water requirement is expressed in terms of acre inches. The results are presented in Table I.

TABLE I

Wheat sown on 13-11-1954; germination complete on 18-11-1954; crop harvested on 19-3-1954. The average yield from tanks was 860 lb./acre.

Period		Consumption of water*
II to IV week	..	1·7"
V to VII week	..	2·8"
VIII to X week	..	3·54"
XI week to harvest	..	6·80"
	Total	14·48"

* Total for the period, average of three tanks.

It can be seen from Table I that the total water need of a wheat crop irrigated at intervals only but otherwise drawing moisture from a water-table 18" below the soil surface is of the order of 15" during the entire growing season.

Fig. 1 gives the average daily loss of water from the supply reservoir. In this is also given the growth of wheat crop in the tanks. It will be seen from Fig. 1 that the loss of water from the supply reservoir is reduced when water is added to the tanks from above but it attains a steady state in about a week. The daily loss of water from the supply reservoir is about 3 litres in the beginning of December and increases uniformly to about 9·5 litres by middle of January, *i.e.*, about a week before ear-emergence (1 litre = 0·43 mm. of water). The period of maximum loss from tank corresponds with the period of maximum rate of elongation of the crop. The loss of water decreases after ear-emergence and particularly so after about 2 weeks.

These studies are being continued. The author is indebted to Dr. L. A. Ramdas and Shri S. P. Venkiteshwaran for their guidance in conducting this investigation.

1. Thornthwaite, C. W., "Report of the Committee on Transpiration and Evaporation," *Trans. Amer. Geophysical Union*, 1946, 27.

UTILIZATION OF WIND POWER IN INDIA

INDIA has considerable resources of wind energy which have not been utilized to any large extent so far With a view to developing these resources, the Council of Scientific and Industrial Research set up a Wind Power Sub-Committee in December 1952 with Dr P. Nilakantan as Convener. The Committee was charged with preliminary investigations on the available wind power in the country which could be put to practical use, and study of various important aspects of the economic utilization of wind energy.

The Wind Power Sub-Committee started work by studying in detail the available meteorological data on surface winds, a large amount of which have been collected and analysed by the India Meteorological Department. These have proved very useful in giving general indications of wind regimes. From anemograph records, velocity duration and power-duration curves have been prepared. On the basis of the velocity-power duration diagrams, it has now been possible to establish a correlation between the annual mean hourly wind velocity and the availability of power for specified speed ranges for various regions.

As the wind velocities recorded at meteorological observatories are generally lower than those prevailing in the most favourable sites in the region, the Wind Power Sub-Committee is now engaged in a programme of making more detailed surveys in order that a proper assessment of the availability of power under optimum conditions at favourable sites may be made.

The question of utilizing wind power for pumping water has been examined in some detail. As a result of preliminary surveys, the conclusion has been drawn that there are large untapped resources of wind power which could profitably be used in rural areas for such purposes as pumping water for drinking, sanitation, irrigation of small holdings, drainage, etc. Other possible uses of windmills in rural areas are for the processing of agricultural products, such as grinding corn, threshing and oil extraction.

Most regions in India have average wind velocities of less than 10 m.p.h. (16 km/hr.). Studies of windmill efficiency have indicated that economic utilization of windmills will be possible in these regions only by constructing fairly large size windmills at low cost using indigenous materials. A design project has been initiated by the Committee and a prototype windmill using wood and bamboo to a large extent has been developed and will be tested shortly. Several prototypes will be built and tested.

With regard to electricity generation through wind power the field in India is more restricted although regions in Saurashtra and Coimbatore are promising. A 6 to 8 KW wind-electric plant of German make is being obtained for experimental purposes. Large-scale use of such plants will be possible only after determining the most effective way of operating them with either batteries or auxiliary power systems.

A proposal is now under consideration by the Government of India for utilization of wind power on a large scale in accordance with a phased programme. It is contemplated to use more than 20,000 small windmills in rural areas and perhaps a few hundred medium-sized wind electric plants for electric supply, for the operation of pumping installations and for supply of electricity in out-of-the-way localities for light-houses, plantations, etc.

The Wind Power Sub-Committee is now organizing the setting up of 20 wind survey stations in various regions in the country and expects to operate a few more pilot installations including the low cost type developed by the Committee and the 6 to 8 KW wind electric plant.

In all work relating to wind velocity surveys, the Wind Power Sub-Committee is being assisted by the India Meteorological Department.

STUDIES ON RADIATION PROBLEMS

THE radiation dangers involved in working in atomic plants, or in laboratories and other institutions where radio-isotopes are used, were discussed at a recent meeting of scientists and medical men called by the World Health Organization in Geneva. The group recommended that standards laid down by the International Commission on Radiological Units should be used as widely as possible and that radio-isotopes should be handled only by technically qualified persons.

A second problem examined was that of training personnel in methods of protection. Besides the training of "health physicists" specializing in radiological protection, the experts recommended a more general instruction for other professional groups such as sanitary engineers, public health administrators, ecologists and reactor engineers. The need for doctors trained in the medical use of radioactivity and in radiation protection was particularly stressed. The group recommended that instruction in these subjects be included in the curricula of medical schools.

Lastly it was emphasized that radiation hazards were likely to become a public health problem for entire continents. The possible pollution of rivers crossing several countries was particularly mentioned in this connection. It was urged that WHO should encourage the creation by competent bodies of international disposal areas where highly radioactive materials could be safely put away.—UNESCO.

LADY TATA MEMORIAL TRUST SCHOLARSHIPS AND GRANTS FOR THE YEAR 1956-57

THE Trustees of the Lady Tata Memorial Trust have announced the following awards of Scholarships and grants for the year 1956-57.

The International awards of varying amounts (totalling £ 6,962) for research in diseases of the blood with special reference to Leucaemias are made to Doctors J. F. Kieler (Denmark), J. Ringsted (Denmark), J. Rygaard (Denmark), J. Nordmann (France), M. Seligmann (France), Professor H. Teir (Finland), Doctors C. G. V. Wasastjerna (Finland), G. Marinone (Italy), M. Simensen (Copenhagen), B. G. Thorell (Sweden), A. J. Therkelsen (Denmark), Alice Stewart (England), and Dr. A. Sreenivasan (Bombay).

Indian Scholarships of Rs. 250 per month each for one year for scientific investigations having a bearing on the alleviation of human suffering from disease are awarded to Dr. Prem Nath Satsangi (Lucknow), Dr. Mahendra Kumar Trambaklal Mehta (Patna), Dr. Gangadhar Vyankatesh Bhide (Bombay), Mr. Umakant Waman Kenkare (Bombay), Dr. Hargobind Jashanmal Mulchandani (New Delhi), Dr. Ram Krishna Arya (Lucknow), and Miss P. Parvathi (Calcutta).