home makers.

6. Pending the transfer of title to the remaining public lands they should be administered by the government and their use should be allowed in a way to prevent or control waste and monopoly.

The present public land laws as a whole do not subserve the best interests of the nation. They should be modified so far as may be required to bring them into conformity with the foregoing outline of policy.

Next to our need of food and water comes our need of timber.

Our industries which subsist wholly or mainly upon wood pay the wages of more than 1,500,000 men and women.

Forests not only grow timber, but they hold the soil and conserve the streams. They abate the wind and give protection from excessive heat and cold. Woodlands make for the fibre, health and happiness of the citizen and the nation.

Our forests now cover 550,000,000 acres, or about one-fourth of the United States. The original forests covered not less than 850,000,000 acres.

Forests publicly owned cover one-fourth of the total forest area and contain one-fifth of all standing timber. Forests privately owned cover three-fourths of the area and contain four-fifths of the standing timber. The timber privately owned is not only four times that publicly owned, but is generally more valuable.

Forestry is now practiced on 70 per cent of the forests publicly owned and on less than 1 per cent of the forests privately owned, or on only 18 per cent of the total area of forests.

The yearly growth of wood in our forests do not average more than 12 cubic feet per acre. This gives a total yearly growth of less than 7,000,000,000 cubic feet.

We have 200,000,000 acres of mature forests, in which yearly growth is balanced by decay; 250,000,000 acres partly cut over or burned over, but restocking naturally with young growth to produce a merchantable crop, and 100,000,000 acres cut over and burned over, upon which young growth is lacking or too scanty to make merchantable timber.

From the Forests.

We take from our forests yearly including waste in logging and in manufacture, 23,000,000,000 cubic feet of wood. We use each year 100,000,000 cords of firewood; 40,000,000,000 feet of lumber; more than 1,000,000,000 posts, poles and fence rails; 118,000,000 hewn ties; 1,500,000,000 staves; over 133,000,000 sets of heading; nearly 500,000,000 barrel hoops; 3,000,000 cords of native pulp wood; 165,000,000 cubic feet of round mine timber, and 1,250,000 cords of wood for distillation.

Since 1870 forest fires have destroyed a yearly average of 50 lives and $50,000,000 worth of timber. Not less than 50,000,000 acres of forest is burned over yearly. The young growth destroyed by fire is worth far more than the merchantable timber burned.

One-fourth of the standing timber is lost in logging. The boxing of longleaf pine for turpetine has destroyed one-fifth of the forests worked. The loss in the mill is from one-third to two-thirds of the timber sawed. The loss of mill product in seasoning and fitting for use is from one-seventh to one-fourth.

Of each 1,000 feet which stood in the forest, an average of only 320 feet of lumber is used.

We take from our forests each year, not counting the loss by fire, three and one-half times their yearly growth. We take 40 cubic feet per acre for each 12 cubic feet grown; we take 280 cubic feet per capita, while Germany uses 37 and France 25 cubic feet.

We tax our forests under the general property tax, a method abandoned long ago by every other great nation. Present tax laws prevent reforestation of cut-over land and the perpetuation of existing forests by use.

Great damage is done to standing timber by injurious forest insects. Much of this damage can be prevented at small expense.

To protect our farms from winds and to reforest land best suited for forest growth will require tree planting on an area larger than Pennsylvania, Ohio, and West Virginia combined. Lands so far successfully planted make a total area smaller than Rhode Island; and year by year, through careless cutting and by fires, we lower the capacity of existing forests to produce their like again; or else totally destroy them.

Need of Much Wood.

In spite of substitutes we shall always need much wood. So far our use of it has steadily increased. The condition of the world's supply of timber makes us already dependent upon what we produce. We send out of our country one and one-half times as much timber as we bring in. Except for finishing woods, relatively small in amount, we must grow our own supply or go without. Until we pay for our lumber what it costs to grow it, as well as what it costs to log and saw, the price will continue to rise.

The preservation by use, under the method of practical forestry, of all public forest lands, either in state or federal ownership, is essential to the permanent public welfare. In many forest states the acquirement of additional forest lands as state forests is necessary to the best interests of the states themselves.

The conservation of our mountain forests, as in the Appalachian system, is a national necessity. These forests are required to aid in the regulation of streams used for navigation and other purposes. The conservation of these forests is impracticable through private enterprises alone, by any state alone, or by the federal government alone. Effective and immediate co-operation between these three agencies is essential. Federal ownership of limited protective areas upon important watersheds, effective state fire patrol and the co-operation of private forest owners are all required.

The true remedy for unwise tax laws lies not in laxity in their application nor in special exemption, but in a change in the method of taxation. An annual tax upon the land itself, exclusive of the value of the timber, and a tax upon the timber when cut, is well adapted to actual conditions of forest investment, and is practicable and certain.

It is far better that forest land should pay a moderate tax permanently than that it should pay an excessive revenue temporarily and then cease to pay at all.

Forests in private ownership can not be conserved unless they are protected from fire. We need good fire laws well enforced. Fire control is impossible without an adequate force of men whose sole duty is fire patrol during the dangerous season.

