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Industrial Mobilization Course

War Potential of U. S. and Foreign Nations
Lecture III — Natural Resources (15 January 1946)

by

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This lecture is supposed to cover natural resources and principal raw materials of the world. That is a big subject, not only broad, but deep. It extends from the forests and snow on the mountain tops to the fish in the sea and minerals far in the earth.

Natural resources are customarily divided into forests, soils, water and minerals. Forests, and to some extend soil and water, are replaceable. Moreover, they are mutually interdependent for each contributes to the other. Nature has established a balance between forests, soils and waters; an equilibrium that is often upset by man. The destruction of forests, for instance, may soon be followed by soil erosion and floods.

Minerals are the oldest of our resources. Yet the use of minerals was comparatively small until the late nineteenth century. The growth of heavy industries and two world wars have been accompanied by a marked increase not only in the volume, but in the variety of minerals used. Most striking has been the rise in petroleum consumption since World War I. In attempting to project the trends and to appraise the future it is necessary to keep in mind the irreplaceable nature of mineral resources. The tremendous drains of World War II have caused concern over the depletion of mineral and forest resources.

The first general survey of our natural resources was made by a National Conservation Commission in 1908. In general, the report of that Commission underestimated reserves and overestimated the rate of depletion. The forecasters of today have much better information on which to base estimates. However, prophecies in the field of resource exhaustion or depletion have not been very accurate. In estimates of mineral ore bodies there is considerable room for error. Even if reliable estimates are available as to prospective supplies, there are many imponderables involved in forecasting future demands. Considerable caution is therefore necessary in using estimates of mineral reserves and their probable exhaustion.

Forests

Forests are one of our greatest resources. A forest is not merely a group of trees. It is a highly organized community of plant and animal life. Forest life is characterized by a struggle for survival—for water, sunlight, soil nourishment, space and safety from enemies—much as human beings struggle with their fellow-men and the relentless forces of nature.

Although the giant redwoods are one of the oldest living things on earth, trees generally are the product of a few decades to a century or two. As such they are mere youngsters among natural resources. With adequate protection and proper management, forests can afford a continuing source of many raw materials and other assets on a sustained yield basis.

Lumber, fuel and various types of wood are the chief forest products, but the forests also provide many other things such as foods, forage, fur-bearing animals, recreational features, water conservation, regulation of stream flow and prevention of soil erosion. The United States Forest Service estimates that half of our forest area exercises a major influence on stream flow and an additional quarter a moderate influence.

The forests provide raw materials for many industries. Foremost of these is the lumber industry. Other industries make numerous turned-wood products, tannins, cooperage products, cellophane, plywood, paper, rayon and furniture. Cellulose, with its thousands of uses, is the chief industrial chemical obtained from wood. Wood is the most abundant and compact source of cellulose, constituting more than half of wood substance. Rosin is one of the most versatile industrial products and is found in thousands of articles of everyday use. Recent technological developments have opened the door to a new age for wood products. New methods make wood harder, stronger and fireproof, in some cases enabling its use as a substitute for steel. Low-cost soft woods can be processed or impregnated with resins and compressed into products that for some purposes will take the place of light metals.

Military uses of lumber, direct and indirect, totalled nearly eighty billion feet, or over two-thirds of United States lumber consumption during the three years 1942-1944, an average of over twenty-six billion feet per year. Roughly one-third of military requirements for lumber was used in constructing cantonments, hospitals and overseas troop housing--the greatest carpentry job in history. Nearly another one-third went into containers such as shell cases, boxes and crates. About one-fourth of the lumber was used to take the place of steel in building warehouses, munition factories, airplane hangars, piers and dry docks.

In the United States we are inclined to think of our forests as a great and replenishing reservoir of lumber and wood products. But we are using up our forests at a rather alarming rate. The annual timber growth in this country is now about thirty billion board feet. In 1942-1944 the annual drain on our forests, including lumber and various other wood products such as fuel wood, pulp wood, poles and veneer logs was about 60 billion board feet, or twice the replacement. The growth of timber must be greatly increased to meet anticipated needs and to balance our forest budget.

In the absence of forest inventories, the percentage distribution of forested areas among the major nations may be used to indicate their approximate forest resources. Of the world forest area, the British Empire and Russia each have one-fifth; Brazil, one-eighth; United States and possessions, one-tenth. Data on the production of timber in foreign countries are inadequate for any specific comparisons. Such data as are available indicate that in the early or mid-1930's the annual production of timber, especially saw timber, was much larger in the United States than in any other country. The cut of all timber in the major foreign producing countries as a fraction of the United States cut was approximately as follows: Russia, five-eighths; Canada and Japan, one-fifth; Sweden, one-sixth; Finland and Germany one-eighth or less. Prior to World War II the principal lumber exporting countries were Russia, Finland, Sweden, Canada and the United States.

Waters and Soils

Water, and even air, at times are classed as minerals; sometimes they are designated as man's most important minerals. Water supply usually is taken for granted, but to the herdsman and the farmer, the amount and distribution of water are of great importance. In bygone days we were more dependent on inland waters for power and navigation. Nowadays we are more concerned with the control of floods, hydroelectric power, soil erosion and the maintenance of water levels for agriculture and for city water supplies.

Soils are the most valuable of natural resources. They provide man's chief essentials: food, clothing and shelter; also considerable equipment. In fact, agricultural products rank first in volume and value in nearly all countries. The value of soil is determined largely by its productivity, as well as the kind and quality of vegetable and animal products that can be grown. This in turn depends to a great extent on the nature and pattern of the climate and rainfall. Nations with a large area of productive land benefit from varied climates and balanced productive capacities. The great valley of the Mississippi and its tributaries is one of the three large regions that possess first-quality soil combined with a climate that makes for high yields; the others being southern Russia and Argentina.

Agricultural Production

Military needs for information about agricultural resources has led to a collection of agricultural statistics since ancient times. The famous Doomsday Book contains returns from a nationwide survey of English agriculture by William The Conqueror. Prior to the War Between the States, American wars were on a small scale, and the problem of food and fiber production did not differ greatly from peace to wartime. The lack of adequate agricultural statistics was a serious handicap in dealing with wartime food requirements soon after the outbreak of war in 1861. President Lincoln called the situation to the attention of Congress and the United States Department of Agriculture was established under an act approved by Lincoln in May 1862.

