NATURAL RESOURCES IN THE ECONOMIC DEVELOPMENT OF THE SOUTH HUNGARIAN PLAIN

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The planning and economic district of the South Hungarian Plain comprises one-fifth of the area of Hungary, and contains *18* per cent of its population. It is one of those regions in the country where the economic structure — inherited from the earlier system — is at present undergoing a transformation, and where the population is redistributing itself.

The industrial profiles, which have developed (to the greatest extent) in the South Hungarian Plain as an economic district (as regards its internal unity) are those, which depend on an agricultural raw material basis: preserving, meat, sugar, milling and textile industries. Development is currently under way in the hydrocarbon industry and in those agricultural production trends controlled by irrigation and thermal energy: grape, fruit, wheat, maize, industrial plant and vegetable production, and animal breeding.

A large contribution is being made to the transformation of the industrial structure by the free labour force, released by the mechanization of agriculture, while a contribution is also made by the economic exploitation of the natural resources. (Fig. 1.)

A significant role in the structural transformation of industry is played by the heavy industry, which is based on hydrocarbon mining. It is well known, that hydrocarbon mining on the South Hungarian Plain is a relatively young branch of industry, but it promises energy reserves of considerable magnitude. At present, this district gives more than 40 per cent of the natural gas production, and 60 per cent of the mineral oil production of the country.

The hydrocarbon mining is greatly promoted by the favourable geological characteristics. The wide variety of the geological structure of the South Hungarian Plain developed in the course of long geological ages, and this geological variety makes the area a relatively rich one. It is well known that the part-basins, with crystalline bed-rock at the different depths possess rich mineral oil and natural gas reserves, and also hot-water and medicinal-water springs with various mineral compositions. (Fig. 2—3.) It is to be expected that the ever more intensive and wideranging researches will result in the Hungarian Plain becoming of increasingly greater economic and social importance from a number of aspects.

If we examine the geology of the South Hungarian Plain, it can be stated that it is not differentiated from its environment either in structure or in form.

At a depth of about 1500—3000 m, the base is comprised of block elevations, originating from the Palaeozoic and Mesozoic; thus, one can find Palaeozoic crystalline rocks, mainly gneisses and slates (clay, mica), and also Mesozoic rocks,

