REPORT TO
NATIONAL COUNCIL FOR SOVIET AND EAST EUROPEAN RESEARCH

TITLE: SOVIET AGRICULTURE TODAY:
INSIGHTS, ANALYSES, AND COMMENTARY

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COUNCIL CONTRACT NUMBER: 800-15

DATE: March 1988

The work leading to this report was supported by funds provided by the National Council for Soviet and East European Research. The analysis and interpretations contained in the report are those of the author.

NOTE

This overview of Soviet agriculture is an incidental product of the Council-funded research project identified on the face page. It is not the Final Report under that contract, which was distributed to the U. S. government previously (in a limited number of copies) and consisted of a brief technical report plus cassette copies of the radio broadcast series developed during the project. Additional copies of the technical report and the broadcast cassettes are available from the Council on request.

Those broadcasts were based on this volume, which is designed to provide a guide for broadcasters and other members of the U.S. farm community to Soviet agriculture, including its broad patterns of historical development, its place in the general Soviet economy, the attitudes of the regime, and the life and problems of the Soviet farmer. The authors selected topics for inclusion by asking potential users what they wanted to know, thus emphasizing relevance to the intended audience.

STATEMENT OF

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AUTHORS' PREFACE

While this study of Soviet agriculture was designed to serve the needs and interests of those who dwell and work in rural America, it will also provide pertinent insights and analyses for students of Soviet agriculture and all persons with an interest in Soviet rural life. There exists a shortage of perceptive publications on contemporary Soviet agriculture and contemporary Soviet rural life--especially those based upon observations made by authors who have traveled and conducted field work in the Soviet Union and lived on communist farms. This monograph, a deliberate intermediate step toward a much larger publication on Soviet agriculture currently being researched, introduces new approaches, topics, concepts, up-to-date facts and figures, and provides a basic set of clear maps. We hope that the result will satisfy farmers, students, and specialists who are searching for a readily understandable, but sufficiently comprehensive study of Soviet agriculture today.

This research project was planned along unorthodox lines, though funded in an orthodox manner by the National Council for Soviet and East European Research. A nationwide survey of National Association of Farm Broadcast members was conducted to determine which topics on Soviet agriculture their listeners considered most important and interesting. We assembled and classified a list of twenty-five topics into five broad units:

1) Geographic and Climatic Influences upon Soviet Agriculture; 2) Contemporary and Institutional Problems in Soviet Agriculture; 3) Farming Techniques and Mechanization; 4) Lifestyles of Soviet Farmers; and 5) Soviet Agriculture in the Twenty-First Century. A position paper was researched for each topic, from which the radio broadcast series, "Soviet Agriculture Today," was developed. Twenty-five four minute programs, each self-contained, were narrated and produced by Gary Enright, a nationally recognized agricultural broadcaster, and recorded at station KFJM on the campus of the University of North Dakota. These programs were distributed nationally to nearly four hundred radio stations, including National Public Radio. The position papers were then refined, expanded, and edited; they serve as the basis for this publication.

It must be noted, however, that even individuals who have traveled extensively throughout the Soviet Union are still incapable of adequately describing the total rural Soviet scene. The USSR is too big! Extensive use of field notes, maps, Soviet statistics, quotes from American sources, and statements by Soviet citizens are employed in this monograph. A short bibliography of suggested readings is included and focuses upon materials published in English.

Special recognition is due the National Council for Soviet and East European Research, for providing the funds to make this all possible. Acknowledgements and thanks are due to many who

have helped with this unique research project, specifically: Gary Enright, President of Insight Development Institute in Rapid City, South Dakota; Bruce Dahlman from the Department of Geography at Bemidji State University (Minnesota) and the Cartographic Laboratory at the University of North Dakota; and Charlotte Minier, Office Manager for the Department of Geography at the University of North Dakota. We extend our thanks to all who have assisted in the research project and in this publication's development.

