THE ENGINEER AND THE CONSERVATION OF NATURAL RESOURCES

IT has now become a truism that the history of man's achievement has been his constant effort to master the forces of Nature and the tremendous resources that are his inheritance. But in his endeavour to fulfil this aspiration, which has never been entirely realized, man has disturbed the delicate balance maintained by Nature in guarding her resources and has created the problem of conservation of these natural resources, the depletion of which is, in some quarters, a matter of growing concern. Such was the subject of the first Graham Clark Lecture, delivered to the Institution of Civil Engineers on May 4 by Sir Harold Hartley. The Lecture is given in honour of the late Graham Clark, who for many years was secretary of the Institution and who strove to promote co-operation between engineering societies both in Britain and abroad; after paying a brief tribute to him, Sir Harold turned to the main topic of his address, a subject which, while it has been dwelt upon previously in one way or another, he approached from a novel direction in stressing the importance of the engineer in contributing to the conservation of the great bounty of Nature.

The greatest resources upon which our civilization depends are soil and water, and Nature has always jealously guarded these and maintained her equilibrium therein; but man, when he appeared on the scene, upset this by the clearing of land for cultivation and dwellings, creating, as a result, problems of conserving these two most valuable resources. Irrigation and storage schemes have constituted one attempt to meet these problems, from the great systems of the ancient empires to the tremendous multi-purpose projects of to-day, embodying the storage of water for irrigation, hydroelectric power, flood control and transportation, such as the Tennessee Valley Authority Plan. Such facilities as improvements in dam and canal construction, the use of hydraulic models, geophysics and soil mechanics have aided the solution of many problems; but the inexorable forces of Nature are always at work, and man is reminded of this by the appearance of new difficulties such as the silting up of reservoirs or increasing salinity in irrigation systems by lack of sufficient water. In some areas shortage of water is a grave problem, and the future of water supplies is dependent on the wider acceptance of such techniques as the re-use of water by the treatment of sewage and effluents, or the distillation of sea water, added to which is needed a more thorough knowledge of the behaviour of ground water. Again, where land is valuable, coastal and inland erosion are being curtailed and land is being reclaimed from sea and marsh as in Holland and in the Fens in Britain. In all these efforts, the main problem is to maintain cultivation without loss of fertility in the soil, and in this regard we are gradually learning how to make use of Nature's gifts.

Sir Harold went on to remark that, next to soil and water, energy forms the greatest need of mankind; the consumption of energy per capita determines the standard of living of a country. Here the engineer's role is to increase the efficiency of combustion devices and so effect a saving of such sources of energy as coal and petroleum products,

since these provide mankind with a tremendous amount of energy; but with the advent of nuclear power man will be able to utilize these more for their chemical potentialities than before.

The conservation of raw materials and their economical use form one of the engineer's most notable contributions to-day. New methods of treating raw materials, such as the economic recovery of low-grade ores, have advanced greatly during the past two decades. In the field of structural engineering, a saving of steel has been effected by the increasing use of concrete and by new concepts of structural analysis, such as the plastic method of design, developed in the Engineering Department at Cambridge, with the advance of new structural steel forms. Improvements in the working of metals and developments in lubricants and anti-corrosives have resulted in further economies. Finally, there is the greatest economy of all, that of human labour by the use of automatic control and the possibilities of the automatic factory; here Sir Harold directed attention to the fact that, while control engineering is making great advances abroad, more recognition needs to be shown in Britain in this field.

In his closing remarks, Sir Harold drew three important conclusions: first, progress needs specialization, coupled with a wide outlook and a knowledge of other fields of endeavour, for too much specialization is dangerous. Secondly, we must work more closely with Nature in a new partnership made possible only with the great forces that she encompasses. Finally, there is in each generation a limit to what is possible, and it is imposed by the resources and skills which are available to man and which, with their uneven distribution, must be used to their best advantage with careful planning, for our convenience.

One may feel inclined to think of this Lecture as a catalogue of attainments, but it was, in fact, more than that; it was a timely warning. While man has a creditable record of achievement to look back upon, he still has to come to work more with Nature, for he cannot control her. Only then will he be able to use and enjoy the great endowment of her resources which has come to be his heritage.

E. I. HOLMGREN

TOWNS AND THEIR HINTERLANDS

SINCE its inception in 1941, the Research Maps Office of the Ministry of Town and Country Planning, now part of the Ministry of Housing and Local Government, has carried through a remarkable programme of work. In particular, it has prepared with the joint sponsorship of the Department of Health for Scotland the now extensive series of National Planning maps on the uniform scale of 1:625,000, or approximately ten miles to the inch, each in two sheets covering England, Wales and Scotland. Civil servants work in anonymity; but it is not difficult to detect the skill and care of the guiding hand of Dr. E. C. Willatts, who has been in charge of the work for most of the past fourteen

years. Many of the maps have marked new departures in cartography, and this is certainly true of the latest addition to the series depicting towns and their hinterlands*. It is obvious that every market town exercises a considerable influence on the surrounding countryside, but this 'hinterland' is difficult to define and to delimit. It has little or no connexion with administrative units, and yet is obviously of great importance in planning the social services to be provided by the urban centre as well as of no little interest in the organization of retail trade and services.