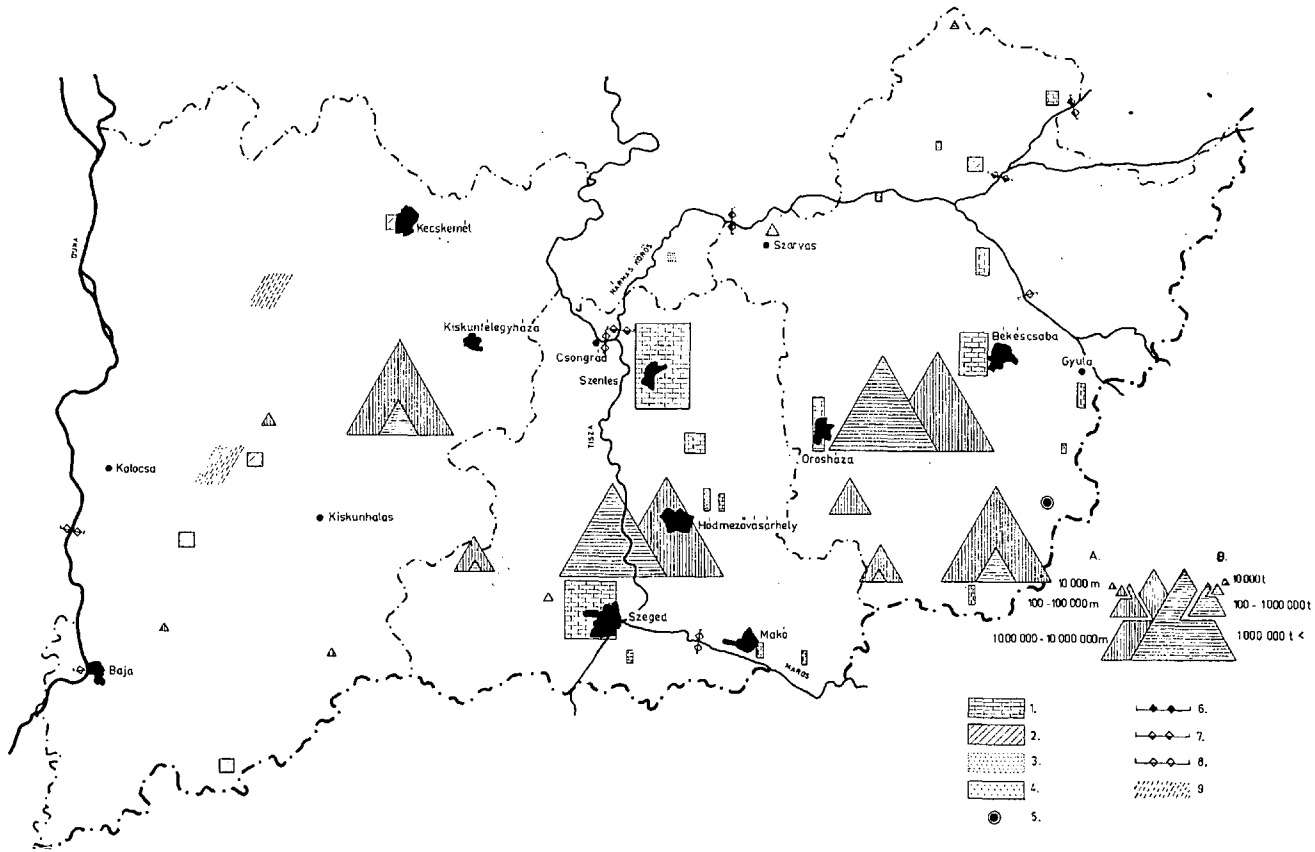

Fig. 1. Mineral stockpile of raw materials and primary energy sources. (On the basis of the atlas of South Plain Lowland.)

I. Exploitable stockpile of natural gas.
II. Exploitable stockpile of crude oil.
1. Important brick-works.
2. Working and not-working brick-works.
3. Working and not-working brick-works without calculating stockpile.
4. Fine ceramic raw material.
5. Important sand mining.
6. Existing hydroelectric power plant and river barrage.
7. Hydroelectric power plant and barrage to be established later on.
8. Hydroelectric power plant and barrage to be established later on.