December 1, 1986
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METRIC-ENGLISH AND MONETARY CONVERSIONS

LENGTH

1 kilometer = 0.62 mile

1 millimeter = 0.04 inch

VELOCITY

1 kilometer/hour = 0.62 mile/hour

AREA

1 hectare = 2.47 acres

1 sq kilometer = 0.39 sq mile

WEIGHT

1 metric ton = 1000 kilograms = 2205 pounds

1 centner = 220.5 pounds

1 kilogram = 2.20 pounds

VOLUME

1 liter = 1.06 quarts

YIELD

1 centner/hectare = the following figures in bushels/acre

Wheat	1.48
Rye	1.59
Barley	1.85
Oats	2.78
Corn	1.59
Potatoes	1.48

MONEY

1 ruble = 1.55 dollars

CHAPTER I

GEOGRAPHIC AND CLIMATIC INFLUENCES UPON SOVIET AGRICULTURE

INTRODUCTION

A knowledge of modern Soviet agriculture is vital today to those who have a deep interest in American agriculture and those who want to preserve the American single family farm. Prior to the American grain embargo of 1980, the Soviet Union was one of the largest purchasers of American grain and American agricultural products, and Soviet impact on world commodity flow was dramatic. As exports of American farm products continue to decline, and as the rural economy of our nation continues to suffer from excessive agricultural surpluses, the Soviet markets' role in the economic well-being of rural America increases.

Under the present system of socialist agricultural organization, the Soviet Union is unable to feed its people well. Annually, Soviet leaders say they have plans to boost sagging Soviet farm production by one superficial means or another. Annually, they report disappointing results or a drop in the yearly harvest of one crop or one aspect of livestock production. Year in and year out they report that Soviet socialized agriculture has stagnated again. We must learn what the problems and prospects of Soviet agriculture are, and benefit from their mistakes.

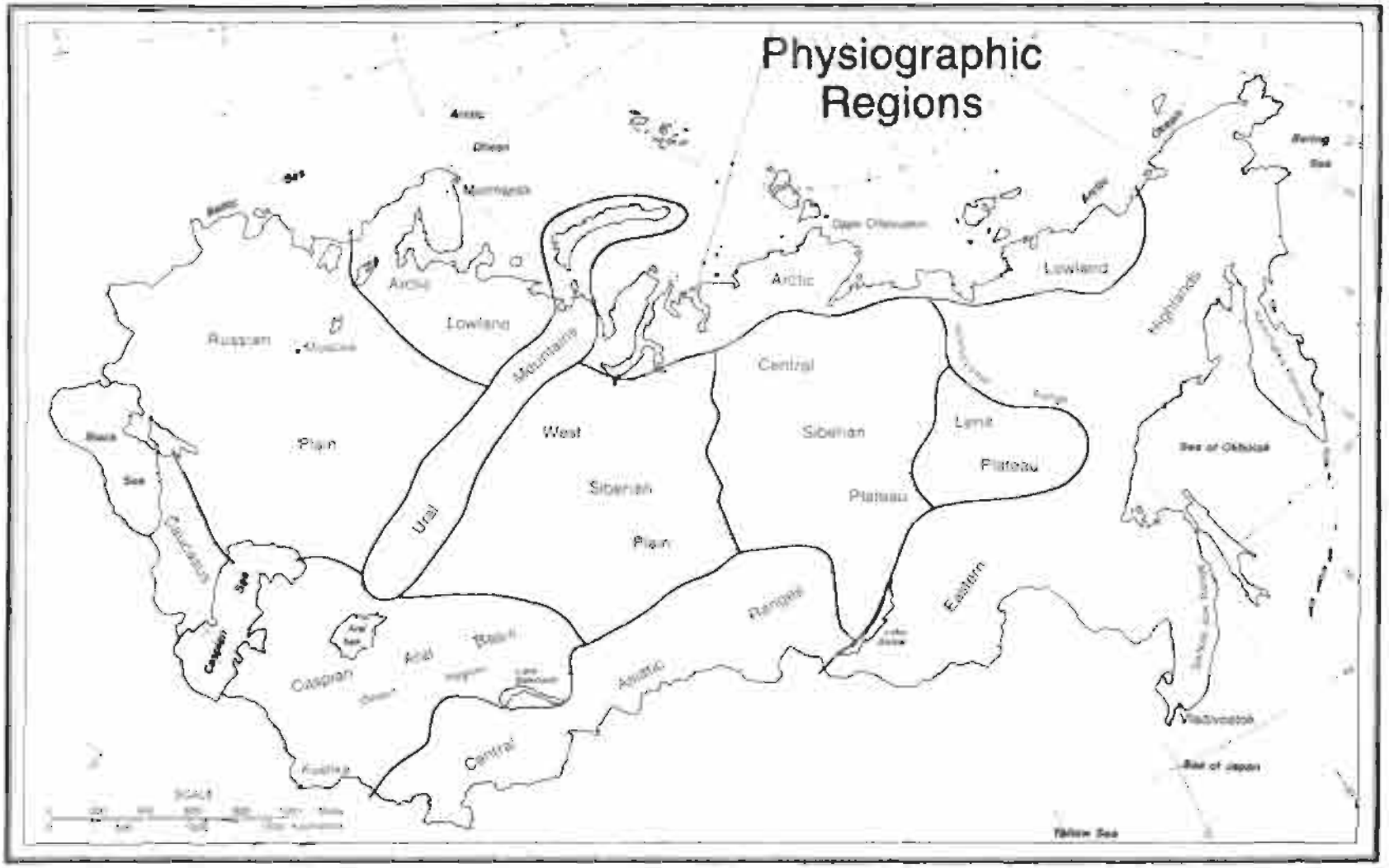
No great improvements in rural and small town American life and easing of world tensions are possible until American farmers, food processors, distributors, bankers, concerned citizens and decision-makers understand Soviet agriculture, think seriously and constructively about Soviet agricultural problems, and sensitively react to Soviet agricultural policy crises. Erroneous