Both World Wars brought considerable devastation to agricultural production in Europe, shut off imports, curtailed production of farm machinery and reduced the supply of farm labor.

World War II brought about abrupt changes in the world food and fiber situation. Surpluses in many cases soon dwindled and scarcities arose in many lands.

Wartime food and agricultural programs differ considerably among nations depending upon their degree of preparedness and capacity for change. One universal tendency of war is to disrupt international trade and to place greater reliance on domestic and local supplies. The dependence on local supplies was driven home to me some years ago in making an historical study of prices in Virginia. In March 1865 Richmond was surrounded by Union armies and wheat prices there, in terms of inflated Confederate currency, reached $100 a bushel. At the same time wheat was selling for one dollar a bushel in southwestern Virginia.

In the United Kingdom, the wartime food problem is largely one of importation and improved distribution. In peacetime about two-thirds of the food is imported. However, a marked expansion and readjustment in agriculture was promptly undertaken in World War II. All readily available cropland including old pastures and turf were brought into cultivation along with shifts from livestock to more intensive production of crops.

The United Kingdom is self-sufficient in fresh milk and potatoes but usually depends to a large extent on imports of butter, pork products, cheese, wheat, fruits and sugar. Normally a large part of these foods is obtained from the continent of Europe and from faraway places in the Southern Hemisphere--Australia, New Zealand and Argentina. The risks and shortages of shipping have shifted wartime source of supply to North America. Moreover, to save space and weight in shipping, marked shifts were made in World War II toward the importation and consumption of dehydrated and compressed food.

Agriculture in Russia is considerably different from that in the United States. The collectivization of farming has facilitated centralized government control over agricultural production and marketing. Russia has the most concentrated control of crop production of any nation. The claim of having the most mechanized agriculture in the world is true of certain operations such as plowing and the harvesting of small grain. Russia has a much larger farm labor force than the United States, but the value of net agricultural production normally is much less. The prewar output per farm worker in Russia was less than one-fourth as much as in the United States. Some of the principal reasons for this big difference are the shortage of machinery, equipment and managerial ability in Russia along with the poor quality of equipment and livestock, and the less suitable climate and soil over large areas. Agriculture in Russia was conducted at or near current capacity before World War II and suffered a decline in output during the war even in the territory not occupied by the Germans. In the United States on the other hand, the agricultural potential permitted a great wartime expansion in production.

Food

Of the two billion people in the world, over two-thirds are badly fed. The great food problem is not starvation, but malnutrition. People generally get enough food to stay alive, but not enough of the right kind of food to stay healthy and live long. The first objective listed by the Food and Agriculture Organization of the United Nations is to raise levels of nutrition and standards of living.

Energy foods are chiefly fats, sugar and the great cereals--wheat, rice and corn. Protective foods such as meat, milk, eggs and green vegetables, which provide protein, minerals and vitamins, are relatively scarce and costly. An acre of soybeans, for instance, can support many more people--with a much smaller expenditure of labor--than an acre devoted to beef production.

In China, about 2 percent of the diet consists of animal products compared with 40 percent in the United States. Although few Americans would willingly give up any large proportion of their meat, eggs and poultry products, we could if necessary get along with considerably less animal foods. The shifting of land and other resources from animal to crop production, along with the direct human consumption of cereals ordinarily fed to livestock, would provide food for many more people.

Cereals are the most important world foodstuffs and wheat is the leading food cereal. Wheat occupies the premier position because of its widespread growth adaptation; its high caloric value; and its gluten, which enables wheat flour to be baked into yeast-leavened bread.

The leading wheat producing countries in 1938 were the U.S.S.R., United States, China and India (See Figure 1). The principal exporting countries were Canada, Argentina, United States and Australia. The United Kingdom was much the largest importer of wheat.

Rice is the leading food in south and east Asia where about 95 percent of the world's rice is grown. The chief surplus producing (exporting) countries are Burma, Siam and Indochina. (See Figure 2). The United States is a net exporter of rice. This is one of the few cases where mechanization has resulted in a comparative advantage over the cheap labor of the orient in the production of a raw material.

Maize (corn) is the foremost field crop in the United States and the chief food crop of Latin America. The United States produces over half of the world's corn, but about 85 percent of the crop is fed to livestock and a considerable amount finds its way into numerous industrial uses. Argentina, Rumania and the Union of South Africa export considerable corn whereas the leading importers are the United Kingdom, the Netherlands, Germany and France.

Sugar is an important food crop, especially in the United States where consumption has attained a very high level--about 100 pounds of refined sugar per capita. Sugar usually is a scarce article in wartime. World production is about two-thirds from cane and one-third from beets. In 1938 the leading areas of production were India, Cuba, Continental United States, Germany, Java, Philippine Islands, Hawaii and Puerto Rico. (See Figure 3) These areas, except India, United States and Germany normally have a large surplus of sugar for overseas shipment. The United States and United Kingdom are the largest importers of sugar.

Fats and oils, especially butter and lard, have higher caloric values than other foods. Oilseeds have become an increasingly important source of food in comparatively recent times. Fats and oils, like sugar, have been relatively scarce in wartime, especially in the battle areas of Europe. Many of the vegetable oils entering international trade normally come from southern and eastern Asia, far from their usual destination. (See Figure 4) In wartime, even if trade routes are open there may be a shortage of shipping. Furthermore, numerous industrial uses of fats and oils lead to increased requirements in wartime.

Meat in some respects is a luxury food, especially beef. Feeding crops such as grain to livestock substantially reduces the amount of calories available for human consumption. Dairy cows and hogs are more efficient than beef cattle at converting grain into protein and fats. Hogs are a common source of both meat and fat.

Fish is the principal source of protein in some areas, such as Japan and among many Puerto Ricans. The annual per capita consumption of fish is about forty pounds in the United States compared with 120 in Japan and fifty-three in the United Kingdom. Oceans yield other products as well as fish, but they usually contribute but a minor part of a nation's resources.

