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## OUR WATER RESOURCES

### 3. WATER POWER SURVEYS

In the last two issues of the News Letter articles have appeared telling of the vital importance of adequate records of stream flow to community and industrial development in the state, and indicating the methods used in North Carolina for the collection of these records. As pointed out in those articles, one of the most important uses of stream flow data is to enable water power projects to be planned with economy and operated with efficiency. But other information besides knowledge of stream flow is important for the proper conservation of the great water power resources of the state. Water power surveys of streams form, the only basis upon which the state as a whole or individual industrial enterprises may get the most out of the potential wealth which is inherent in many of our streams.

#### Surveys of Undeveloped Rivers

There are still a number of rivers in North Carolina which are relatively undeveloped from a water power standpoint, and which have great potentialities for producing water power. Whether or not these streams are developed according to some comprehensive plan which results from a complete study of the entire river, and often of its relation to other power producing rivers, may make a difference of tens of thousands of horsepower in the ultimate total power producing capacity of the stream. It is essentially a function of the state to investigate its streams to determine the most efficient method for their development, and then to try to see that some such method is followed by private or municipal interests building power projects. The State Department of Conservation and Development (formerly the Geological Survey) has since the creation of its Water Resources Division in cooperation with the Engineering School at the University in 1920, been making river surveys as funds were available. The scope of such surveys is usually dependent upon the amount of money which may be contributed by cooperating agencies such as counties, municipalities, or group interests.

#### Scope of Power Surveys

The water power surveys in general make the following studies, comprising an entire stream within its power producing portions. First accurate levels are run along the course of the river and checked on some standard bench mark of the United States Geological Survey. Often, as in Stokes county and along Deep river, these are the first accurate levels ever carried into the region, and they are permanently marked and left for standard elevations for use of engineers and surveyors in the future. Following the levels, a profile is made of the entire stream, so that the fall on every portion is accurately known. At the same time a plan of the river is made, locating all existing power developments and noting points where good dam sites exist. Cross sections are made of all good dam sites, and by contour maps the amount of water determined which can be stored behind each dam. If there are not enough gaging stations on the river, new ones are established to determine the stream flow. The field data are taken to the office, and studies made to determine the best points at which to locate dams to (1) develop the greatest total fall, (2) involve the least number of dams or least cost for dams, (3) create the greatest storage to be let out during periods of low flow. As a result a complete report is prepared and published, presenting an outline for the development of the river as a unit for power production. Each development, as made, ought to fit into this scheme in order to get the most out of the river. The basic idea is to outline for every river in the state, now undeveloped, some plan for complete utilization along similar methods to those so efficiently consummated by the Southern Power Company on the Catawba.

#### The State's Duty

Why should the state do this, and what happens if it does not? Look on

any number of streams in the state. See the isolated small water powers which have been developed at great expense and with no thought of their relation to other developments on the same stream. A ten-foot dam at one point creates a small industrial community which would be entirely destroyed by a fifty-foot dam at an excellent site a few miles further down stream. Manifestly the fifty-foot dam cannot be built, except at prohibitive cost in most cases. But, could a dam be built at the lower site to pond water back to the upper site? Certainly. And could the same total amount of fall in the river be developed? Certainly. Then why worry? Because a single high dam at the lower site would impound a great deal more water than the two dams built separately, and much of that impounded water can be drawn on during dry periods to produce power. At every low dam in the state there is more power lost over the dam during high-water periods than is utilized in making power during the entire year. That water, or some of it, can be conserved by being stored behind high dams and used when needed in times of low flow. Moreover, the single high dam will usually cost considerably less than two or more low dams.

Further need for unit thought in developing streams is seen in places where a dam has been built, say, ten feet high. A mill community, with expensive industrial buildings, collects about the power source, usually along the banks of the stream. A fifty-foot dam could be built at the site cheaper than at any nearby point to develop the same fall. But the fifty-foot dam, if constructed now, would flood out valuable property. That forty extra feet of fall in the river will probably never be developed, and thus its power-producing ability will be lost to the state. Numerous other instances of the need for forethought in developing a stream could be cited did space permit. It is the duty of the state, and, as the need for power consumption presses more hardy on power production, it will be necessary for the state to see to it that the power resources of its streams are developed efficiently.

#### Example of Lost Power

On one of the most important power streams of the state, plans had been made for the construction of a dam 180 feet high. It would have created large power itself, and by storing flood waters would have increased the power producing capacity of other developments below by from 10,000 to 20,000 horsepower. Certain interests owned a dam site above this one and built a fifty-foot dam there which develops possibly 1,000 horsepower. This dam and power would be flooded out by the high dam below. Will the high dam, with its resulting benefits, ever be built now? Not unless the small "dog in the manger" can be bought out or condemned, and the excessive cost of this, even if possible, will raise the price of power at the large development, if built, and will unquestionably delay its building.

