stand how very few people realize what has transpired in the Canadian forests since that date. One outbreak after another has occurred in an uninterrupted series. As previously stated, about 250,000,000 cords of spruce and balsam have fallen prey to the budworm between 1909 and 1946. Statistics of this kind make little or no impression on our imagination. Let us put it another way. Suppose that all the spruce and balsam killed in Canada by the budworm in the past 37 years were sawn into 4-ft. logs. Suppose also that, after the fashion of piling a cord measure, we attempted to heap this wood in lots 8 feet long, 4 feet wide and 4 feet high, each pile being contiguous with the next. When our job is finished we would have a band of wood 4 feet in height and 60 feet in width, completely encircling the earth at the equator.

The following statement shows the extent of the areas infested by spruce budworm during the period 1936-45:—

	Ontario	*Quebec*
	sq. miles	sq. miles
Large portion of balsam, dead or injured beyond recovery	19,000	3,360
Balsam heavily attacked, beginning to die singly or in groups	24,500	15,520
Total area seriously affected	43,500	18,880
Total area lightly infested	115,000	20,000[1]
GRAND TOTALS	158,500	38,880

[1] Approximate.

These figures represent over-all measurements of the areas affected. They give no idea of the actual size of white spruce and balsam stands in these areas. The apparent spread eastward into Quebec, practically as far as the St. Maurice Valley, is the most important recent development in the spruce budworm situation.

To place a value in dollars and cents on these losses either to the Government in stumpage dues or to industry in raw materials, would be extremely difficult. Some parts of the destroyed forest had probably little or no commercial value, others could have yielded substantial financial returns. Such computations of direct losses, either in money or raw material, are little better than a post-mortem: they are apt to obscure our undertanding of the real issues involved. The repercussions of a budworm epidemic are felt for many years after the trees have died. Increased fire hazard is perhaps the most immediate effect. It is humanly impossible to control a fire in an area littered with dead trees, nor is it usually possible to confine it to that area. Such fires burn with unbelievable intensity, often causing serious damage to the site, after which floods and erosion put the finishing touch to this picture of desolation.

But the most far-reaching consequence of a budworm outbreak, and the one which should cause us more concern than any other, is the profound change in the composition of the succeeding stands. For years lumbermen, paper manufacturers, and foresters have noticed, with serious apprehension, the apparent inadequate regeneration of spruce and its consequent replacement by balsam in many forest areas. This state of affairs is by no means general, but it obtains in a great number of the most accessible localities. Failure of spruce regeneration is attributed to several causes inherent in the species: (1) inability of spruce seedlings to root in thick layers of moss, raw humus, or forest floor debris; (2) lower seed production than balsam (less frequent seed years); (3) lower degree of shade tolerance than balsam. Two external factors should be added; namely, certain methods of cutting, and the spruce budworm. The latter are interdependent to a considerable extent.