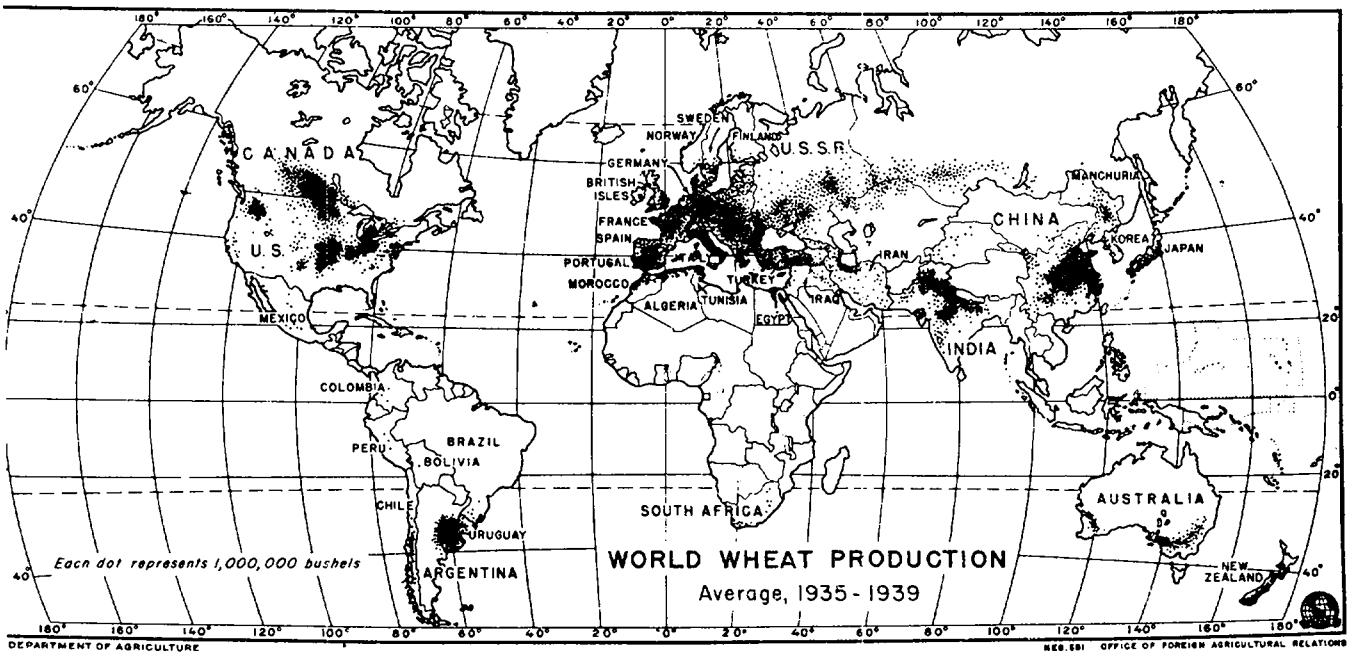
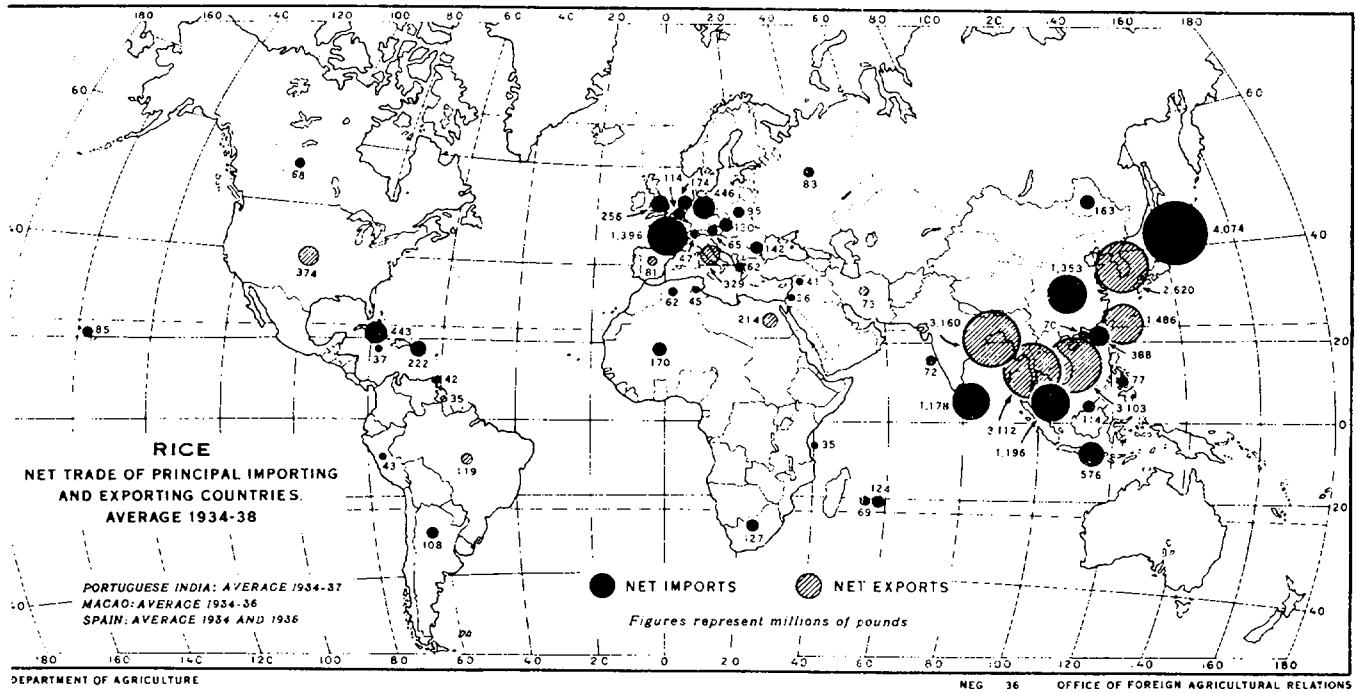


Figure 1.



