

It may be contended that treatment of several important facets is brief to the point of superficiality, but it must be remembered that the publication is aimed at the layman, not the professional. A more valid criticism is that it is so close to being technical in wording that few laymen will fully comprehend it, even with the help of the glossary of technical terms, unless they already have considerable knowledge of the forestry scene.

Those who persevere, however, will gain a balanced perspective of the overall picture which will enable them to give intelligent support to the aims of forestry in our developing national economy. If this result is achieved, the editor and his collaborators will have good grounds for satisfaction with their work.

However, no professional forester in New Zealand should neglect to read the book, merely on the grounds that it is aimed at the general public. As an up-to-date summary of the present position, it may well serve as a basis for a weighing of successes and failures, and a re-thinking of objectives. If we think the professional image it projects is inadequate, it is for us to remedy the deficiencies.

F.E.H.

VEGETATION AND HYDROLOGY by H. L. Penman, 1963. Tech. Commun. No. 53, Comm. Bur. of Soils, Harpenden. 124 pp. Price £1.

This work, which appeared in 1963, comes as a breath of fresh air in a field of investigation in which bias and circumstantial evidence have for too long held sway. Its virtue lies in the fact that the author is no man with a mission, but a physicist, whose association with agriculture has led him to enquire more deeply into the problems of water use by vegetation.

The book can be divided into two parts. In the first part, which contains the first six chapters, the author covers the fields of vegetation and rain, interception, infiltration runoff and erosion, evaporation, transpiration and evapotranspiration, water use, and evaporation at and between extremes of water supply. The use of theoretical meteorological arguments is kept to a minimum consistent with a clear understanding of the factors causing these phenomena, and much emphasis is placed on the presentation of factual material gleaned from a large number of experiments covering an impressive number of crops from a wide geographic range.

In the second part, and seventh chapter of the book, the author goes on to review, country by country, the various experiments which have been carried out on catchment areas since the initial experiments in the Emmmental in Switzerland in 1903. By his critical approach to much of this work, Penman helps put many of the findings in perspective. Findings are seldom accepted at face value—the adequacy of a raingauge network may be questioned, or the comparability of paired catchments queried. The effect of this is to encourage a more critical approach on the part of the reader, and to indicate that results are seldom as clear-cut as they seem.

In the preface, Penman suggests that in the coverage of the literature, on which he has relied heavily, he has probably missed

a lot. Whether or not this is so, all foresters with an interest in the effect of vegetation on water yield will find this an essential reference source.

J.Y.M.

ANIMAL DISPERSION IN RELATION TO SOCIAL BEHAVIOUR,
by V. C. Wynne-Edwards. Oliver and Boyd. 653 pp., 50 tables,
11 plates.

The general theory of regulation of animal numbers which is taught throughout the world is that individuals of a population (and at the higher level, species) compete with one another in the fight which results in selection and survival of the fittest individuals. And in doing this they use as much of their surrounding resources as possible. All the machinery of population homeostasis—density dependent fecundity, survival, growth, mortality, etc.—is usually considered to act to this end. Professor Wynne-Edwards, however, is completely disenchanted with the theory and has contrived a philosophical Molotov cocktail with which to rend it asunder.

Starting with the observation that in nature starvation is almost never the *proximate* cause of lopping the numbers of a too-numerous population, he proceeds to argue this is evidence that animals cut their numbers before food shortage occurs. To do this, he suggests, the animals must behave in a way by which they voluntarily chop their numbers *before* over-population occurs, that such behaviour must by its nature involve groups of animals, and therefore that group selection (rather than individual selection) must be the basic evolutionary force.

After establishing these points, Wynne-Edwards seeks to consolidate his foothold on the reader's attention with a review (103 pages long) of the paraphernalia by which animals communicate with one another, and brings to the fore evidence of the vast amount of effort animals put into this activity. Calling, roaring, bird-song, sign-posting, swarming, communal roosting, herding, secreting substances into the environment, are considered. Throughout this review he reiterates the point that much of this activity is for display alone (epideictic), and that its purposes are to enable the population to assess its own abundance, disperse its members throughout the habitat in the best possible manner, and by the contacts provided act as a stimulus for the appropriate homeostatic response of increasing or lopping numbers.

These displays are considered to act on the society in many ways. If the signs suggest the society is understocking its environment, the population calls the juvenile, usually unsuccessful breeding "surplus" into breeding action. If there are too many, these socially inferior individuals are denied the right to breed. If after all these social devices fail and recruitment is still too high for safety, the surplus is expelled, exposed to predation, the parents intervene by killing and sometimes eating young, or subordinate individuals are so persecuted by their superiors in the society that they become stressed and die from organic disturbances. Wynne-Edwards sees in all these phenomena evidence that the animals are not just suffering the vicissitudes of the environment and getting along as well as they can, but suggests rather that they act as a