ideas, deep fears, and outmoded assumptions are helping to perpetuate trade barriers, bigotry, hunger, and reliance upon military might rather than diplomatic solutions. Relations between the United States and the Soviet Union can be improved via agricultural trade--all parties involved will benefit when myths and fears are replaced by fact, common sense, business sense, and mutual respect.

A wide selection of topics, all necessary for a comprehensive understanding of Soviet agriculture today and in the future, will be discussed in this monograph: 1) the basic geographic and climatic assets and liabilities of Soviet agriculture; 2) contemporary institutional problems in Soviet agriculture; 3) current farming techniques and mechanization; 4) lifestyles of Soviet farmers; and 5) prospects for Soviet agriculture in the twenty-first century. All topics were carefully selected to reflect the interests of the American farmer and those who have an interest in contemporary Soviet agriculture. They will enable all concerned to gain insights into the factors which eventually influence decision-making processes in Soviet agriculture.

LOCATION, SIZE, and SOILS

The Union of Soviet Socialist Republics is the largest country in the world, its territory covering approximately one-sixth of the earth's total land surface (Map 1 and Table 1), nearly two and one-half times the size of the United States. Sprawling over the European and Asian continents, it spans almost



Map 1. All maps in this publication are modified from the USSR Agriculture Atlas, Central Intelligence Agency, December 1974.