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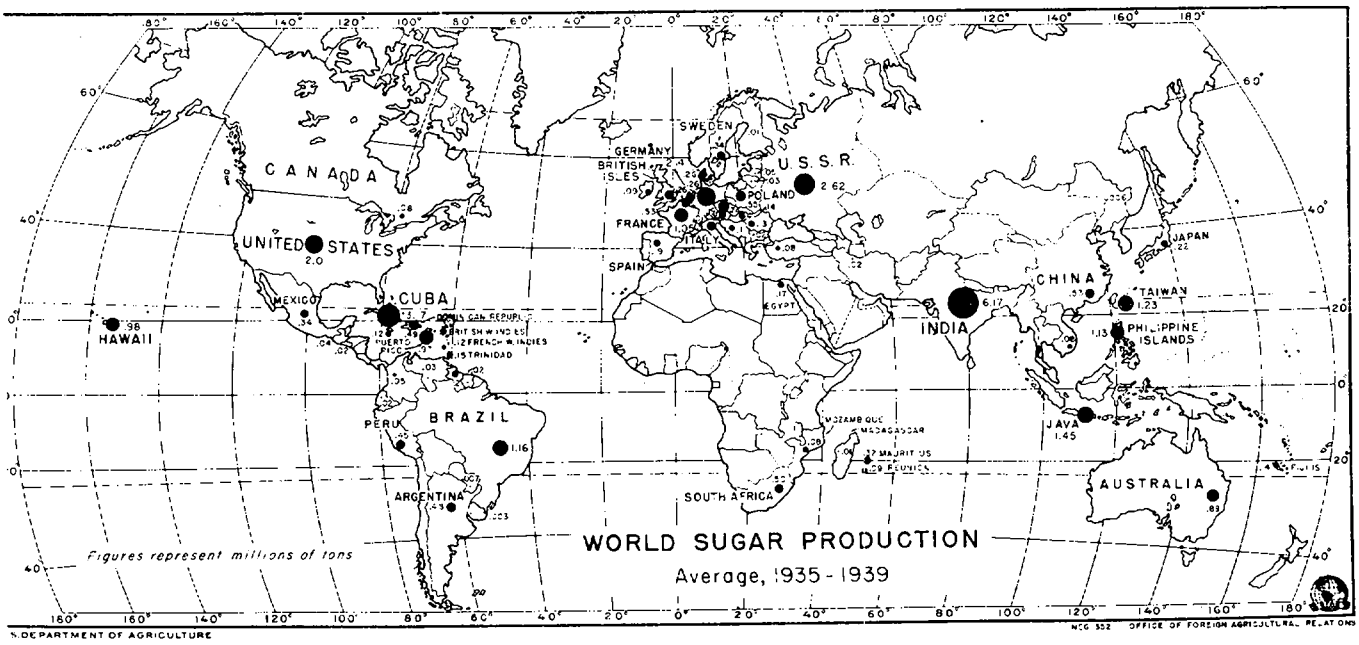

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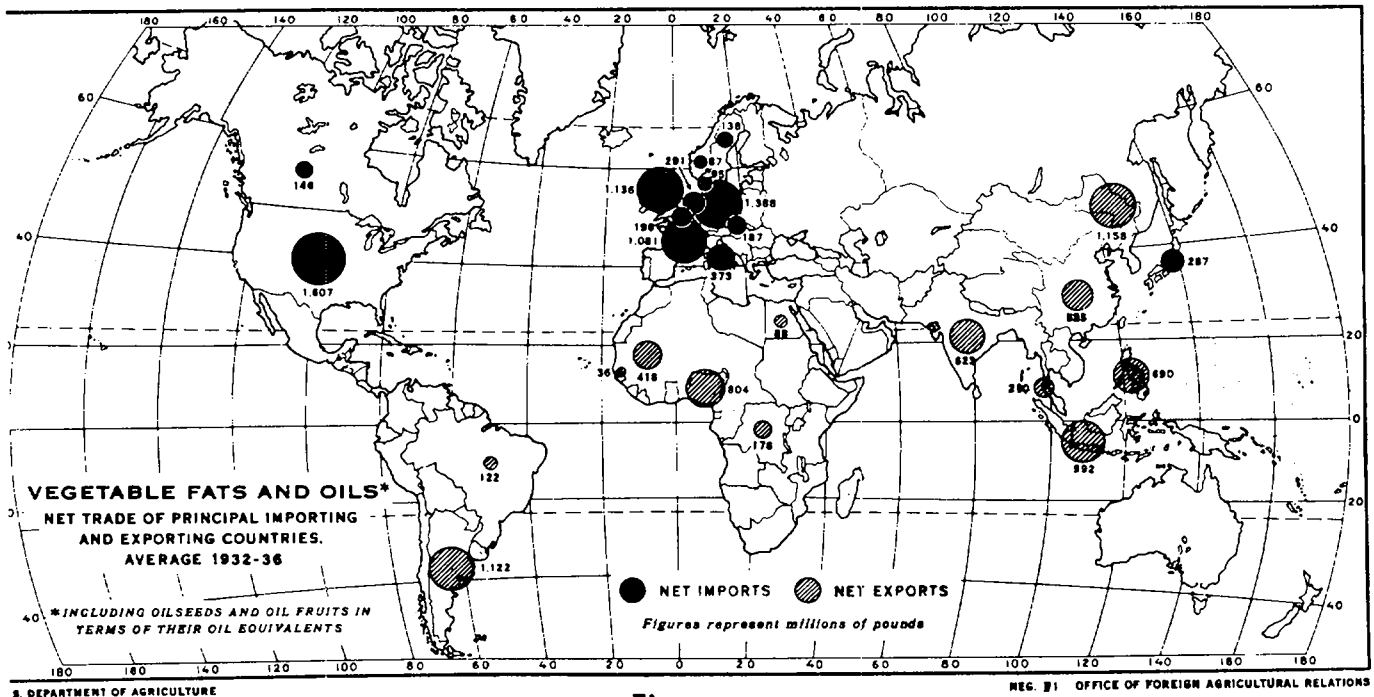

Figure 4.

Fibers

Cotton is the leading textile fiber. In addition it has numerous industrial uses. Cotton linters are used in making explosives and other products. The chief cotton producing countries in 1938, in decreasing order, were the United States, India, U.S.S.R., China, Brazil, and Egypt. Except for the U.S.S.R. and China, these were also the principal exporting countries. (See Figure 5) Japan, the United Kingdom, France and Germany led in imports of cotton. In recent years American cotton has declined in relation to foreign cotton in world production and trade. Unless cotton prices in the United States are permitted to return to a competitive level in world markets, this trend may continue and the U.S.S.R. or some other country may take the lead in cotton production. Cotton also faces stiff competition from synthetic fibers.

Wool requirements are increased greatly by war. Military uniforms and blankets are needed immediately to outfit the armed forces, and frequent replacements are necessary in combat and training.