River surveys, of varying scope, have been carried out by the Department of Conservation on the power streams in Surry, Wilkes, Cherokee, and Clay counties. Many of the sites reported upon are now under development, and the published data have served not only to indicate the best methods for developing the streams, but to make public the existence of the power in an authoritative manner and bring it to the attention of capital which is developing it.—Thorn-dike Saville.

#### COMPARING TWO STATES

Interesting comparisons between Virginia and North Carolina are contained in the University of Virginia News Letter. The two states run close together in most classifications. The interesting feature is the comparison with the average for the United States, and the growth during the last ten years.

Some Virginians have become sen-

### OUR BASIC INDUSTRY

Agriculture is a basic American industry into whose interests all other interests inextricably are woven.

Everyone knows that without a healthy condition in agriculture, all other lines of business feel the depressing reaction, and it is therefore as much the concern of industry at large as of agriculture itself that agriculture be protected from economic illness.

The business community which seeks merely to exploit the agricultural producers in its trade area has no worthy place in the ranks of modern organized business. Those dollars which come from agricultural wealth are new dollars. It is a distinct obligation of every Chamber of Commerce and like business group in agricultural areas to enhance the purchasing power of those dollars.—Richard F. Grant, in *The Country Gentleman*.

sitive at the extravagant praise of North Carolina's progress in roads and schools. It is always well to face the facts calmly and in this instance it is fortunate that the figures were gathered from an unprejudiced source, the information being taken from the University of Tennessee's Digest of Southern States.

Virginia leads in total and per capita wealth, resources, many items of agriculture, mining, total annual production of electricity, in telephones, exports, wholesaling, home ownership, automobiles, personal incomes, public debt, health and sanitation expenditures, in reading public, in literacy, in number and value of all colleges and universities, in number of students and in the average expenditure per pupil in the public schools.

North Carolina leads in manufacturing, lumbering, water-power development, corporation income, highway expenditures, value of plant and equipment and appropriations to state-supported colleges and universities, and increase in total wealth during the last census decade.

In Virginia 46.1 percent of the population lives on farms; in North Carolina 58.7 percent; in the nation at large 29.9 percent. The percentage of farmers owning their own farms in Virginia is 73.2; in North Carolina 56.1; in the United States 60.9.

There is room in both states for further manufacturing development. Virginia has 2,570, North Carolina 2,602 plants, while the average for all the states is 4,038. Virginia has 100,117 people employed in factories; North Carolina 147,753. Virginia made up \$454,261,467 of manufactured products; North Carolina \$665,117,738.

In mining Virginia far excels, producing \$38,551,000 to \$7,268,000 in North Carolina. In lumbering North Carolina excels, cutting 936,248,000 feet to Virginia's 617,493,000 feet. Virginia has 44 department stores of over \$50,000 capital; North Carolina 45; Virginia has 516 banks to 617 in North Carolina, but the aggregate resources of Virginia banks are \$606,219,000 to \$442,810,000 in North Carolina.

Virginia has 450,229 separate homes to 495,269 in North Carolina, but Virginians own 51.1 percent of their homes, while North Carolinians own but 47.4 percent. The number of motor cars per 1,000 of population is for Virginia 91; for North Carolina 90.

The assessed valuation of all property in Virginia is \$1,826,263,000; in North Carolina \$2,521,115,000, property in Virginia being assessed on an average of 49.7 percent of its true value, and in North Carolina at 75.7 percent of its true value. The total debt of states, counties, and cities in Virginia is \$119,115,000; in North Carolina \$182,711,000, while the average debt, state, city, and county for the 48 states of the Union is \$642,767,187. The per capita debt in Virginia is \$50.33; in North Carolina \$69.03, in the United States \$283.77.

Both states are far behind the average in the number of newspaper readers. In Virginia there is one paper to each 8.1 persons; in North Carolina one to each 13.5; in the nation at large one to each 3.6 people.

Virginia appropriated for state-sup-

ported universities and colleges per white person 42 cents; North Carolina 55 cents; the average for the United States being 70 cents. Virginia's percentage of illiteracy of all classes over ten years of age was 11.2; that of North Carolina 13.1; that of the whole nation 6. Public school expenditures per capita in Virginia were \$8.94; for North Carolina \$8.33; the average for other states \$15.10. The percentage of population from five to eighteen years old attending school, for Virginia is 68; for North Carolina 70.5; for all other states 74.7; the average salary of teachers in Virginia is \$818; in North Carolina \$720; in other states \$1,013.

