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A SURVEY OF THE NATURAL RESOURCES OF AFRICA AND THEIR AVAILABILITY

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A SURVEY OF THE NATURAL RESOURCES OF AFRICA AND THEIR AVAILABILITY

Almost half a century ago Africa ceased to be the dark, unknown continent. Few areas have remained totally unmapped, and for certain parts of the continent quite reliable and detailed topographic sheets are available. Every year the number of scientific studies dealing with Africa increases, and today the geographic literature pertaining to the various aspects of geography of the different parts of the continent embraces thousands of publications in English, French, German, Italian, Portuguese, Spanish, and other languages. Nevertheless, our knowledge of the resources of Africa is still in its infancy, and a tremendous amount of scientific work remains to be done before this knowledge will even approach the fund of data which we have, for example, for the United States.

Among scholars there is, unfortunately, no unanimity as to what constitutes "natural resources". I like to define natural resources broadly as all those natural materials which man may be able to utilize for the satisfaction of his own needs, either directly, or after application of appropriate methods of extraction and manufacture. Basic resources of a region reside in the bedrock, in the mantle rock, and in the atmosphere. Bedrock is important for its mineral resources. Mantle rock furnishes the main material for soils. The atmosphere gives rise to varying climatic conditions, which, in turn, cause differences in natural vegetation, further differences in soils, as well as regional and local differences in the ability of the land to produce crops. These climatic differences, combined with differences in relief and altitude, also cause great variations in hydrographic conditions.

In Africa our scientific knowledge of the nature and available quantities of the natural resources is still far from complete. However, the basic facts regarding their distribution are known.

We have fairly good general information on the nature and distribution of the natural vegetation and on climatic conditions. Our knowledge of the soils of the continent, however, is still exceedingly fragmentary. We are fairly well informed on the general distribution of the major crops, but for much of Africa accurate statistical data on acreage of crops are still lacking. Data on agricultural production are even more incomplete, and for many regions the only criterion of production we have are the export figures. These, of course, are totally unsatisfactory for all products which are also consumed by the native population. Our information on actual mineral production is quite reliable, and even very accurate for gold and silver, but our information on reserves and available resources is far from complete.

In a continent such as Africa, where the natural landscape is still vastly more extensive than the man-made cultural landscape, the natural vegetation is an important aspect of resources. Grass and shrub lands are used without much modification for extensive grazing purposes. Wood is needed for fuel and shelter and for primitive forms of water transportation.

In the dry, subtropical lands of the mediterranean rim and the Cape of Good Hope area forests are of minor importance and economic value, except in the high mountains, which have a more humid climate. On the steppes of the high Algerian plateaus alfa grass is important commercially, since it is used in the manufacture of paper.

The semi-desert and desert lands of the northern Sahel, the Sahara, the Sudanese Chael, and the so-called "African Horn" have a very scanty vegetation. Wood is scarce and is used locally only for fuel and a few other purposes.

In the semi-humid to sub-humid savanna regions, and in many of the plateau regions of eastern Africa, good quality timber may often be found in the gallery forests of the floodplains. On the uplands trees sometimes occur in small clumps, and elsewhere extensive forests with many thorny trees, and trees which shed their leaves during the dry season. These forests are usually quite open, and the individual trees are often rather gnarled. Their value as timber is limited, and the wood is used mostly locally. The more valuable commercial forest stands are of limited extent, and occur primarily in the higher lands, such as in the mountains of Uganda, Kenya, and Tanganyika, on the slope lands of Ethiopia, and in parts of the Fouta Djalon of West Africa.

The main source of African timber is the enormous forest area which extends along the Upper Guinea coast from southern Sierra Leone to southeastern Nigeria, and from there across the southern part of French Equatorial Africa into the Congo basin. This area contains a tremendous amount of timber, some of very great size, and has been exploited only to a limited extent. Unfortunately, for a number of reasons commercial exploitation is difficult. One of the most important of these reasons is that pure or even semi-pure stands are extremely rare. In one square mile of forest there may be from dozens to over a hundred different species. Thus the number of each kind of commercially important species is rather small. African mahogany, Khaya or Entandrophragma, for example, may be limited to not more than 20 to 25 trees of merchantable size per square mile, and in many sections the number is even smaller. The qualities of the wood of the various species are often imperfectly known, though in recent decades great progress has been made in this respect. There is often a Babylonian confusion of names. Some trade names are used for the wood of different species which, though it

may have the same appearance, frequently has dissimilar characteristics. In other cases the same wood may be known by several names. The physical difficulties of logging are great, but can be solved with the aid of modern machinery.

