

SOIL MAPS AND THEIR PRACTICAL USE

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Cartography as a science has a history of almost 6.000 years. It has developed parallelly with the technical sciences and thus it has been, is, and always will be closely connected with discoveries. The basis of cartography is provided by geodesic works. The old geodesic works — and here we mean works of the last two centuries — were almost entirely limited to military geodesic research. Unbroken, exhaustive literature of this research is nowhere to be found. The history of geodesic research can be reconstructéd only on the basis of periodic publications as well as documents of the supreme war councils, staffs and certain court authorities. This is true for geodesic work both in this country and abroad.

Surveying the collected data and the reports based on practical experience, we can see that the geodesic work done in the Carpathian Basin satisfied all requirements within the boundaries of the Austro-Hungarian Monarchy already from the year 1760 on was gradually perfected with the advance of the technical sciences. The progress was appreciated neighbouring countries and in the whole world by competent experts. Our own experts created the firm foundation upon which not only the past and present geodesic work is built, but also the topography of the future can be based. Space ships and artificial satellites are now contributing greatly to the advancement of cartography, while the first base line measurements and triangulations provided the basis for its earlier development. Before dealing with the practical use of soil maps, it is necessary to discuss the classification of planimetric maps of the earth. As to the method of their preparation, they may be survey maps, site plans, or topographic maps. From the point of view of copying, they may be cartographic or construction maps.

As regards their use, they may be maps serving scientific, instruction, and state administrative purposes.

According to the method of representation, they may be geodesic, military, or geographic maps. We do not undertake classification of relief maps.

For practical use of soil maps, acquaintance with scientific and geodesic maps is necessary.

A map may be provided either with a graphic or a numeric scale. In the case of the latter, the greater the value of the quotient expressing the ratio, the larger is the scale of the map. It follows from this that there are maps of large, and maps of small scale. (Site maps are made on 1:2.000 to 1:5.000 or even larger scale, while maps

serving scientific purposes are of smaller scale, e.g. 1:50,000 to 1,000,000 or smaller. The ratio of the two numbers shows how many cm correspond in reality to 1 cm on the map. The map records the data measured in the field, according to given rules and points of view.

Depending on their purpose, soil maps may be of large scale or of small scale, or to use professional terminology, they may be either survey maps or thematic maps. Those of large scale show smaller areas in detail and are used to help solve problems of soil amelioration, irrigation, fertilization and plant cultivation, while maps of the other kind show the soil types of the country, Europe, or a part of a continent.

Thus small-scale soil maps are suitable to show the dominant kinds of soil in larger areas. On such maps only those kinds of soil are shown which spread over wide areas.

Soil maps generally serve agricultural production directly or indirectly, because characterization of the soil has for its aim to determine which types are most suitable for which kind of agricultural production.

Agricultural or soil maps of our country have been made on the scales mentioned. The soil map of 1/200,000 divides the area of the country into 35 soil regions. The latter represent also units of agricultural practice based on natural science. The region boundaries always enclose those areas in which identical agrotechnics have to be used and identical conditions have to be reckoned with when crop rotations with grass or other plants are introduced. Of course the same fertilization system can be used on similar kinds of soil, and the method of soil amelioration is also determined by the region boundaries. Maps on 1:75,000 and 1:50,000 scales have also been made for the purposes of regional production: they show what kinds of plants can be cultivated in the various large regions of the country and what results can be expected. In the interests of successful cultivation, they include also some agrotechnical advice (1).

Kreybig's soil maps of 1:25,000 scale put in the foreground the soil properties as well as the chemical, physical, and biological conditions that play a role in cultivation. It is these maps that have given us a clear picture of the distribution of the various kinds of soil in the territory of our country.

By reconstruction, or rather further development, of the newest Keybig-type soil maps, special soil maps on similar or larger scales have been made for practical needs. The map sheets describe the soil properties from the point of view of plant cultivation and agrotechnics. These maps provide a scientific basis for the organization of suitable agricultural production units. These maps are made so as to cover areas within the limits of villages or agricultural cooperatives, and they are available for those concerned.

The chief purpose of these maps is to show in detail the local resources and possibilities in a given area on the basis of complex scientific investigation of the factors influencing agriculture, and thus to give guidance to the selection of the most suitable lines of production. In the course of the preparation of these maps, the villages are regarded as the smallest producing units. This is necessary partly because there are no reliable production, population, economic, or other data concerning relatively stable areas smaller than these, partly because in the course of time they developed practically uniform lines of production. For the above-mentioned reasons, the factors influencing production cannot be investigated either in their development or in their correlations in smaller units. Besides this, the villages can have — and indeed

in most cases do have — regional characteristics too. Utilization of the results in practice can best be ensured by data processing, using the degree of detail necessary in the case of villages. Our cooperatives functioned first within the limits of villages; now they generally function in the area of several villages and lend assistance to large-scale cooperative farming.

Investigation of the factors influencing agricultural production on the level of detail suitable for villages or cooperatives is not limited to the present conditions, but considers also the development history of production. Thus the development of production between 1931 and 1940, and from 1952 up to now is also investigated.

The development of agricultural production depends on the interaction of several factors not only in every single cooperative, but also in every single area unit therefore soil maps are prepared on the basis of investigation of all of the factors separately and also in their interaction.

Accordingly, cartographic work involves detailed analysis of the natural and economic factors, investigation of the historical development, and current conditions of agricultural production, as well as investigation of the lines and proportions of it from the point of view of farming cooperatives and economics.