Except for the United States and Russia the great wool-producing countries and all the main wool exporting areas are in the Southern Hemisphere: Australia, Argentina, New Zealand, Union of South Africa and Uruguay. The leading importers of wool in 1938 were the United Kingdom, France, Germany, Belgium, Japan and United States. (See Figure 6)

Cordage fibers. In peacetime, the industrial nations have relied on the hard fibers from the tropics for making cordage; namely, abaca (manila fiber), sisal and henequen. The outbreak of war with Japan brought a crisis in the supply of cordage fibers in the United States by cutting off imports of abaca from the Philippines. This situation--though less publicized--was about as serious as the lack of rubber. Immediate and far-reaching steps were taken, including conservation, the development and procurement of fibers in Latin America, hemp production in the United States and the substitution or mixing of soft fibers in the manufacture of cordage. A more widespread growth of hard fiber including the production of abaca in Central America; synthetic fibers; and stockpiling may prevent the recurrence of such a serious cordage fiber situation.

Before leaving the foods and fibers it may be well to stress their importance and to emphasize that agricultural production must not be taken for granted in industrial mobilization planning.

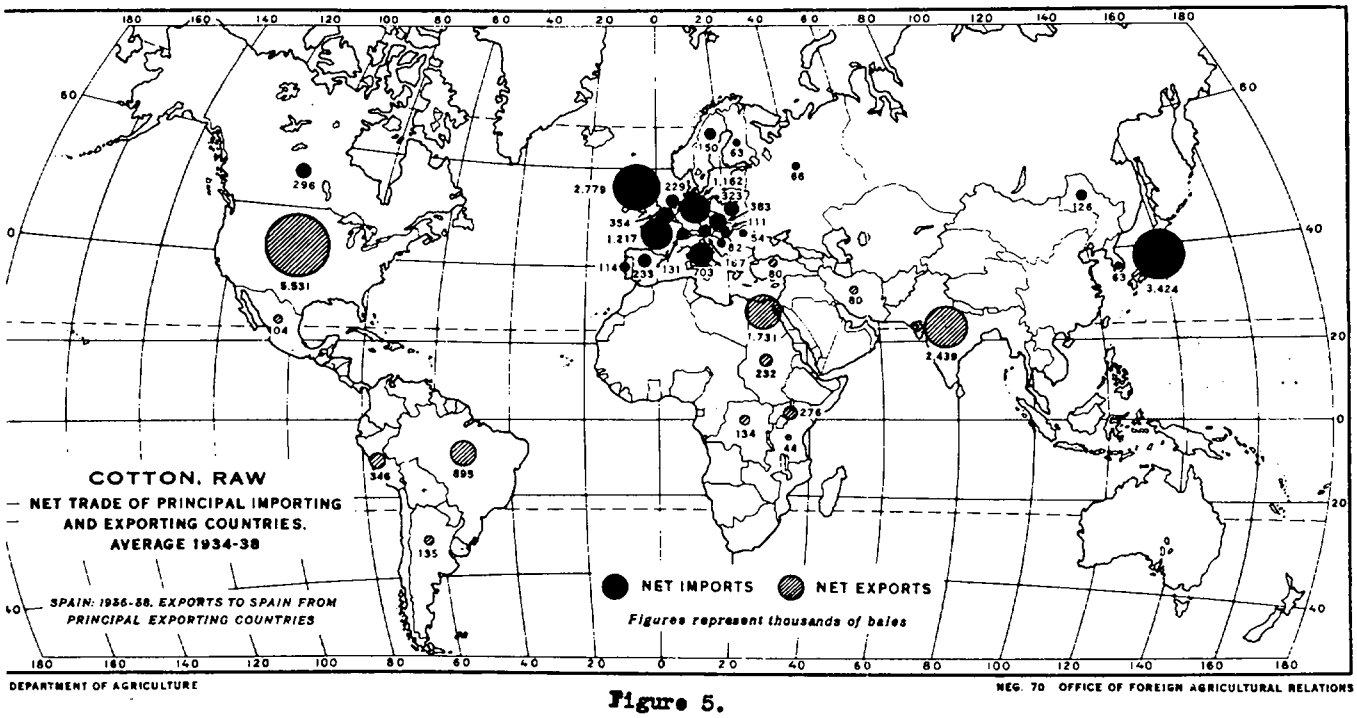

Figure 5.

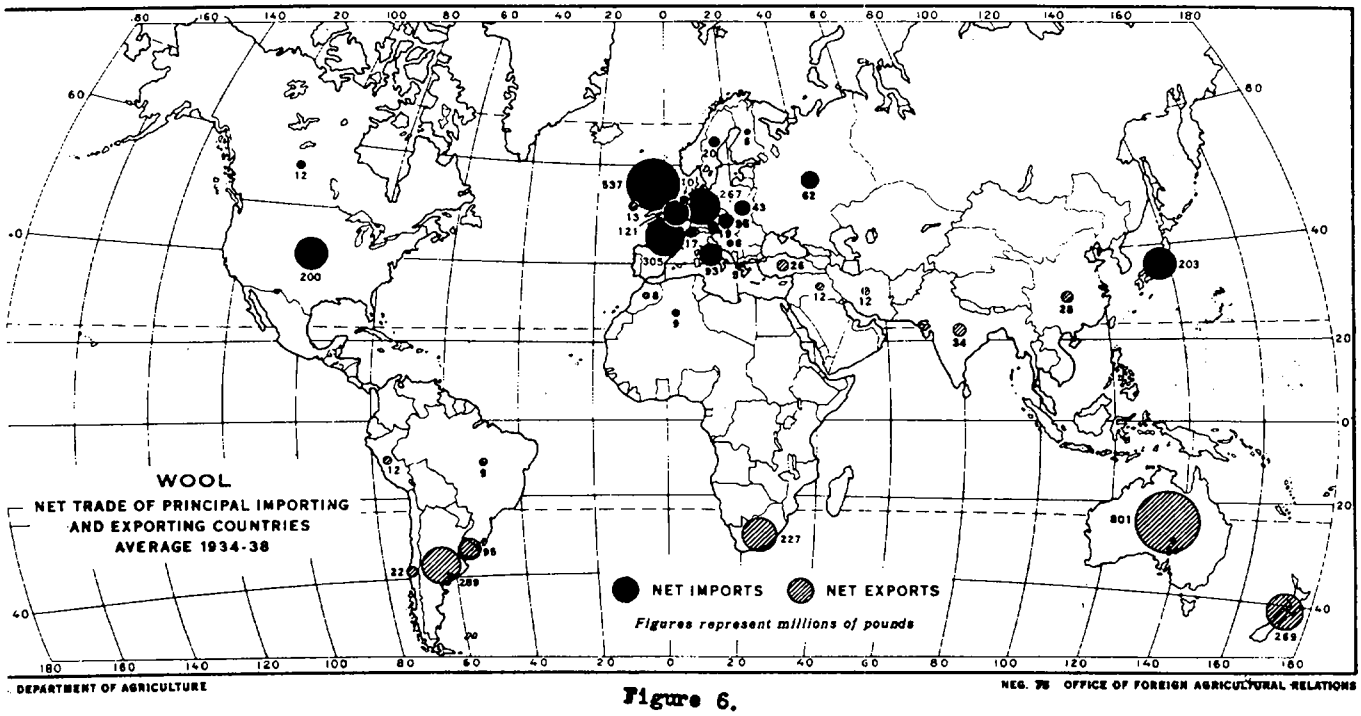

Figure 6.