The forest contains several species of fast-growing trees, some of which, such as the parasol tree, may be suitable for the manufacture of paper pulp and related products. It is entirely within the realm of possibility that in the future the humid tropics of Africa, with the advantage of an all-year growing season, may become an important area for the growing of such woods under modern methods of forestry.

From the point of view of agricultural resources a somewhat similar division of Africa can be made as has been followed for the survey of the timber resources.

Probably as much as 45 percent of Africa consists of desert and semi-desert lands. Both the present and the potential agricultural value of these are little above zero. In these regions tillage agriculture can be carried on only in small, scattered oases, and production beyond the local subsistence needs is possible only for specialized products, such as dates. The amount of irrigable land is strictly limited by the amount of available water. Though in various cases additional sources of ground water can undoubtedly be tapped with the aid of modern engineering methods, such amounts will have to be husbanded carefully, and will not alter to any extent the general picture. The only important exceptions are the Nile valley and delta, and the region at the great bend of the Niger river, where large amounts of water are available, and irrigated and irrigable areas attain considerable extent. Even here, however, expansion possibilities are limited by the cost of irrigation works, the limited extent of the areas with suitable topography for irrigation purposes, and the average amount of water available from the Nile and Niger rivers. Egypt produces a wide range of crops among which corn, wheat, cotton, millet, and legumes occupy the largest acreage, but the irrigated area along the Niger river is still in the first stages of development.

On the dry lands extensive to very extensive grazing is the major activity. The livestock consists almost entirely of sheep and goats. Because of the long summer droughts it is often necessary to seek more favorable pasture conditions in somewhat better-watered adjacent lands. In the northern Sahara, for example, flocks go northward in summer to the slope lands of the Atlas mountains, while in the southern Sahara they move into the northern Sudan. Severe recurrent droughts may from time to time cause great losses in livestock.

The area with Mediterranean climate in the north, where more favorable conditions exist for tillage agriculture, is only a narrow

zone which practically disappears along parts of the Libyan and Egyptian coasts. In Algeria it has a width of from 60 to 70 miles, widening in in northern Tunisia to about 120 miles and in Morocco to about 90 miles. Thus, from a continental point of view, this area is of minor extent. However, if Egypt be omitted, it supports the bulk of the population of North Africa, and produces appreciable quantities of the Mediterranean types of crops: fruits, wine grapes, olives, early vegetables, and grains, particularly wheat and barley. Village agriculture cannot spread much beyond this belt, as climatic limitations to the south are too severe. However, within the belt further increases in production can be made.

The South African area of Mediterranean climate is very limited in extent, but together with the more humid coastal plains to the east, from Port Elizabeth to the Mozambique border, and the highlands of Cape Province, Orange Free State, Transvaal and Southern Rhodesia, it constitutes an area of important agricultural production, which ranges from Mediterranean fruits and wheat to corn, tobacco, sugar, and animal products such as wool, hides, and skins. Much of South Africa, particularly the two Bechuanalands and western Cape Province, receive only scant rainfall, and are subject to recurrent severe droughts. This is true, to an even greater extent, of Southwest Africa, where only the high areas, above the Namib desert and the Kalahari steppe, are suitable for livestock--in the north cattle, and in the south sheep and goats.

The plateau lands of eastern Africa--parts of Northern Rhodesia, Tanganyika, Kenya, Uganda and Ethiopia--are in a category by themselves. Within this area altitudes, relief, precipitation, natural vegetation, and soils vary greatly. Because of elevation, many sections have a moderate climate and are suitable for white settlement. Such settlement can still be expanded considerably. However, several regions will have to remain closed to white settlers, partly on account of unfavorable climatic conditions, partly because of the needs of the native population. Besides, there are large regions where rainfall is so low that extensive grazing will have to remain the principal agricultural activity. A great variety of crops can be grown, from temperate crops in the highest parts of Ethiopia to subtropical and tropical crops farther down the slopes and farther south. Corn, tobacco, sisal, cotton, coffee, tea, and peanuts play a role in this area.

A great deal can still be done to raise the levels of production on the east African plateaus. It must be kept in mind, however, that infestation with tsetse still is serious, that central and south-central Tanganyika have a rainfall of less than 35 inches, which is low even for tropical highland areas, and that Kenya east of Mount Kenya and the Lake Rudolf region has even less rain and must be classed as semi-arid.

By far the most promising part of the continent from an agricultural point of view are the regions of humid tropical climate. These

lie south of a line which runs approximately from Dakar to the northern tip of Lake Rudolf, and west of a line from this lake via Lakes Albert, Edward, and Kivu to beyond the southern tip of Lake Tanganyika. They extend southward approximately to the parallel which almost bisects Angola in the latitude of the port of Lobito.