Table 1. TERRITORY AND POPULATION OF THE UNION REPUBLICS

	Territory, thousand square kilometres	Population, thousand people				
		1940	1959	1970	1979	1985
USSR	22402.2	194077	208827	241720	262436	276329
RSFSR	17075.4	110098	117534	130079	137551	143078
Ukrainian SSR	603.7	41340	41869	47126	49755	50843
Byelorussian SSR	207.6	9046	8056	9002	9560	9941
Uzbek SSR	447.4	6551	8119	11799	15391	17989
Kazakh SSR	2717.3	6148	9295	13009	14684	15858
Georgian SSR	69.7	3612	4044	4686	5015	5203
Azerbaijan SSR	86.6	3274	3698	5117	6028	6614
Lithuanian SSR	65.2	2925	2711	3128	3398	3572
Moldavian SSR	33.7	2468	2885	3569	3947	4105
Latvian SSR	63.7	1886	2093	2364	2521	2604
Kirghiz SSR	198.5	1528	2066	2934	3529	3976
Tajik SSR	143.1	1525	1981	2900	3801	4500
Armenian SSR	29.8	1320	1763	2492	3031	3320
Turkmen SSR	488.1	1302	1516	2159	2759	3197
Estonian SSR	45.1	1054	1197	1356	1466	1529

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 8.

10,000 kilometers from the Baltic Sea in the west, to the Bering Sea in the east, and 5000 kilometers from Cape Chelyuskin in the north, to the city of Kushka in the south. The Soviet Union encompasses 22,402,200 square kilometers and is part of two continents--Europe and Asia. Accepting the Ural Mountains as the division between Europe and Asia, 24 percent of the nation is located in eastern Europe, and 76 percent in Asia. There are eleven time zones within the Soviet Union, compared to four in the contiguous United States. For example, when it is 8:00 a.m. in the western Baltic republics, it is 6:00 p.m. in the far eastern Kamchatka Peninsula. Most of the country lies north of the 49th parallel, which forms much of the international border between the United States and Canada. Its southern most city, Kushka, in the Turkmen republic, is on the same latitude as Memphis, Tennessee. In terms of population, the Soviet Union ranks third among nations, after China and India, with 278 million people; the United States is fourth with 240 million people (Tables 2 and 3).

The territorial boundaries of the Soviet Union are over 60,000 kilometers long and form five distinct frontier zones. To the north lies the Arctic Ocean. Murmansk, located in the northwest reaches of the Soviet Union, is the only year-round port on the Arctic Ocean. To the northeast, sea ice may be present as long as nine to ten months each year. The Pacific Ocean forms the second and eastern boundary of the Soviet Union. Vladivostok, an important naval facility, is one of a few Soviet far eastern ports that are ice free most of the year. The People's

Table 2. POPULATION

Year	Population million people	of which		As a percentage of total population	
		urban	rural	urban	rural
1940	194.1	63.1	131.0	32.5	67.5
1959	208.8	100.0	108.8	47.9	52.1
1970	241.7	136.0	105.7	56.3	43.7
1971	243.9	138.8	105.1	56.9	43.1
1976	255.6	155.1	100.5	60.7	39.3
1979	262.4	163.6	98.8	62.3	37.7
1985	276.3	180.2	96.1	65.2	34.8

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 5.