The criterion here adopted owes much to the pioneer studies of F. H. W. Green, and is that of bus services. A town or village is defined as a centre if it has operating from it at least one bus service which serves no place larger than itself. The centres with populations over three thousand (using the 1951 Census) are represented by an orange circle proportional to the population, surrounded by a green circle proportional to the population of the hinterland. Firm lines mark—perhaps with a firmness their shadowy nature does not warrant—the boundaries of the hinterlands. In general terms, the people living within a given hinterland normally visit the centre shown for shopping, entertainment, cultural and professional services.

So much of the extensive programme of town and country planning to which Britain is committed is of necessity based upon very slight factual knowledge, and such attempts as are illustrated by this map to introduce a scientific objectivity are entirely praiseworthy. Though the centres are smaller and the hinterlands are larger in the sparsely populated parts of the country, what strikes one is the relatively even spacing of the centres. In days of old when people walked to market (or the richer rode on horseback), the effective hinterland of a market town had a radius of about four miles. It still seems to be only about six miles. Over much of England the centres tend thus to be ten to twelve miles apart. It is more in Wales and Scotland.

L. DUDLEY STAMP

* Local Accessibility: the Hinterlands of Towns and Other Centres as determined by an Analysis of Bus Services. Sheet 1: Scotland and N. England. Sheet 2: the Remainder of England and Wales. Compiled by the Ministry of Housing and Local Government from information supplied by the Bus Operators and the Ministry of Transport and Civil Aviation. (Chessington, Surrey: Director General of the Ordnance Survey, 1955.) 5s. per sheet.

LIBRARIES OF THE DYESTUFFS DIVISION OF IMPERIAL CHEMICAL INDUSTRIES, LTD.

NEW BUILDING AT BLACKLEY

THE new library building of the Dyestuffs Division, Imperial Chemical Industries, Ltd., was opened at Blackley, Manchester 9, on June 27 by Mr. Clifford Paine, development director of Imperial Chemical Industries, Ltd., and until recently chairman of the Division. Mr. Paine said that a first-class scientific library is the core of a research organization and expressed the hope that the new building will provide the conditions which will stimulate creative work in the minds of those who are expected to make the discoveries of to-morrow. Although the value of library and related services has long been recognized in the Dyestuffs Division, it is only with its

removal in May 1955 to the present building that the Main Library of the Division has been housed in premises worthy of its holdings and the services provided. The Divisional libraries hold a total of nearly forty thousand bound volumes (of which about half are periodicals), together with about twenty thousand pamphlets and miscellaneous publications, some fifteen hundred bound volumes of patent specifications and several hundred unbound specifications. About half the total collection is housed at Hexagon House, Blackley, where the collection in organic chemistry and related subjects is probably one of the finest in Great Britain. More than a thousand current periodicals are taken, and about half of these are bound.

The present library collection goes back to the days before the formation of Imperial Chemical Industries, Ltd., the nucleus being provided by the libraries maintained by Levinstein, Ltd., of Blackley, and British Dyes, Ltd., of Huddersfield; the bulk of the latter forms the nucleus of the branch library now maintained at Huddersfield, just as that of Scottish Dyes, Ltd., later formed the nucleus of the Works Library at Grangemouth, Stirlingshire. In 1925 the Levinstein collection was moved into the block of buildings which now houses the administrative offices of the Dyestuffs Division, being transferred in 1932 to a new wing specially designed to be permanent quarters. This was evacuated on the outbreak of war in 1939 and, after two years in makeshift premises in a local school, the Library was moved into a temporary single-story building adjacent to the Research Department of the Division. The library organization includes a Records and Reports Section which is responsible for the care of most of the Dyestuffs Division's permanent technical and commercial records and reports, of which about a hundred and fifty thousand different documents are at present filed; a Technical Section, which collects and indexes technical data of various kinds; and a Commercial Library, not housed in the new block, but situated adjacent to the Sales Departments in Hexagon House, which also collects commercial data.

The new library building, which connects two existing research blocks, has four main floors and a top floor that is occupied by a lecture theatre seating 156, most of the seats being provided with writing flaps. Of the total floor area of 17,000 sq. ft., 2,500 sq. ft. is occupied by the lecture theatre and ancillary rooms, 3,000 sq. ft. by the ventilating plant, corridors, lift, etc., and 2,000 sq. ft. by the basement store. The Main, Technical and Patents Libraries and library offices occupy 5,500 sq. ft., the Records and Reports Section 1,600 sq. ft., and general administration and workshop 1,200 sq. ft. All are characterized by light and spaciousness; the Main Library, on the first floor, measuring 75 ft. by 45 ft., has good north and south lighting and seating accommodation for forty. Shelving and reading space are arranged in the form of alcoves, and shelving and furniture are in walnut, many of the individual tables provided having built-in table easels.

The Technical Library on the ground floor has about one-third the area of the Main Library, and seating accommodation for twelve. It is equipped with cream-coloured steel adjustable shelving, and tables and chairs in natural oak. Adjacent to it is a workshop equipped for repair work on books and pamphlets, cover and case making, report binding and parcelling, and a small dark room off the work-