As is well-known, agricultural production is in essence yearly purposeful repetition of the biological processes of nature resulting from human activity in order to produce agricultural raw materials, to satisfy the needs of the population. In many cases its task includes satisfaction of foreign needs, too.

The basis of agricultural production is plant cultivation, which with its products serves partly the satisfaction of human needs, partly the supply of food for animals. Vegetal life depends basically on the interaction of the natural factors. With his present knowledge man cannot change fundamentally the totality of the natural factors, although he can influence them to some extent according to this purpose. He can modify them and even create them on a smaller scale. It follows from the above that in the case of plant cultivation we have to conform to the general conditions determined by the natural factors. This is why for determination of the possibilities of agricultural production the geographic location, the relief, the soil, and the climatic and hydrologic conditions of the area to be mapped have to be investigated.

Within the framework of this activity a soil map must be constructed which makes detailed investigation of the soil possible for the purpose of production. Thus the map provides the specialist having average training with an aid which gives him all the information he needs concerning the soil in the course of agricultural production.

The possibilities of the use of the newest maps are very wide: they can be used for demarcation of the areas of soils with different physical and chemical properties and for compilation of a soil register according to soil properties, which is helpful not only in practical production and agrotechnics, but also in the distribution of the power and work machines of the large cooperative farms for plant cultivation, soil amelioration, distribution of artificial fertilizers, and the solution of a number of practical problems.

After we have acquainted ourselves with the properties of the soils, various elements of weather, such as rainfall, temperature, sunshine hours, and atmospheric vapour content, are worked up for each village and economic region. The weather elements of larger areas are given to the economic experts in interpolated form on according to many years' average on the basis of the data gathered by the station

network of the National Meteorological Institute. Besides these the combination of the average, variation square, slant, flatness, and range of the various weather elements may often feature in weekly, monthly or yearly surveys. The extreme values of the individual weather elements are also often indicated.

The hydrological conditions of the farming units — especially in the case of larger areas — are worked up in separate hydrographic maps which show the natural water-courses, the areas threatened by floods, as well as the areas threatened by accumulations of stagnant water, the possibilities of their drainage or control, existing irrigation systems, and the possibilities of their extension.

If the terrain of the area under investigation makes it necessary, separate maps are prepared of the eroded and deflated parts. This is the case where hilly and sandy areas are concerned.

After on-by-one and complex investigation of the natural factors, the current production conditions of the areas examined are analyzed in detail for the divisions of the area according to branches of cultivation, the structure and yields of plant cultivation, fruit-growing, meadow and pasture farming.

When we examine the problems of land use, we discuss separately the possibilities or potential optimality of live — stock raising in connection with the structure of fodder production. Analysis of livestock raising is done on the basis of the density of the whole livestock and the density of the kinds of animals in the area as well as on the basis of the yields.

In the supplement of the maps, the connection of plant cultivation and livestock raising with land use policy is discussed.

Crop yields depend not only on natural factors and the know-how of the cooperative population, but also on economic factors. For this reason the conditions of land-owning — the number and size of farms, distribution of the population and the structure of the settlements are discussed in detail. Besides this, the workforce, especially the labour power resource of the area, is studied in detail.

In the course of construction of the map of the area, attention is given to the economic problems of transport, selling, and working up of agricultural products.

Besides the factors influencing agricultural production directly, the production costs of the different products are also analyzed. At the same time it must be examined how the moving prices of the various products change. In the yearly balance, the factor of profitability is very important. This means that only such crops should be grown as are sure to bring profit when sold.

Soil maps are constructed on the basis of the principles and points of view mentioned above. At the same time, land use maps are made, which show what kinds of plants can be grown in which areas. They show in detail the productive and economic relationships between plant cultivation and livestock raising, taking bread grain, fodder, soil, and manpower into consideration. Keeping current needs in view, these land use maps point out among possible lines of production such favourable lines as are capable of ensuring not only smoothly developing production of the cooperatives, but also maximal crop yields.

Besides soil, land use, erosion, etc. maps, the supplement contains descriptions of the conditions of cultivation in each area of each region, a critical description of the method of cultivation, and the proposed lines of production. These maps are of immediate usefulness to the experts in their efforts to develop the lands, fields, and crop rotations of the farms incorporated into the cooperatives, in the selection

of the main asset of the cooperative farms in a given area, and in working out their annual and long-term plans.

These maps covering the whole territory of the country were ready by the end of 1962. It must be noted, however, that their completion is going on continuously, depending on which area requires it and for what purpose (2).

Besides the types of map mentioned, another kind of special map is also used in practical agriculture: the soil map of the cooperative farm. This type developed parallelly with the development of the cooperative movement. It can be considered the forerunner of the practical soil science and land use maps. Therefore their purpose is also similar, but the soil map of the cooperative farm contains much fewer principles and practical hints than the regional or areal maps in current use.

The aim of the soil maps of cooperatives is to show the soil properties that play a role either in large-scale plant cultivation or in horticulture, viticulture, fruit farming, silviculture, meadowland and pasture farming.

Their aim is, in other words, to give guidance for choosing the suitable kinds of plants, creation of meadow strips and shelter belts, efficient fertilization, use of stable dung and artificial fertilizers, soil amelioration with artificial materials, soil cultivation or tilling, utilization of pastures and meadows, and irrigation (2).

Agricultural maps must not be overcrowded or else they will not be clear enough. Therefore only the most important and most characteristic features are represented in the maps; any other information absolutely necessary for the management of production is usually given in the supplementary notes added to the map sheets.

From the above it can be seen that the making of soil maps constitutes first of all the scientific and practical basis of increased agricultural production in socialist planned economy.

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