Practice Forestry.

The conservative use of the forest and of timber by American citizens will not be general until they learn how to practice forestry. Through a vigorous national campaign in education, forestry has taken root in the great body of American citizenship. The basis already exists upon which to build a structure of forest conservation which will endure. This needs the definite commitment of state governments and the federal government to their inherent duty of teaching the people how to care for their forests. The final responsibility both for investigative work in forestry and for making its results known rests upon the states and upon the nation.

By reasonable thrift, we can produce a constant timber supply beyond our present need, and with it conserve the usefulness of our streams for irrigation, water supply, navigation and power.

Under right management our forests will yield over four times as much as now. We can reduce waste in the woods and in the mill at least one-third, with present as well as future profit. We can perpetuate the naval stores industry. Preservative treatment will reduce by one-fifth the quantity of timber used in the water or in the ground. We can practically stop forest fires at a cost yearly of one-fifth the value of the merchantable timber burned.

Waters.

The sole source of our fresh water is rainfall, including snow. From this source all running, standing and ground waters are derived. The habitability of the country depends upon these waters. Our mean annual rainfall is about 30 inches; the quantity about 215,000,000,000,000 cubic feet per year, equivalent to 10 Mississippi rivers.

Of the total rainfall, over half is evaporated; about a third flows into the sea; the remaining sixth is either consumed or absorbed. These portions are sometimes called, respectively, the fly-off, the run-off and the cutt-off. They are partly interchangeable. About a third of the run-off, or a tenth of the entire rainfall, passes through the Mississippi. The run-off is increasing with deforestation and cultivation.

Of the 70,000,000,000,000 cubic feet annually flowing into the sea, less than 1 per cent is restrained and utilized for municipal and community supply; less than 2 per cent (or some 10 per cent of that in the arid and semi-arid regions) is used for irrigation; perhaps five per cent is used for navigation, and less than five per cent for power.

For municipal and community water supply there are protected catchment areas aggregating over 600,000 acres, and over $250,000,000 are invested in waterworks, with nearly as much more in the appurtenant catchment areas and other lands. The population thus supplied approaches 10,000,000, and the annual consumption is about 37,500,000,000 cubic feet. The better managed systems protect the catchment areas by forests and grass; the water is controlled and the storm product used, but there is large waste after the water enters the mains.

For irrigation, it is estimated that there are $200,000,000 invested in dams, ditches, reservoirs and other works for the partial control of the waters; and that 1,500,000,000,000 cubic feet annually diverted to irrigable lands, aggregating some 20,000 square miles. Except in some cases through forestry, few catchment areas are controlled, and few reservoirs are large enough to hold the storm waters. The waste in the public and private projects exceeds 60 per cent, while no more than 25 per cent of the water actually available for irrigation of the arid lands is restrained and diverted.

Improvements Needed.

There are in continental United States 282 streams navigated for an aggregate of 26,115 miles, and as much more navigable if improved. There are also 45 canals, aggregating 2,189 miles, besides numerous abandoned canals. Except through forestry in recent years, together with a few reservoirs and canal locks and movable dams, there has been little effort to control headwaters or catchment areas in the interests of navigation, and none of our rivers are navigated to more than a small fraction even of their efficient low-water capacity.

The water power now in use is 5,250,000 horsepower; the amount running over government dams and not used is about 1,400,000 horsepower; the amount reasonably available equals or exceeds the entire mechanical power now in use, or enough to operate every mill, drive every spindle, propel every train and boat, and light every city, town and village in the country. While the utilization of water power ranks among our most recent and most rapid industrial developments, little effort has been made to control catchment areas or storm waters in any large way for power, though most plans effect local control through reservoirs and other works. Nearly all the freshet and flood waters run to waste, and the low waters which limit the efficiency of power plants are increasing in frequency and duration with the increasing flood run-off.

Practical Utility.

The practical utility of streams for both navigation and power is measured by the effective low-water stage. The volume carried when the streams rise above this stage is largely wasted and often does serious damage. The direct yearly damage by floods since 1900 has increased steadily from $45,000,000 to over $238,000,000. The indirect loss through depreciation of property is great, while a large loss arises in impeded traffic through navigation and terminal transfers.

The freshets are attended by destructive soil erosion. The soil matter annually carried into lower rivers and harbors or into the sea is computed at 780,000,000 tons. Soil wash reduces by 10 or 20 per cent the productivity of upland farms and increases channel cutting and bar building in the rivers. The annual loss to the farms alone is fully $500,000,000, and large losses follow the fouling of the waters and the diminished navigability of the streams.

Through imperfect control of the running waters lowlands are temporarily or permanently flooded. It is estimated that there are in mainland United States about 75,000,000 acres of overflow and swamp lands requiring drainage; that by systematic operation these can be drained at moderate expense, and that they would then be worth two or three times the present value and cost of drainage, and would furnish homes for 10,000,000 people.

It is estimated that the quantity of fresh water stored in lakes and ponds (including the American portion

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