



PUBLISHED  
SEMI-MONTHLY.

The only Newspaper devoted to the Lumber and Timber Industries published in Canada

SUBSCRIPTION  
\$2.00 PER ANNUM

VOL. 6.

PETERBOROUGH, ONT., JANUARY 15, 1886.

NO. 2.

**ON THE INFLUENCE OF FORESTS UPON CLIMATE.**

At the meeting of the Royal Meteorological Society, held on Wednesday, Dec. 10th, a paper on the above subject, by Dr. A. Woeikof, was read, of which the following is an abstract:—The existence of a influence of forests upon climate has often been contested, and the question remained for a long time unsettled, because meteorologists were content with principles of too general a character. The first step towards a scientific investigation of the subject was taken by the establishment of the Bavarian Forest Meteorological Station, the results of which have been published by Professor Ebermayer. The excellent example of Bavaria was soon followed by Germany, France, Switzerland, Italy, and other countries. As a general result it was found that during the warmer season (1) the air and earth temperatures were lower in the forest as compared with contiguous woodless places; (2) their variations were less; and (3) the relative humidity was greater.

The following details, referring to the amounts of evaporation from April to September, are quoted as being of special importance.

	In the Open.	In the Forest.	Per-centages.
Eastern France...	16.23	5.20	312
Alsatian Mountains	13.19	6.26	211
Bavaria.....	14.85	6.22	239
Braudenburg.....	15.71	6.42	245
Eastern Prussia...	9.93	4.73	210
Silesian Mountains	10.52	4.17	250

It will therefore be seen that the evaporation from a free surface of water in the open was everywhere more than double, and even above three times that in the forest. In Bavaria, the evaporation from soil saturated with water was observed. This amounted in the same seven months to 16.7 in. in the open, 6.26 in. in the forest without dead leaves, and 2.44 in. in the forest with them. This experiment shows that the evaporation in the open is 6½ times as much as in the forest with the covering of dead leaves. The influence of the forest on the diminution of evaporation from water and ground is so great that it cannot be explained by the lower temperature of the warmer months only by greater humidity, or even by the shade; one influence which has hitherto been too little regarded is especially important in effecting this result, viz., protection from the wind by the trees standing closely together. This last cause is probably more important in its effects than all the others put together.

The diminution in wind force which is caused by the presence of trees is well known, although we have unfortunately no numerical data with reference to it; but it could easily be investigated by the erection of anemometers. It follows also, from the laws of Mechanics, that

if this diminution of the wind by forests is especially evident in the lower strata of the air below the tops of the trees, it cannot cease above them, but owing to the so-called viscosity of the atmosphere must extend to a considerable height, so that the motion of the air is weakened up to five or even ten times the height of the trees. This indicates the extent of the favorable influence which forests must exert in maintaining the humidity existing in air or soil; and naturally the denser the forests and the higher the trees the greater is this influence. But if this question is incontrovertible, the same cannot be said of influence of forests upon rainfall, etc.; an influence which is as often asserted as it is denied. Hitherto there has only been one series of observations giving comparable values and maintained a sufficient length of time, viz., that in the neighborhood of Nancy. These observations indicate a considerable influence of forests on the increase of rainfall. The explanation appears to be that in winter the effect of forests upon rainfall should be unimportant in the climate of Central Europe—the difference of temperature and humidity between forest and field being very small, and the amount of vapor in the atmosphere inconsiderable. The observations, however, show that during this season the forests receive much more rainfall, &c., being accounted for by the following facts:—(1) In winter the clouds being of a lower level than at other seasons, the obstruction caused by the forests to the motion of the air must then considerably affect their motion, the air will consequently be forced upwards, and at a time of great relative humidity a small ascent suffices to produce condensation of the vapor. (2) In winter damp winds are more frequent, and the rainfall is of longer duration, hence the greater importance of forest influence. In spring and early summer the effect of forests upon the increase of rainfall is much diminished, because at these seasons there is considerable evaporation from the surfaces of fields and meadows; probably more water evaporates than from a given extent of field than from an equal surface of forest, taking into account the evaporation both from the crops and the soil. Towards the end of summer and the beginning of autumn the soil of the fields is considerably dried up, corn is ripe and evaporates but little, while the surfaces of the leaves in the forest still evaporate freely. Conditions then are more favorable to an increased humidity of the air in the forests, their immediate vicinity, and hence to more copious and frequent rainfalls. Other kinds of condensation of vapor for which forests are especially favorable exist. In winter large quantities of hoar-frost collect upon the pine trees, which as the air gets warmer and damper soon falls, increasing the amount of snow on the ground. In warm and moist climates, especially in the tropics, dew collects so freely on the surface of leaves as to fall in

large drops and wet the ground. In this manner a considerable amount of the water evaporated during the day returns again to the earth in the form of dew the following night.