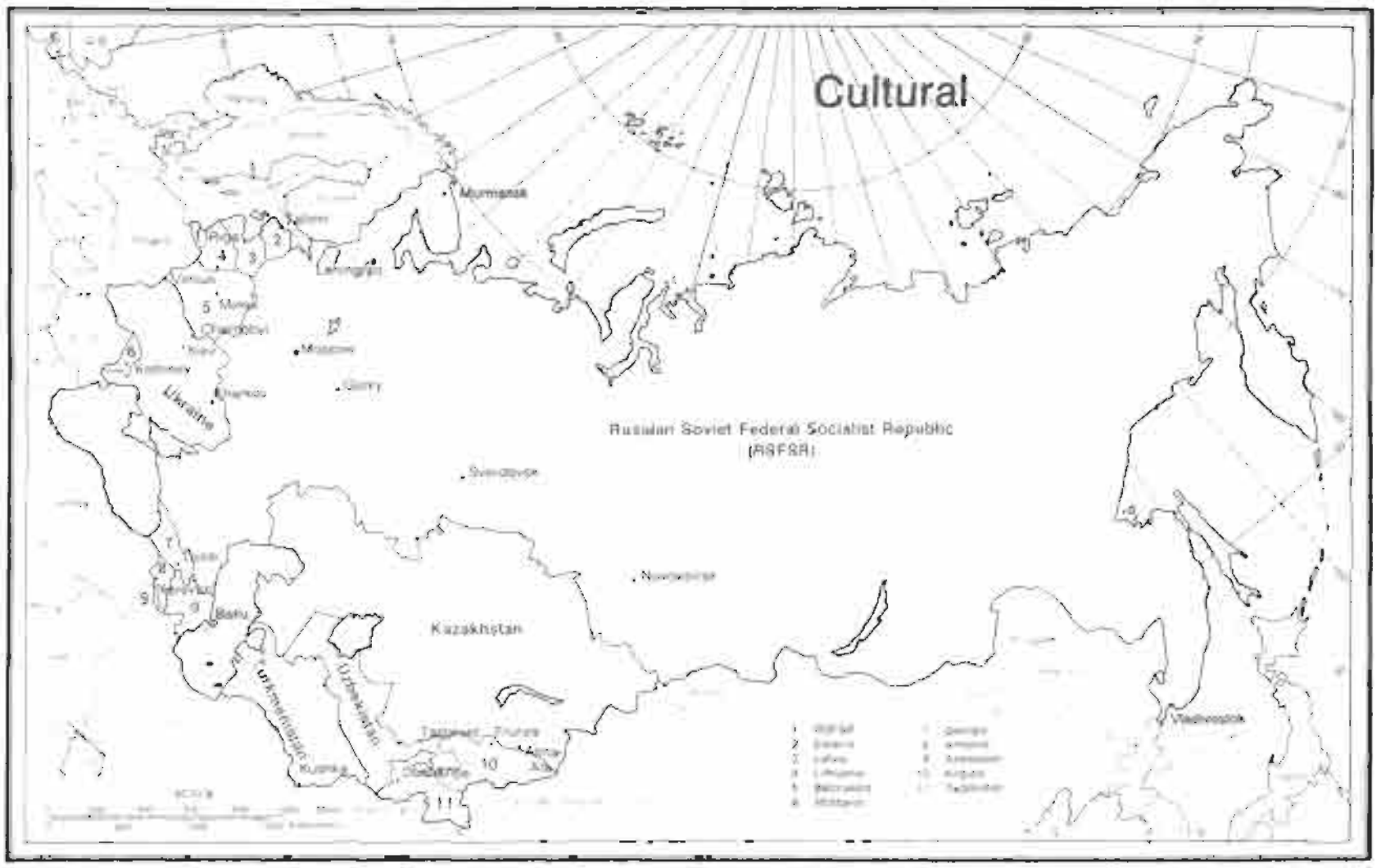
Table 3. POPULATION BY SEX

Year	Total population, million people	of which		As a percentage of total population	
		males	females	males	females
1940	194.1	93.0	101.1	47.9	52.1
1959	208.8	94.0	114.8	45.0	55.0
1970	241.7	111.4	130.3	46.1	53.9
1971	243.9	112.6	131.3	46.1	53.9
1976	255.6	118.7	136.9	46.5	53.5
1979	262.4	122.3	140.1	46.6	53.4
1981	266.6	124.5	142.1	46.7	53.3
1982	268.8	125.7	143.1	46.8	53.2
1983	271.2	126.9	144.3	46.8	53.2
1984	273.8	128.3	145.5	46.9	53.1
1985	276.3	129.6	146.7	46.9	53.1

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 6.

Republic of China, Mongolia, and North Korea are aligned along the Soviet border in the southeast. While Mongolia may be considered a Soviet satellite, its border with China is one of the most heavily fortified in the world, and is often the site of small skirmishes. Possibly the most volitile of the Soviet borders lie to the southwest, with Turkey, Iran, and Afghanistan. Since late 1979, the Soviet Union has occupied Afghanistan under the authority of the "Treaty of Friendship, Good-neighborliness and Co-operation," signed 5 December 1978. Finland, Norway, Poland, Czechoslovakia, Hungary, and Romania border to the west; only Finland and Norway are not members of the Soviet bloc. These border countries form a buffer zone between the Soviet Union and western Europe (Map 2).