Over this huge area climatic conditions range from rainy tropical in the Guinea coast area, southern French Equatoral Africa, and much of the Belgian Congo, through semi-humid conditions in the Sudanese savanna lands and the southern savanna and dry deciduous forest zone, to the sub-humid conditions of the transition belts which lead into Sahara and Kalahari.

Density of population over much of Africa is less than 25 per square mile, but in parts of the northern savanna area, especially in Nigeria, the northern Gold Coast, and adjacent French territories, and a few areas farther west population densities attain 50 per square mile, or even over 100. These densities are a reflection of conditions which are fairly favorable to subsistence agriculture. The lack of similar population densities in the savanna belt south of the Equator may be largely due to isolation and to the fact that the stimulating cultural influences from north of the Sahara did not penetrate there.

In much of the area occupied by the tropical rainforest population densities are low, generally well below 25 per square mile. This is true for large parts of the Belgian Congo and the adjacent forest regions of French Equatorial Africa. In recent decades, however, agricultural settlement has made considerable inroads upon the rainforest in the Gold Coast, southern Nigeria, and Sierra Leone. Indiscriminate clearing of the forest, with resulting erosion and land deterioration problems, has alarmed the agricultural and forestry officials of several colonies of the Guinea coast. In some of them it has become necessary to set aside areas for permanent forest reserves. Regions of density of population exceeding 25 per square mile are found in Sierra Leone, the coastal regions of the Gold Coast, Dahomey, Nigeria, and adjacent Equatorial Africa.

The natural luxuriant forest vegetation of the rainy tropics unfortunately is not an infallible indication of high soil fertility. Rainfall is high, and temperatures and relative humidity are also high throughout the year. Thus leaching is both rapid and continuous. Many of the soils, though they are not true infertile laterites, are lateritic loams, poor in minerals such as phosphor and potash. Rotting of organic matter is rapid and often quite complete. As long as the forest grows and sheds its leaves and fruits, the nitrogen content of the soils remains adequate, but after clearing the land the nitrogen content rapidly falls below the danger point. Thus, except on volcanic mantle rock such as in

the Cameroon Highlands, where soils have a more permanent fertility, successful agriculture requires the liberal use of fertilizers.

The rainforest area is becoming an important contributor to the world economy. Cacao is produced in the Gold Coast, Nigeria, the Ivory Coast, French Cameroon, and Dahomey. Palm oil and palm kernels are produced in Nigeria, the Belgian Congo, the Ivory Coast, Sierra Leone, French Cameroon, Dahomey, and Angola. Some Hevea rubber is produced in Liberia, Nigeria, and a few other sections. Along the Guinea coast the cocoanut palm occurs, but it is of more importance commercially along the narrow, humid east coast in Mozambique, Zanzibar, and Tanganyika. Small amounts of coffee are grown on some of the higher lands. In much of this area, and particularly in the Belgian Congo, southern French Equatorial Africa, and the Ivory Coast a system of shifting of milpa agriculture still prevails. This type of agriculture, in which the hoe is used but not the plow, is for subsistence purposes only.

There is little doubt that this part of Africa can support a much larger population than it does today, and that it can make vastly greater contributions to the world economy. This will be possible only when sufficient capital becomes available for development purposes: for better transportation, better sanitation, better tools, training of the natives, and, perhaps, for importation of suitable agricultural labor. Such development will be feasible if world trade becomes freer than it is today, since at present only a few of the colonial powers have sufficient available capital even to press development purely for purpose of trade with the mother country.

The savanna belt, particularly the northern one in French West Africa and Nigeria, is becoming more important economically. The more open natural vegetation--wooded savanna or savanna--makes it easier to clear the land. The existence of a dry season brings about somewhat healthier conditions and the soils, on the whole, are not as leached as those of the rain forest.

Peanuts are the major commercial crop of French West Africa, particularly of Senegambia, and are of increasing importance in Nigeria. Cotton production is expanding, as is that of sisal.

Over much of the area conditions are favorable for expansion of both tillage agriculture and stock raising, though again the conditio outlined above are a sine qua non for further development.

The mineral resources of Africa show close relationships with the geological conditions prevailing over the continent.

With the exception of northern Africa beyond approximately the 26th parallel, of the Somaliland peninsula, and the narrow coastal strips, the continent consists of ancient crystalline rocks, dating far back into geologic history to pre-Cambrian times. These rocks were intensely folded--mostly before the beginning of the Cambrian--and thus have been highly metamorphosed. The predominant types of rocks are metamorphic and igneous, such as schists, gneisses, granites, and diorites.