The comparisons in no sense contribute to a jealousy between the states, for one excels in some things, one in others. They serve to point out to each state those things in which it has dropped behind, and should prove most stimulating to both in their effort to catch up with the procession of states of the American Union.—Danville News.

### CHILDREN IN JAILS

One hundred and thirty-eight children under sixteen years of age are in jail in North Carolina, according to reports published by the State Board of Charities and Public Welfare. These reports are based upon data received from 546 jails. Of the children under 16, 49 were white boys, 18 white girls, 60 negro boys and 11 negro girls. There were also 1,765 persons between 16 and 21 years of age in jail, 782 white boys, 612 negro boys, 186 white girls, and 185 negro girls.

### THE CALL OF THE CHURCH

"Yes, sir," said Dave, "I believe that church attendance pays. Why just think of the farmers around

here who are regular at the little white church in the grove. Judging by their buildings and their dairies and their crops they are certainly more prosperous than the men who spend Sunday loafing, fishing, and visiting.

"How do I explain it? Well, I sort of figure it out that church attendance has something of the same effect upon a man's life that a shower has upon the fields. It starts to growing those business virtues, industry, thrift, honesty, and eagerness to help, which make for success."

After all, is not Dave about right? He might have gone further and have spoken of church attendance also as a kind of liberal education where one hears the great hymns of the ages, where the Book of Books is read and explained, and where the thought that Daniel Webster said was the greatest thought that ever filled his mind—the thought of man's accountability to God—is emphasized.

Furthermore, Dave might have pointed out that the man who heeds the call of the church bell gets the Robinson Crusoe instincts out of his system. He becomes a friend of man, and in a large sense a citizen of the world. His own purposes enlarge as he shares in the purpose of the church to make over the nations of the globe according to the principles of the Master Teacher.

At church one is reminded of the things which are really worth while; the cobwebs are brushed away from the chamber of conscience; faded ideals are brightened once more as the brown fields of autumn grow green when spring returns; and religion becomes a real experience of fellowship "with a heavenly Father who is supremely made real in the Man of Galilee, in whose service there is completest freedom and fullest joy."—Country Gentleman.

### FACTS ABOUT NORTH CAROLINA, 1880 AND 1923 Forty-Three Years of Progress

The following table of facts about North Carolina, showing her development from 1880 to 1923, is taken from the South's Development, an excellent volume of nearly 700 pages, issued recently by the Manufacturers Record. Total area, 52,426 square miles; land, 48,740 square miles; water, 3,686 square miles.

	1880	1923
Population	1,399,750	2,686,325
Property, true value	\$461,000,000	\$4,543,110,000
Manufactures:		
Capital	\$18,045,639	\$669,144,000
Products, value	\$20,095,037	\$665,118,000
Mines and quarries:		
Capital		\$2,250,434
Products, value		\$2,744,583
Cotton manufacturing:		
Capital	\$2,856,000	\$268,323,000
Products, value	\$2,554,000	\$318,368,000
Spindles, number active	92,385	5,463,547
Looms, number active	1,790	76,974
Cotton consumed, pounds	11,833,000	646,921,000
Cottonseed oil mills:		
Capital		\$14,586,456
Products, value		\$46,995,107
Furniture manufacturing:		
Products, value		\$29,725,000
Lumber cut, feet	241,822,000	\$36,248,000
Mineral products, value	\$575,679	\$7,268,000
Coal mined, tons	350	
All land in farms, acres		\$20,021,736
Improved land, acres	6,481,191	\$8,198,409
Number of farms		\$269,763
Value of all farm property		\$1,250,166,995
Value of farm land		\$857,815,016
Farm products, value	\$51,730,000	\$613,400,000
Farm crops, value		\$436,800,000
Cotton crop:		
Bales, number	890,000	1,020,000
Tobacco crop, pounds	27,000,000	886,400,000
Grain crop:		
Corn, bushels	36,954,000	58,568,000
Wheat, bushels	4,871,000	6,038,000
Oats, bushels	5,515,000	5,082,000
Livestock:		
Cattle, number	607,000	631,000
Sheep, number	462,000	82,000
Swine, number	1,454,000	1,159,000
Horses, number	134,000	163,000
Mules, number	82,000	260,000
National banks:		
Resources	\$8,420,060	\$192,329,000
Capital	\$2,501,000	\$13,557,000
Deposits	\$2,883,365	\$125,170,000
Other banks, deposits	\$1,596,632	\$219,972,000
Railroad mileage	1,486	\$5,382
Highway expenditures		\$36,148,000
Public schools, expenditures	\$376,000	\$22,079,000
Assessed value property	\$156,100,200	\$2,576,338,000

\* Census 1920. † 1922. ‡ 1921.