

channels at various points with accumulations of stone and other *débris*. The overfull brooks discharging into the larger tributaries raise the waters of the rivers into mighty torrents that sweep seaward, often causing disastrous floods in the lower valleys. Almost as quickly as they rise, the rivers fall again, and, should a prolonged period of dry weather follow, they will shrink away into their deeper channels, leaving the side shoals exposed as mud-flats. The brooks become dry beds, no longer fed through springs nursed by the bountiful supply of a forest region."

In similar terms, Marsh, in his classical work "Man and Nature," describing the destructive effects of deforestation on the land, says:—

"The soil is bared of its covering leaves, broken and loosened by the plough, deprived of the fibrous rootlets that held it together, dried and pulverised by sun and wind, and at last exhausted by new combinations. The face of the earth is no longer a sponge, but a dust-heap, and the floods which the waters of the sky pour over it hurry swiftly along the slopes, carrying in suspension vast quantities of earthy particles, which increase the absorbing power and mechanical force of the current, and, augmented by the sand and gravel of falling banks, fill the beds of the streams, divert them into new channels, and obstruct their outlets. From these causes there is a constant degradation of the uplands, and a consequent elevation of the beds of watercourses and of lakes by the deposition of the mineral and vegetable matter carried down by the waters. The channels of great rivers become unnavigable, their estuaries are choked up, and harbours which once sheltered great navies are shoaled by dangerous sandbars. The washing of the soil from the mountains leaves bare ridges of sterile rock, and the rich organic mould which covered them, now swept down into the damp, low grounds, promotes a luxuriance of aquatic vegetation that breeds fever and more insidious forms of mortal disease, and thus the earth is rendered no longer fit for the habitation of man."

In applying these general principles to the case of our own country, I need not enter into the debatable question whether forests increase the rainfall; I do not even need to insist that they exercise a mitigating effect upon extremes of climate: I am content to rest the case against deforestation, in the crude and reckless form that it has taken in New Zealand, chiefly upon the consequences of erosion with its contingent evil of floods, and, as a subordinate though important aspect of the question, upon the coming timber-famine.

First, as to erosion: For a general description of this degradation of the surface of the country let us again turn to Marsh, and contemplate "the transformation of forest-crowned hills, luxuriant pasture-grounds, and abundant cornfields and vineyards well watered by springs and fertilising rivulets, to bald mountain-ridges, rocky declivities, and steep earth-banks furrowed by deep ravines with beds now dry, now filled by torrents of fluid mud and gravel, hurrying down to spread themselves over the plain, and dooming to everlasting bareness the once productive fields. In traversing such scenes," adds this distinguished observer, "it is difficult to resist the impression that Nature pronounced the curse of perpetual sterility and desolation upon these sublime but fearful wastes, difficult to believe that they once were, and but for the folly of man might still be, blessed with all the natural advantages which Providence has bestowed upon the most favoured climes."

Possibly this picture may seem imaginative; but it is, on the contrary, painfully realistic, and is based upon careful observation of what has actually occurred in many other countries, notably in France, Spain, Asia Minor, and China. As it is impossible to separate the effects of floods from the other consequences of erosion, I submit a little evidence bearing on the damage and injury produced by these means working in conjunction:—

"The countless ruins of Palestine," says Mr. A. Page in a recent issue of "The World's Work," "the stony hills and deserted valleys are the result of maltreatment of the land that once flowed with milk and honey. Mesopotamia, one of the most sterile countries in the East, was once a forested and fertile land, and the Euphrates River is now swallowed up in the desert. Greece shows a similar decadence. Sicily, which when covered with forests was the granary of Rome, is now entirely deforested, and even when undisturbed by earthquakes is a poor agricultural country. There are parts of Denmark, Bohemia, Hungary, and Austria which in modern times have become valueless through deforestation. The Chinese have ruined great parts of their empire by destroying their forests, and they are fast becoming waste places in which no man can live."

"China," writes Mr. Emerson Hough, dealing with "The Slaughter of the Trees" in *Everybody's Magazine* (May, 1908), "is the best instance of a land that never cared for forestry. She builds houses now of little poles, uses for fuel saplings, shrubs, herbage. Her children literally comb the hillsides for bits of roots and shrubs for fuel and fodder. The land is bared to the bone. It is a land of floods. Villages are swept away, hard-tilled fields ruined, starvation always stalks in China. Alternate floods and water-famines follow the waste of forests." And in this unfortunate country the work of destruction is still going on. Within the last century hundreds of square miles of country have been converted into a treeless, waterless waste; and what has been the result? The Hwang-Ho and the other great rivers of China are periodically flooded, and millions of lives are sacrificed simply because the forests in northern China have been cut down and never replaced. "They cut off the trees, then the shrubs, then the grass, until not a single living thing remained on the mountain-sides. The rain washed the soil from the rocks. With infinite patience every year they build terraces wherever they can to save a little of the soil for agriculture. The once fertile valley-lands are covered with gravel and rocks, the *débris* of floods. The territory that once was fertile is now bare; its flourishing cities are falling into decay; the land is becoming uninhabitable." (*Vide* photograph opposite page 92.)

Even in the highly civilised countries of Europe the losses thus inflicted by deforestation are admitted to be disastrous and almost irreparable. During 1875 the loss of property in the south of France through floods caused by deforestation was estimated by the State at £3,000,000, and, in addition, at least three thousand people lost their lives. "The indirect results," says Captain