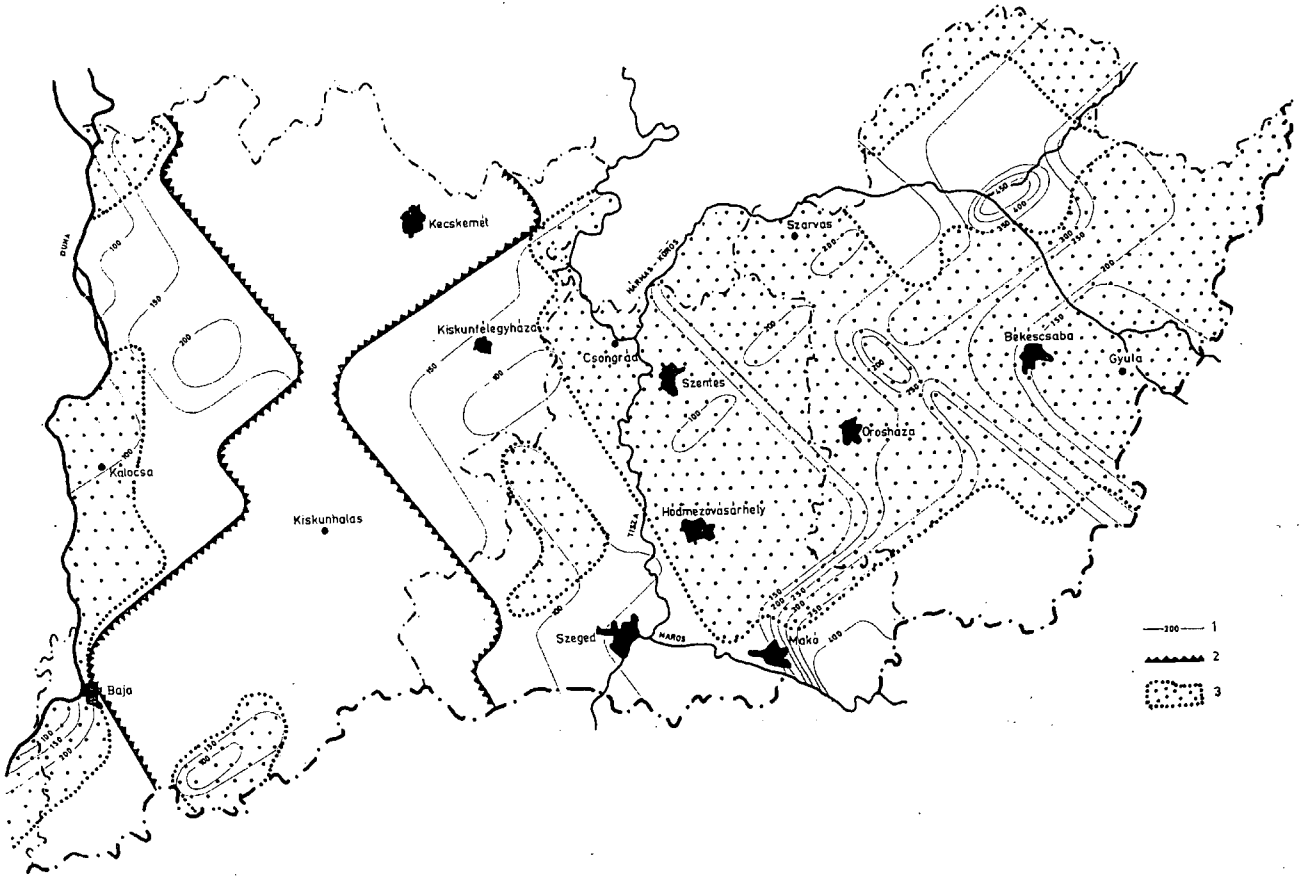

Fig. 2. Hydrostatic and under hydrostatic layer pressure and gaseous area (on the basis of the atlas of South Lowland.