Mineral Resources

Nearly one hundred minerals were used in the last war. Advances in technology and greater specialization have increased the variety of minerals needed. The world's mineral resources are far from equally distributed, and there has been a growing interdependence among nations with respect to minerals. Gold is produced in more than eighty countries; silver and salt in nearly as many. Some other minerals are found in many places, but the bulk of world production usually is concentrated in a few countries. In fact, the supply of many important minerals comes largely from one or two countries. No great modification in the present geography of mineral production is likely despite new developments and discoveries. Since no nation is self-sufficient in minerals, all nations will need to rely to some extent on foreign sources, and the struggle for control of raw materials undoubtedly will continue.

Metallic minerals, unlike fuels, can be reprocessed from scrap and reused as is done to a considerable extent in wars and depressions. In appraising the wartime industrial potential of a nation this may be very significant. Just prior to World War II about one-half of the iron used in steel production came from scrap in various forms. In the depression of the early 1930's as much as 80 percent of United States copper requirements was supplied from scrap. Another point to note is that increased uses of alloys have added to the efficiency and useful life of many materials.

The United States is in a predominant position among the nations in mineral production. In 1939 the value of output of all minerals other than gold in the United States was nearly four times that of Russia, the country of second rank. About 57 percent of the world's mineral output was under the political control of the United States and the British Empire at the outbreak of World War II. If to this be added commercial control in other countries, the United States and the British Empire probably accounted for about three-fourths of the world's mineral output. It is of interest to note in passing that the smelting and refining industries are concentrated in fewer countries than the production of crude minerals.

Maps on world production of the leading minerals in 1938 are contained on pages 13-18 of the ATLAS OF WORLD MAPS (Army Service Forces Manual M-101); a copy of which has been furnished to each of you.

Let us now look at the two charts relating to the position of the United States with respect to various minerals; one on commercial reserves compared with the 1935-1939 annual rate of use, the other on United States self-sufficiency in principal industrial minerals, 1935-1939. (Figures 7 and 8) These and several related charts were prepared

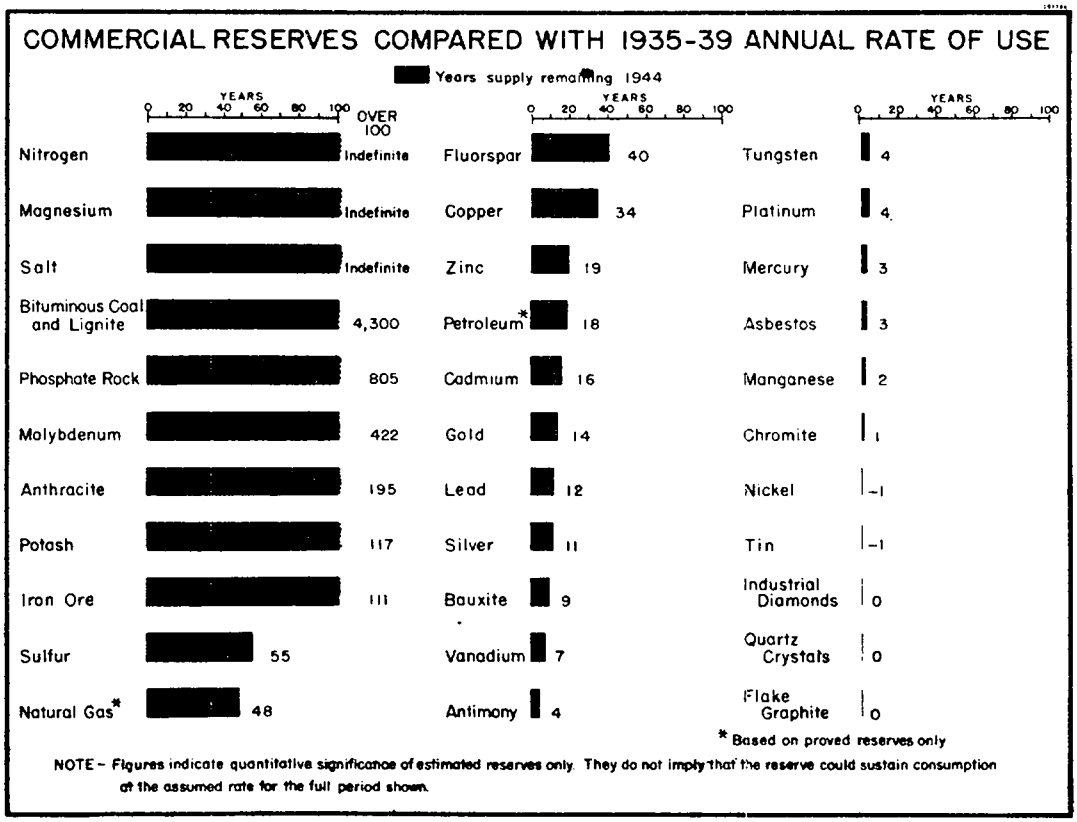

Figure 7. Commercial reserves of certain minerals as of 1944 expressed in terms of years life at average annual rate of consumption 1935-39.
U. S. Bureau of Mines