From an agricultural perspective, only about 27 percent or 607 million hectares of the Soviet Union is suitable or marginally suitable for agricultural use (Table 4). Ninety percent of reasonably productive agricultural land is found in Soviet Europe and northern Soviet Central Asia. South of Khruschev's "Virgin Lands Development" in western Siberia and northern Kazakhstan, agriculture is limited by desert conditions (Map 3). Farming here primarily is confined to areas irrigated by the Amudar'ya and Syrdar'ya rivers, or by small mountain streams. To the north of the New Lands lies the West Siberian Plain, where the growing season is often too short and the soils too poor for the economical production of crops. From the West Siberian Plain east to the Pacific Ocean lie the Central Siberian Plateau, Lena Plateau, and numerous mountain ranges. This eastern third of the Soviet

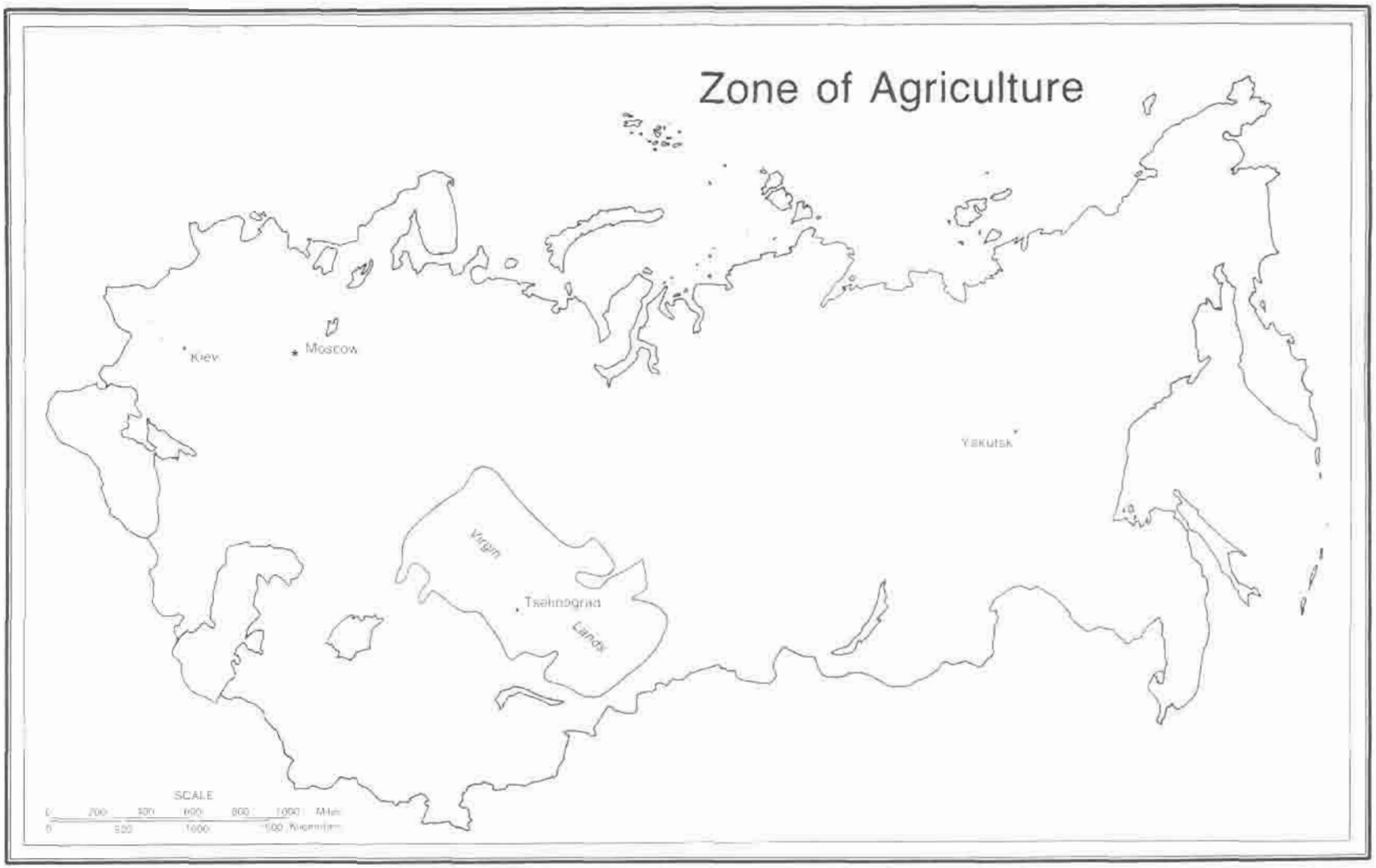

Cultural
Murmansk
Moscow
Russian Soviet Federal Socialist Republic
(RSFSR)
Kazakhstan
Vladivostok

Map 2.

Table 4. SOWING AREAS
(in all categories of agricultural enterprises: million hectares)

Year	Total sowing area	of which				
		grain crops	industrial crops	Potatoes, vegetables and melons	fodder crops	Area under clean fallow
1940	150.6	110.7	11.8	10.0	18.1	28.9
1960	203.0	115.6	13.1	11.2	63.1	17.4
1970	206.7	119.3	14.5	10.1	62.8	18.4
1975	217.7	127.9	14.1	10.1	65.6	11.2
1980	217.3	126.6	14.6	9.2	66.9	13.8
1984	212.6	119.6	13.9	9.2	69.9	20.1

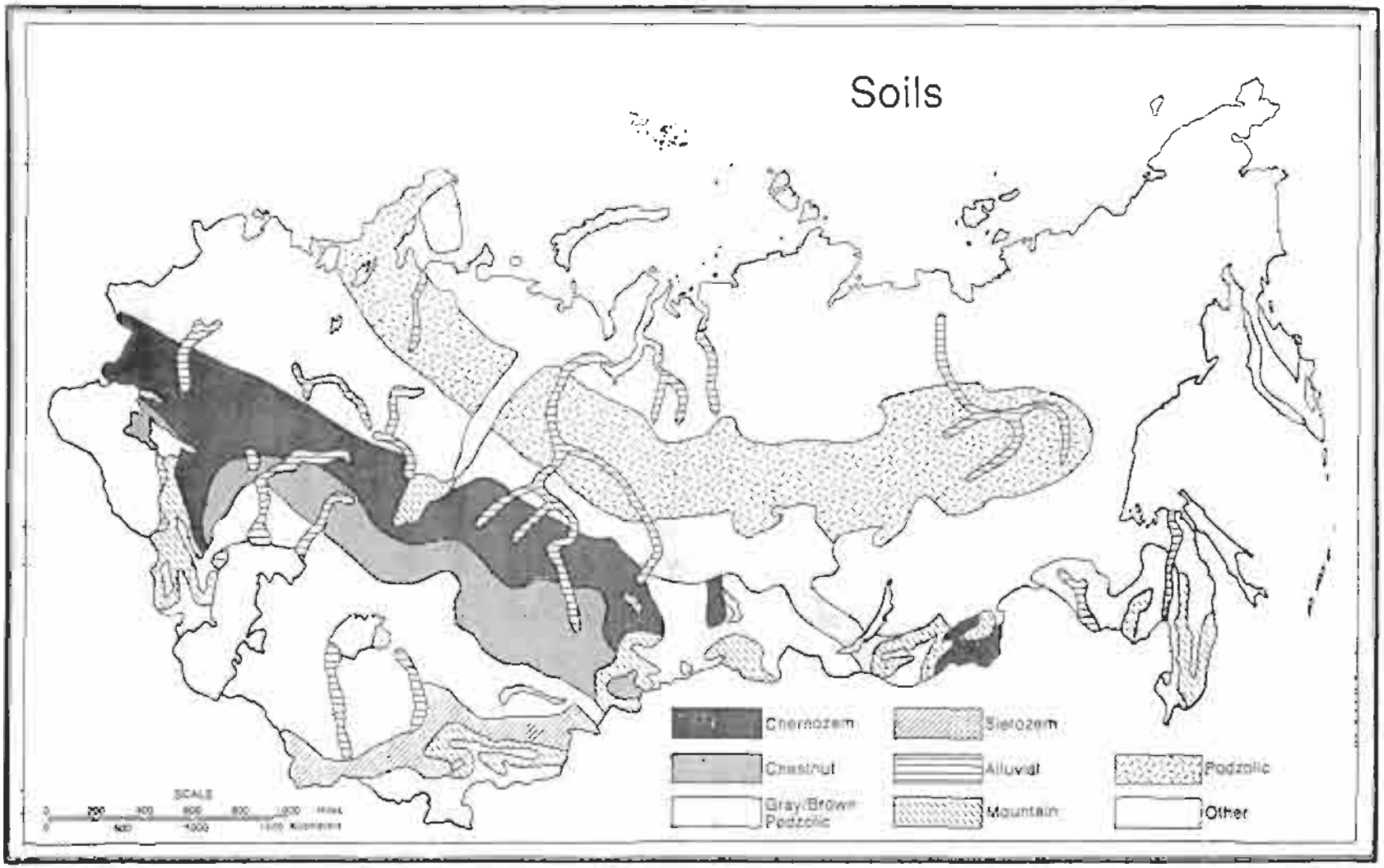
The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 124.