1. Agnefer resulting in ground water.
2. Area having under hydrostatic layer pressure.
3. Gaseous area.

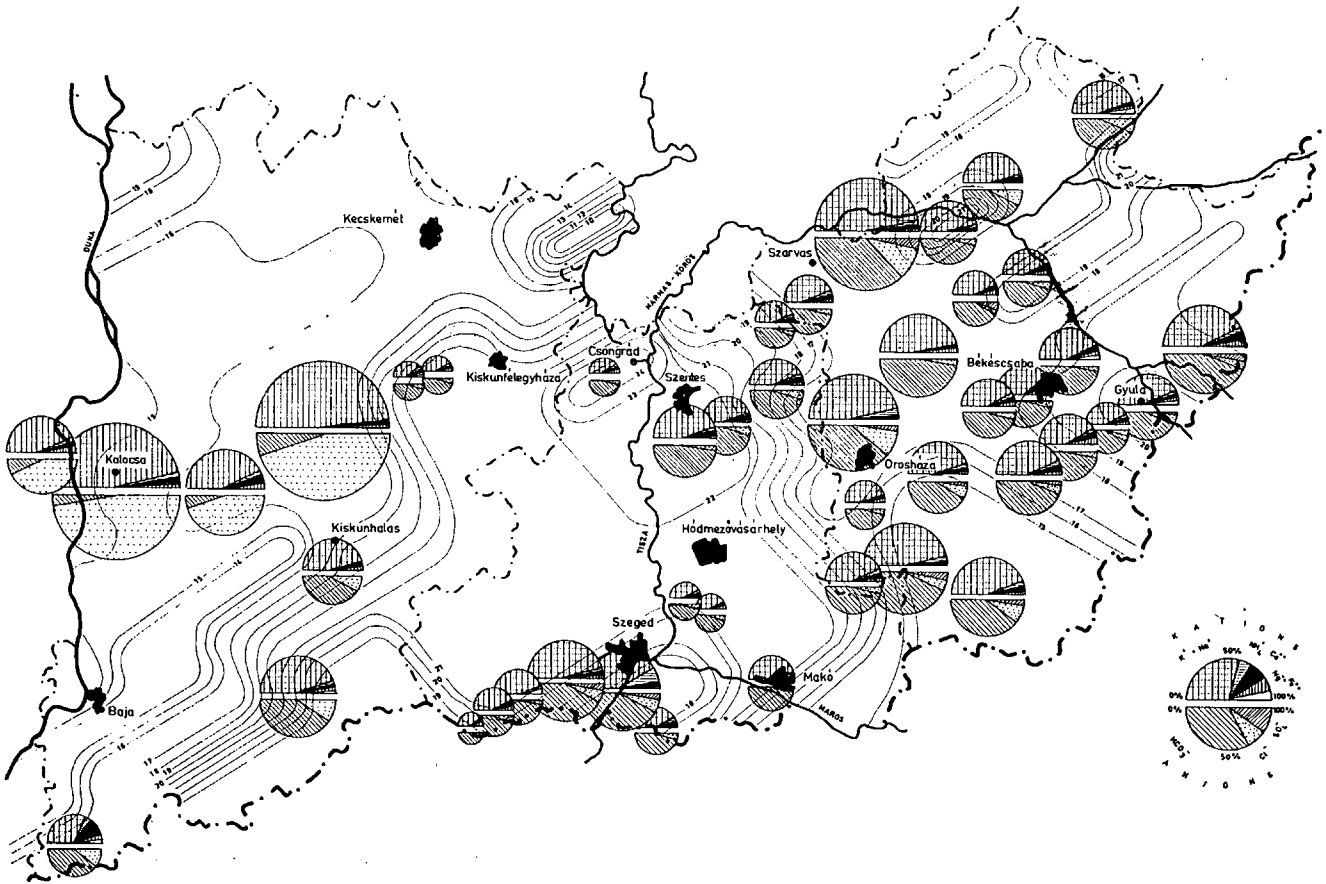

Fig. 3. Geometric gradient and its thermal chemical characteristics. (On the basis of the atlas of the South Lowland.)

for the most part dolomite, limestone, clay and marl. These mineral raw materials mean prospectively useful reserves for the economic development of the country.

The Palaeozoic and Mesozoic basal elevation, explored at the bottom of the basin consists of strongly broken-up series of blocks, among which are strata of smaller basin parts and deep trenches, Deep drillings indicate that the greater part of the Hungarian Plain was dry land in the Eocene, Oligocene and Lower Miocene, but subsidence had then already begun in the mountain zone surrounding the Hungarian Plain, at the edges of the current basin. Subsidence of the whole of the Hungarian Plain began in the Middle Miocene, but became intensive in the Pannonian stage. In the middle of the Pliocene the Pannonian Sea progressively contracted with the elevation of the basin edges.

Subsidence of the South Hungarian Plain continued even after the filling-up of the Pannonian Sea. Up to the present day a deposit several hundred metres in thickness has formed on the Pannonian layers in the unevenly subsiding part basins. The Pannonian formation and the alluvial deposit above it made possible not only the hydrocarbon mining in this region, but also the production of clay, gravel and sand.

As in the country in general, here too the occurrence of brick-clay is the most widespread in the youngest formations, and this is exploited in 17 settlements. However, considerable peat production is also carried on in the region of Kecel. The South Hungarian Plain possesses two gravel fields as well, one at Szalkszentmárton beside the Danube, and the other at Lőkösháza beside the Maros.

To summarize, the importance of the South Hungarian Plains as regards its minerals is given by its natural gas and mineral oil reserves, which are rich even on a national standard. However, the geological characteristics offer further possibilities of as yet undiscovered mineral reserves. These will depend on the development of deep-research equipment.

Another important basis of the natural resources is the arable agricultural land. This feature differs from county to county as regards the nature of the soil, and hence the structure of the agricultural production also exhibits differences. For instance, in the county of Békés ploughland plant production and animal breeding predominate, whereas in the counties of Bács-Kiskun and Csongrád grape and fruit growing and beef-fattening are the more important trends.

The nature of the arable soil has an effect on the profitability of the large farms. In both, its overall volume and its details (plant and animal products), the agricultural raw metarial production of this district is of national importance. Cereals, vegetables and fruit, including the special and varied products of the area (potatoes, paprika, onions, peaches), comprise the bulk of the foodstuffs production of the district. However, there are also considerable areas where the soil properties are unfavourable (sodic, sand, acidic), these making up nearly 50% of the total sodic areas in the country.

On the basis of the different soil properties, the district can be divided into part-areas:

a) A flat district of Great Hungarian Plain loess tables, where there is chernozem soil of excellent productivity, requiring moderately controlled cultivation, mainly liming.

b) The undulating duny area of sand ridges between the Danube and the Tisza.

This has sandy soil which is easy to cultivate, has a low humus content, retains water poorly, and gives a lower productivity than average.

c) The area of the Bácska loess ridge, which is generally flat but has sporadic, highly undulating surfaces. This has moderately bound chernozem soil of excellent productivity, with a rich humus content and a good water household.

d) The plain of the Lower Tisza valley. Its meadow inundation soil is moderately bound, has a good water household, and displays excellent productivity.

e) The plain of the Sárrét—Körös region. This has meadow clay soil with a moderytely deep groundwater level; it is difficult to cultivate, has high lime-requirements, and yields only a moderate productivity. The clay levels formed here preserve the old picture of the Hungarian Plain.