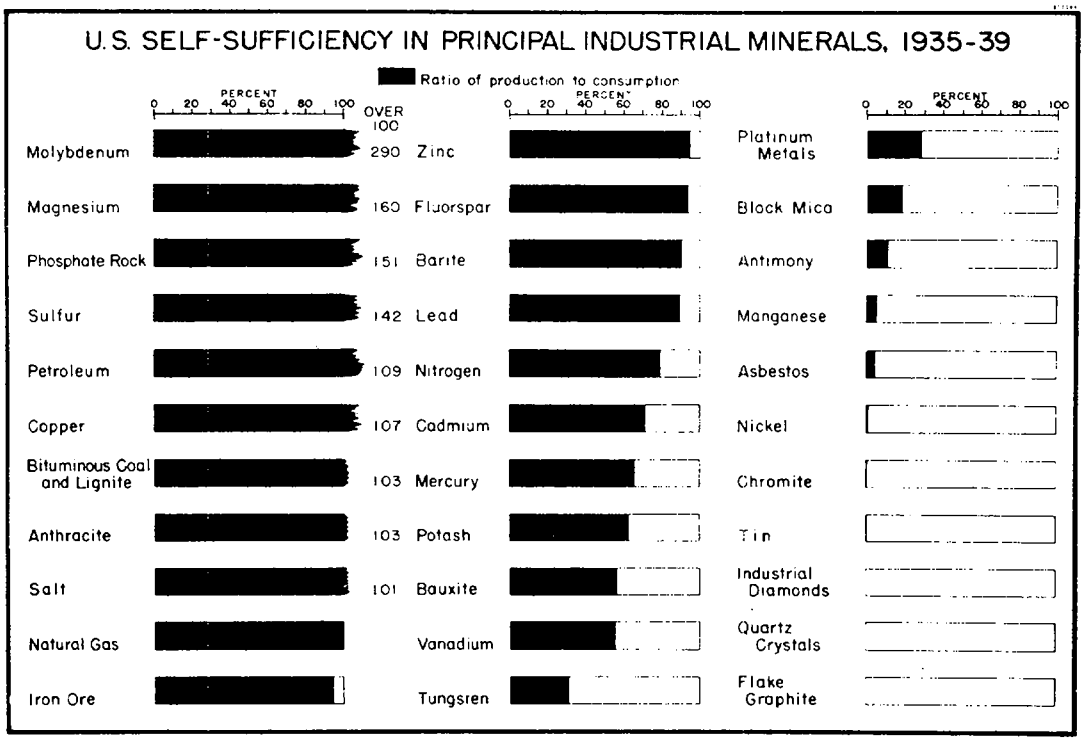

Figure 8. Production of principal industrial minerals in the United States expressed in percentage of domestic consumption, 1935-39. Building materials (stone, cement, lime, etc.) for which the United States is self-sufficient, are not included. U. S. Bureau of Mines

by Mr. Elmer W. Pehrson, Chief, Economics and Statistics Branch, United States Bureau of Mines, and have received rather wide publicity. The data in these charts should be used with caution. Although it is indicated that copper reserves are equivalent to a thirty-four year supply at the 1935-1939 annual rate of use, this does not mean that copper reserves will come to an end abruptly after thirty-four years. No one is better aware of the limitations of these data than Mr. Pehrson. However, the quantitative estimates, even though they be revised from time to time, are very helpful in presenting a picture of our mineral reserves and in shaping our national mineral policy. The data shown in these charts, and their significance, will be discussed more in detail in the forthcoming lecture on stockpiling.

Perhaps it would be well at this point to define self-sufficiency. The term ordinarily is used as a peacetime standard. The degree of self-sufficiency in wheat in 1938, for instance, is the ratio of domestic production to domestic consumption. In military parlance self-sufficiency means a nation's ability and capacity to sustain itself in time of war. Inasmuch as no nation is wholly self-sufficient, the term when applied to a nation's entire economy is not specific or well-defined. The term, however, is a useful one when applied to segments of the economy.

Fuels

The production of fuel and electrical energy affords a good measure of war potential. The production of fuel and power in 1937 as percentages of the world total was as follows: United States, 39; United Kingdom and Germany, 11 each; U.S.S.R., 9; Japan, 3. (Fuels were converted to electrical units at 20 percent efficiency.)

Ninety percent of the world's energy from coal, petroleum and water power as well as 90 percent of the world's pig iron and steel capacity are located in a power belt extending eastward from the Mississippi Valley through Russia. In striking contrast, less than three percent of such energy and capacity are in the southern hemisphere.

Coal, iron ore and petroleum are the basic minerals for industrial and military power. Coal, more than any other material, marks the industrial greatness of a nation. The fuel resources of Europe (excluding Russia) consist largely of coal owing to the scarcity of substitute fuels and limited water power. In Germany, coal was a wartime source of gasoline, lubricating oil, rubber and many other products; even "butter".

Six major powers accounted for 87 percent of world coal production in 1938. Japan and France were partly dependent on imports. The rank of countries in coal resources (1939) was: United States, Canada, China, Germany, U. S. S. R., Great Britain. Germany's coal resources have been reduced considerably by the loss of eastern territory to Poland.

The United States is richly endowed by having about one-half of the world's coal reserves; enough for over 4,000 years. As petroleum resources are depleted, it is a comforting feeling to know that synthetic fuel can be made from coal. Experts estimate that gasoline can be produced from coal at 16-20 cents a gallon, and from natural gas at from 6-9 cents. The cost of making gasoline from crude oil now is about 5 cents a gallon. If atomic energy becomes readily available the relative advantage of large coal deposits would be lessened. A nation such as Brazil, which has little coal but is rich in other resources, might experience a rapid increase in industrial power.

Petroleum is the lifeblood of modern warfare. Without gasoline and fuel oil the machines of war would soon sputter and die. The importance of petroleum in war is indicated by the early drive of the Germans for Rumanian oil, their attempt to capture Russian oil fields and their concentration of submarine warfare against allied tankers; also by the effects of allied bombing of German synthetic oil plants in 1944 and the stoppage of Japanese imports of oil from the Netherlands East Indies by mid-1945.

World production of petroleum is about half that of coal in terms of tonnage, whereas in terms of value it exceeds coal. Only two major powers produced petroleum in quantity in 1938--the United States with 62 percent and Russia with 11 percent of the world's total. These two countries are approximately self-sufficient in petroleum. Western Europe is a great deficit area in terms of requirements. In 1938, the annual production of petroleum in Japan was about equivalent to one day's production in the United States. The two areas of large surplus production of petroleum are Venezuela and the Middle East.

Recent estimation of world petroleum resources in billions of barrels is as follows: United States, 20; U.S.S.R., Venezuela, In Iraq, Kewait, Saudi Arabia, ranging in decreasing order from about six to three billion barrels. The British-Dutch group and American companies each control about seventeen billion barrels of foreign reserves.