In several regions, as in parts of the Sahara, the Belgian Congo, and South Africa, these ancient rocks are covered by younger sedimentary rocks, primarily sandstone, which are nearly all of terrestrial origin. Many of these were deposited under conditions apparently unfavorable to the accumulation of plant matter. Volcanic rocks occur scattered, such as in the Cameroon region and in the Sahara. The largest area of such rocks is found in western Ethiopia, from where it stretches southward into Kenya as far as Mt. Kilimanjaro. It is unfortunate for Africa that volcanic rocks do not occupy greater areas, as certain rocks of this type give rise to excellent soils, especially in the humid tropics where leaching of soils proceeds rapidly.

This simplified geologic picture is basic to the understanding of the geographic distribution of the mineral resources of Africa.

Coal, a sedimentary rock, which develops only under certain conditions of deposition--the existence of low, swampy areas of considerable extent--is rare in Africa. The most important deposits by far are in the Union of South Africa, in the sedimentary rocks of the Karroo beds of southern Transvaal, northern Natal, and northern Orange Free State. Here high quality bituminous coal, and even anthracite are produced, and the reserves appear to be large. The amounts of coal found in other terrestrial sandstone and shale complexes of Africa is insignificant. There is some coal in the Karroo beds of Southern Rhodesia and the Belgian Congo has a little coal in Katanga and near Lake Tanganyika. Other small deposits are found in the younger marine rocks of the Mediterranean rim in Morocco, Algeria, and Tunsia. There is a similar area of younger, coal bearing rocks in southern Nigeria. Prospects of finding additional large coal reserves in Africa are practically nil.

For oil deposits the geological conditions are even less favorable. The ancient igneous and metamorphic rocks cannot be expected to contain petroleum. The terrestrial deposits are mostly of insufficient thickness, and conditions of deposition were not favorable to the formation of oil. The only areas where there is a possibility of finding oil are in the regions of younger, marine deposits. Large parts of these, in French North Africa, however, have been badly disturbed by the Alpine

folding of the Atlas system. Thus far the only deposits of value have been discovered in Egypt, where the younger marine rocks have escaped the effects of the Alpine orogeny. The Somaliland region and adjacent Ethiopia have apparently proven a disappointment to the companies that have explored there.

While insofar as coal and oil are concerned the African continent is a stepchild of mother Nature, it is very rich in undeveloped water power. Its great and small rivers have many falls and rapids, especially where they flow from hard onto softer rocks, or from the interior plateaus to the low coastal strip. It is estimated that about 40 percent of the water power reserves of the world are in Africa. Of this huge amount nearly half is in the Belgian Congo and one quarter in French Equatorial Africa, including French Cameroon.

The old igneous and crystalline rocks, however, are favorable to the occurrence of metallic and other minerals. Here our knowledge is still very incomplete. There is little doubt that important mineral deposits of this type still remain to be discovered.

At present Africa is most noted for the leading role of its gold production in the old metamorphic rocks of the Witwatersrand district of the Transvaal. Considerable quantities of gold are also produced in Southern Rhodesia, the Gold Coast, and the Belgian Congo. Smaller centers of production are found scattered over much of Africa.

Diamonds are found partly in basaltic pipes, partly in alluvial deposits. The Union of South Africa stands first in value of production, but the Upper Kasai area of the Belgian Congo and the adjacent Lunda provinces of Angola, produce the largest quantities. Other important producing regions are located in the Gold Coast, Sierra Leone, Southwest Africa, and Tanganyika.

Large copper deposits exist and are mined by modern methods in the Katanga region of the Belgian Congo, and in adjacent Northern Rhodesia. Manganese is produced in the Gold Coast and the Union of South Africa, and smaller production is found in the Congo, French Morocco, Northern Rhodesia, and elsewhere. Uranium ores occur in the Congo, tin is produced in appreciable quantities in northern Nigeria and the Congo, with smaller deposits in French Cameroon, Southern Rhodesia, Southwest Africa, Swaziland, Tanganyika, Uganda, and the Union of South Africa. Bauxite is shipped from the Gold Coast, Mozambique, and French West Africa. Finally Iron ores are produced in Algeria, Spanish Morocco, Tunisia, French Morocco, the Union of South Africa, and Sierra Leone. There are cobalt, chrome, lead, asbestos, and many other minerals of lesser importance.