The district is rich in natural waters, the largest rivers of the country, the Danube, Tisza, Maros and Körös, flowing through it or affecting it. From the aspect of industrial settlements, these rivers possess considerable water reserves. There is a particularly high potential possibility along the Danube, but a much smaller one in the Tisza and in the Double and Triple Körös systems.

By far the greater part of the district lies in the catchment area of the Tisza. The water flows into the Danube only from the surface of the narrow western band along the Danube. The main river of the district is the Tisza, with its extremely low gradient, which meanders in its bed and flood-area protected in a number of places by wide embankments. Its highwater level rises as a result of intervention on both its Hungarian and its foreign catchment areas. The ratio of its greatest and lowest water yields at Szeged is 49:1.

An outstanding role is played in the northern part of the district by the Körös water system, which feeds a very extensive irrigation network.

The Maros is the largest of the tributaries of the Tisza. Because it has a higher gradient than the Tisza, its alluvium is a coarser, sharp-grained quartz sand, which can be used as a raw material for building.

There are no appreciable natural standing waters in the district. However there are frequent dead branches (oxbow lakes), remaining since the regulation from the one-time oxbows of the rivers (the Tisza and the Körös-es), and also sodic lakes in deflation depressions.

Considerable demands are made on the surface water reserves, not only by industry, but also by agriculture. Irrigation already featured in the development programmes of the nineteenth century. In the district of the South Hungarian Plain, irrigation of the agricultural areas is necessary because of the strongly continental-type climate and the summer droughts. The Körös valley is the area in Hungary where irrigation cultivation was practised earliest.

An intensive development of the irrigation system began following the Second World War. In this district the ratio of irrigated area to total agricultural area is the highest (10 per cent) in the county of Csongrád. This is followed in sequence by the county of Békés, and then Bács-Kiskun. In the interest of the development of the irrigation system, barrages have been and are being built on the Tisza. Barrages have so far been completed at Tiszalök and Kiskőre, while the one now under construction at Csongrád, will affect this district directly.

The possibility of exploiting the subsurface water reserves is also very good, but an important problem, awaiting solution, is the regularization and utilization of the complex inland waters. About 25 per cent of the total thermal wells of the

country are to be found here, which means close to half of the thermal water yield. The degree of utilization of the thermal springs is at a very low level (excluding agricultural production). The most economic exploitation of thermal and medicinal waters is to be observed in the county of Békés.

The layers of various compositions, formed in the different geological periods, each have their own characteristic water-retaining capacities. In general, the upper layers usually give colt water; high-yield thermal wells can be bored in the deeper-lying layers, however. In this respect the South Hungarian Plain is of national importance, providing 40 per cent of the thermal water supply.

In the regional distribution of the thermal wells an outstanding position is occupied by the county of Csongrád, there one-fifth of the total number of thermal wells in the country are to be found, these yielding one-third of the total thermal water. The county of Békés has almost the same number of wells as the county of Csongrád, but they give only one-third of the thermal-water yield of the latter.

The geothermic gradient is particularly favourable in the region of Orosháza. There are frequent wells yielding water at 70—80°, and wells giving water of even higher temperature also occur (Orosháza, Békéscsaba, Szentes).

The mineral, medicinal and thermal waters of the district are used for balneological purposes, but the possibilities are far from being fully utilized. Many of the baths and lidos require modernization and expansion. Lido development is of great importance, for these constitute one of the main tourist attractions to the district.

Another of the natural resources of the South Hungarian Plain is the climate. This provides excellent possibilities for crop growing, but in addition can be classified as a medicinal climate, favourable for human health.

The entire area of the South Hungarian Plain has a warm climate where the continental effects predominate. The more northern parts have insufficient precipitation as regards the whole year, with drought-like summers; the southern and south-eastern parts have insufficient precipitation in the growing period, are moderately dry, and have hot summers. Since the area is fairly flat, its climate is relatively poor in meso- and microclimates. The local differences are primarily caused by the effects of the soil conditions on the temperature.

Over a large part of the district there are in excess of 2500 hours of sunshine annually. The annual mean temperature is 10,5—11 °C, and the annual precipitation 500—600 mm. From the aspect of agricultural production, the temperature and sunshine are favourable features, but are accompanied by the disadvantages of poor precipitation and periods of drought. The annual water-balance here is negative. The Körös region has to contend with the greatest water shortage (175 mm). The low degree of precipitation is aggravated by the poor water-households of the soils. The national economy is helping to combat the droughts with irrigation, appropriate agrotechnology, plant-breeding, and the planting of field-protecting forest strips.

This lecture has attempted to summarize the natural geographic features of the South Hungarian Plain in their main aspects.