Natural gas is a convenient and valuable fuel in the United States, which accounted for 89 percent of world production in 1938; Russia produced 4 percent.

The United States, before the war, produced twice as much hydroelectric power as Japan, which ranked second. World production in 1938 in billion KWH was: United States, 44; Japan, 22; Italy, 14; France, 10; Germany, 7. Although production of hydroelectric power in Russia was small, that country has vast water power resources--at least twice those of the United States.

Minerals (other than Fuels)

Iron ore. Iron is by far the most important metallic mineral. The production of iron ore among the major nations in 1938 in percentage of the world total is: France, 20; United States, 18; U.S.S.R., 16; United Kingdom and Germany, 7 each. In terms of mineral content, which varies considerably, the output in 1938 in million metric tons was: United States and U.S.S.R., each 15; France, 10; Sweden, 8; United Kingdom, 4; Germany, 3.

Unofficial estimates of world reserves of iron ore indicate that U.S.S.R., France, Brazil, United States and Great Britain, in decreasing order, probably have from 4.5 to 3.1 billion tons of "actual" reserves with iron content varying from 30 to 60 percent. In addition, the United States has enormous "potential" or submarginal reserves--apparently much more than any other nation. However, United States reserves of high-grade, direct shipping ore, as in the case of high-grade coking coal, are relatively small. You may be interested in an article on "Iron Ore Dilemma" in Fortune Magazine for December 1945. This article contains a map on iron ore in the Americas, and indicates that the Labrador-Quebec deposit, "now being explored, may turn out to be the greatest high-grade iron ore find in North America since the Mesabi."

Steel-alloy metals. The United States is self-sufficient in molybdenum; deficient in vanadium and tungsten, and dependent almost entirely on foreign sources for antimony, nickel, chromite and manganese. However, the United States has a large submarginal reserve of manganese.

Copper, zinc and lead. The United States reserves of copper, zinc and lead are being depleted rapidly, and world reserves are not large, especially of zinc and lead. The United States has long been the leading producer and consumer of copper. Known reserves of copper in decreasing order are in Chile, Northern Rhodesia, U.S.S.R., Belgian Congo and Canada.

Tin. Known reserves of tin are limited largely to southeastern Asia (Malaya, China, Netherlands East Indies and Siam). Bolivia probably has less than one-tenth of estimated world reserves. The United States depends entirely on imports.

Non-metals. The United States is well supplied with salt, phosphate rock, potash and sulphur; but is dependent largely or wholly on foreign sources for block mica, asbestos, industrial diamonds, quartz crystals and flake graphite.

The use of mineral fertilizers has become more important with the ever-increasing intensification on agriculture. Nitrogen is readily available. Phosphate fertilizers come primarily from phosphate rock of which the United States is the leading producer.

The other principal sources are North Africa, Russia, Nauru and ocean islands in the South Pacific. Potash is produced on a large scale in Germany and to a lesser extent in France, United States and Russia. In World War I the United States was abruptly cut off from potash supplies, nearly all of which had been imported from Germany. Since then domestic resources have been developed to where the United States exports potash.

Bauxite is the principal source of aluminum. World reserves are located chiefly in the African Gold Coast, Hungary, Dutch Guiana, Jamaica, Yugoslavia, France, British Guiana and the United States. Germany and the United States were the two large producers of aluminum in 1938. Recent technological developments (lime-soda-sinter process) permit economical production of aluminum from low-grade bauxite. This may enable the United States to become self-sufficient in materials for making aluminum. Magnesium, which is available from the unlimited waters of the ocean, may reduce requirements for aluminum.

Uranium has attained particular importance because at present it is the only practical source of atomic energy. The Belgian Congo, Canada, Czechoslovakia and United States have been the chief sources. Uranium is rather abundant and widespread in the earth, ranking twenty-fifth or next to copper in abundance, but with a scarcity of workable deposits.

Summary

In conclusion, the situation among the three major powers with respect to natural resources in 1938 was in brief, as follows:

The United Kingdom has a surplus of coal, was about two-thirds self-sufficient in iron ore production in 1938, has practically no petroleum and hydroelectric power, and is dependent on imports for forest products, fibers and most foods.

If the British Empire be considered as a single economic unit, the factor of location becomes of major importance in appraising war potential. The British Empire, as a whole, may be said to be potentially self-sustaining in the essential commodities, except cotton, sugar, maize, abaca, silk, antimony, mercury, petroleum and perhaps timber, wool, meat and wheat. Crude rubber and jute production are considerably in excess of Empire requirements. The Empire contains great and diversified mineral resources.

Russia in 1938 was about two and one-half times the size of the United States—about equal to North America in area and population. Since then Russia has grown in absolute and relative size. The huge expanse of Russia is offset to a considerable extent by the severe handicaps imposed by the natural environment, especially the climate. The vast forest and tundra belts of the north are too cold and much

of the soil is too acid for most agricultural purposes. The extensive timber resources have only begun to be exploited, although they supply domestic needs and in peacetime provide the country's most valuable export.

Russia's mineral resources, although none too well known to us, are abundant but often widely scattered. Few of the chief raw materials for modern industry are lacking. Coal, iron ore, water power, forests and agricultural lands are plentiful. Petroleum reserves are considerable and large foreign reserves are near at hand.

Just before World War II domestic production in Russia was inadequate for consumption by 50 percent or more in the case of rubber, copper, nickel, tungsten, antimony, tin, molybdenum, vanadium, mercury, iodine and silk. There were less serious shortages of nitrates and other chemicals, sulphur, aluminum, zinc, lead, wool, cotton, hides and skins, and some foods. To obtain such materials for current use and stockpiles Russia exported timber, wheat, furs, asbestos, potash, manganese, chrome ore and especially gold.

The United States is second to none in total reserves of coal, iron ore, and petroleum, the three chief minerals for industrial and military power. Reserves of fertilizer are also abundant. Metallic reserves, on the other hand, are not nearly so plentiful and sometimes entirely lacking, thus necessitating a continued and perhaps increasing dependence on foreign sources to meet current and anticipated requirements.

The United States has demonstrated great ability and capacity for agricultural production, concentrated in the interior of a large land area. The principal deficiencies in food and fibers being in tropical products, sugar, silk and wool, many of which may be obtained from Latin America.

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