

in which the lake trends—north and south, or east and west. The orientation of a lake is important, as it determines whether the prevailing winds sweep along the whole length of the lake, or whether they merely blow across it. The effect of winds on a lake will be discussed in considerable detail later, but it may be stated that winds are of great importance in determining the temperature distribution, for they are the means of mixing the waters at the surface, which have been heated or cooled, with the deeper layers of water, thus helping to make temperature changes felt to a greater depth than would be possible by conduction or radiation. If the prevailing winds blow along the length of the lake they have a much greater mixing effect than if they merely blow across it.

(5) **Effect of Surroundings.**—It is at once evident that the natural surroundings of a lake are very important. If the lake is surrounded by high hills, as is the case with many of our Scottish lakes, the prevailing winds will nearly always be deflected to blow along the lake, thus exercising a greater mixing effect than if they blew across it or at an angle. Again, one lake may be greatly sheltered from winds by surrounding hills and woods, while another, similar as regards size and shape, may be exposed to every wind that blows. The presence of hills also has its effect in directly cutting off sunshine from reaching the surface of the lake, and in the formation of clouds which obscure the sun.

(6) **Effect of General Shape.**—It is evident that the shape of the basin of a lake has a considerable effect in determining its temperature conditions. The effect of the wind is different in deep and shallow lakes, as already indicated. Lakes with shelving shores also behave differently in some respects from lakes whose shores are steep. Narrow lakes in confined glens cannot be compared with broad and open sheets of water.

These and many other points will be dealt with later, but I may state here that I have been criticised for generalising from a lake such as Loch Ness, which is deep and narrow compared with other lakes. The criticism is fair, but it only shows the necessity for complete observations in lakes of all kinds. Forel insists that each lake has its own individuality, and that only by a careful and complete study of each lake can we approach the truth. Complete observations in a great number of lakes are not available, but it seems improbable that the temperature conditions observed in Lochs Ness and Garry should not have their counterpart in all lakes.

#### METHODS BY WHICH A LAKE GAINS OR LOSES HEAT

What are the methods by which a lake can gain or lose heat? Some methods may be mentioned merely to be set aside as being too