Forests retain the water from rain or melting snow much better by the covering of dead leaves, mould and moss, and only allow a portion to run off superficially when larger quantities of water fall; the remainder percolates gradually, and much of it is utilized in evaporation from the trees. Although forests, especially the dense, luxurious forests of the tropics, cannot, of course, exist without a certain supply of water, yet the time when they receive it is of little import to them. A good instance of this is the Lencoran Forest, on the west coast of the Caspian Sea, where vegetation is more luxuriant than in any other part of Europe, for a mass of climbing plants encircles the trees so that it is always humid in the forest, and yet here the rain curve is a subtropical one, very little rain falling in summer, but large quantities in autumn and winter. The water is stored up in the forest, so maintaining vaporation during summer droughts.

In Upper Assam also, during the four months November to February, little rain falls, but the evaporation of the forests keeps the air damp. It would appear that the influence of thick forests of warm regions upon rainfall is such that, if the general climatic conditions are opposed to rain no rain falls, even where extensive forests exist. This is the case when the wind is constantly descending, or blows from cooler and dryer quarters—as from November to February in Assam, when northeast winds prevail. If there is a strong wind from warmer and damper quarters, and especially if it has an ascending motion, the conditions are favorable for rain, whether forest, field or steppe predominates. Weather types are very far from being always so strongly defined. Frequently, in the vicinity of the equator, the winds are variable or local; or calms prevail. Under such conditions dense forests must be favorable to rainfall for offering an obstacle to the wind's movement; they cause the air to ascend; since it is already damp, condensation ensues. With the same direction of wind there would be little or no rain in woodless regions. During calms and clear weather, after a long drought, the ascending current over forests is much more humid than that over unwooded districts where the ground is dried up, and vegetation withered. Hence there are conditions again more favourable for rain production, in the former case even calms alone may cause rain with an ascending current; an example of this may be quoted in the case of the frequent afternoon thunderstorms in well-protected Alpine valleys. The correctness of the above remarks is proved by the frequent earlier commencement of rain in the tropical forests.

These considerations show that in the western

portions of the Old World extensive forests materially influence the temperature of neighbouring localities, and that the normal increase of the temperature from the Atlantic Ocean towards the interior of the continent is not only interrupted by their agency, but they cause the summer to be cooler in regions situated further in the interior than those nearer the sea.

Hence forests exert an influence on climate which does not cease at their borders, but is exerted over a greater or less district, according to the size, kind, and position of the forests. Hence it naturally follows that man, but clearing forests in one place and planting others in another, may considerably effect the climate. Many incline to the idea that, as forests increase precipitation, it would only be necessary to plant in order to remove deserts from the earth's surface. A person familiar with meteorological questions will, of course, not assume such an extreme position. If the forest economizes rainfall, stores it up for a long time, and even to a certain extent increases precipitation, many parts of our earth are nevertheless too dry to support them, forest vegetation requiring much water. On the other hand, thin forests such as consist of an excess of waxy trees which diminish evaporation, are certainly able to survive in dryer climates than those consisting of trees closer together, which evaporate more freely; but the former have less effect in moderating heat and drought than the latter. On the other hand the widespread opinion that no forests can exist where none existed at the time of the appearance of civilized man is open to doubt. The success of forest culture in the Steppes of Southern Russia, the prairies of North America, and the Pampas of South America sufficiently prove the untenability of this opinion. If afforestation has not hitherto assumed large dimensions, it is more as a question of economy rather than one of climate.

Other growths, such as corn, or the use of the land for pasture, &c., have been more remunerative to private individuals—human life being of but short duration as compared with that of trees.

If there be only a certain amount of rainfall, no matter at what time of the year it occurs, forests flourish. Even long periods of drought are much less injurious to forests than to meadows and fields; and the impossibility of forest culture in a country is not due to the occurrence of rainless periods, provided that copious precipitation falls in other months.—*Timber Trades Journal.*

A Logger by the name of Johnson, working in a camp near Ogontz bay, upper peninsula, Mich., was accidentally shot for game by a fellow workman named Lewis Gotlip. Johnson was hit in the back of the head and died instantly.