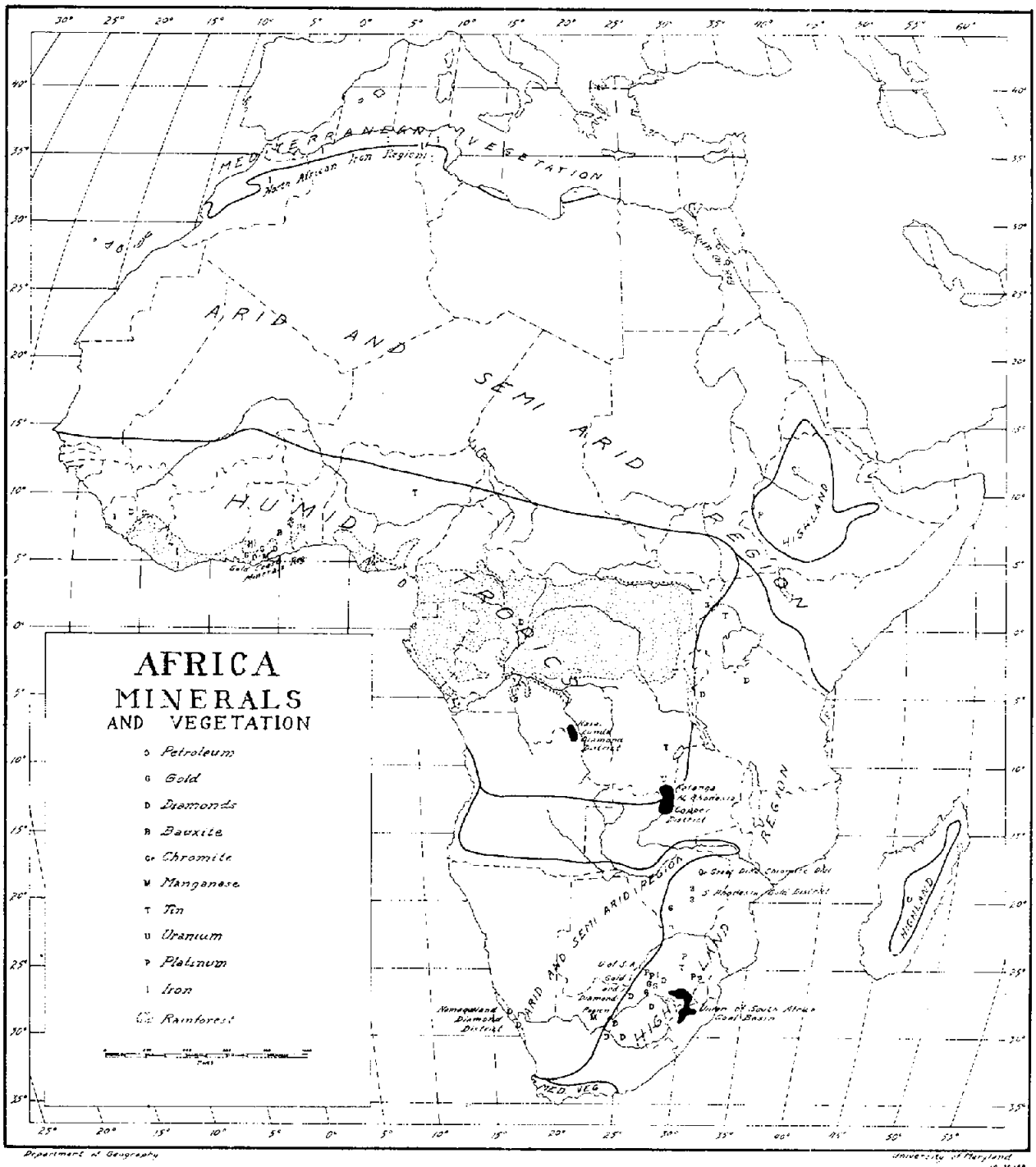
Conclusions.--Africa is rich in natural resources, but not as rich as some popular writers seem to assume. It is a "yes--but" land.

It has large areas of timber, but practical difficulties of exploitation are great, and costs of extraction are high. It has extensive areas suitable for agricultural purposes, but much of the continent is arid, semi-arid and subhumid. In the humid lands tillage agriculture could be greatly expanded, but soil erosion is a constant threat, and so is soil depletion. The livestock industry can be greatly improved and intensified, but the tsetse fly still needs to be conquered.

It has large power resources, but unfortunately not of the cheaper kinds--coal and oil--but of the more expensive kind, waterpower. It has important metallic resources, but suitable fuel for smelting is scarce.

For a better development of the continent many things are needed: scientists and technical specialists to find what there is and what can be done with it; capital to create better transportation facilities, and to provide power and other production goods; doctors and educators to help those upon whom the major tasks of production will devolve. Above all, a freer world economy is needed in which surplus goods can move without the thousand and one restrictions of our present day.

(12 May--750)mmg


AFRICA
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