Zone of Agriculture
Kiev
Moscow
Yakutsk
Virgin
Tselinograd
Lands
SCALE
0 200 400 600 800 1000 Miles
0 500 1000 1500 Kilometers

Map 3.

Union is nonsignificant in production of agricultural commodities on a national scale, producing only for small local markets.

The most important agricultural soils in the Soviet Union are the chernozems, the naturally black earth zone that stretches east from the Ukraine to beyond the southern extent of the Urals (Map 4). As in North America, the Soviet chernozems were formed under grassland vegetation in semiarid conditions and have a thick upper layer rich in organic matter and nitrogen. Chestnut soils are the second most important soil type, and together with the chernozems cover only 13 percent of the Soviet Union but account for 60 percent of the land classified as arable. While both are abundant in mineral and organic nutrients, the meadow chernozems and lighter chestnut soils require minimum fertilization for maximum production. No other soils are as suitable for such soil exhausting crops as wheat, corn, sunflowers, and sugar beets. Less favorably, the chernozem and chestnut soils are vulnerable to erosion and moisture deficiency. Grey and brown forest soils cover 12 percent of the entire area of the USSR, and include 30 percent of the arable land. These soils are primarily located north of, and adjacent to, the zone of chernozem soils. With careful management and proper application of fertilizers, they can be very productive, though poor conservation practices have led to serious erosion problems in some areas. These soils are used for the production of rye, oats, flax, potatoes, and fodder crops. Sierozem or grey earth soils of Soviet Central Asia, covering only 2 percent of total area, are often highly productive when properly irrigated and fertilized. Drawbacks to


Soils
Chernozem
Sierozem
Chestnut
Alluvial
Podzolic
Gray-Brown Podzolic
Mountain
Other
SCALE

Map 4.

utilizing sierozem soils include low nitrogen and humus content and a tendency to collect excessive salts after prolonged irrigation, requiring careful drainage and salinity control. Chief crops of Soviet Central Asia include cotton, fruits, and vegetables. Podzolic and other agriculturally insignificant soils cover 73 percent of the Soviet Union. These soils are characterized by high acidity and poor fertility, and are often underlain by permafrost.

WEATHER, CLIMATE, and NATURAL WEATHER HAZARDS

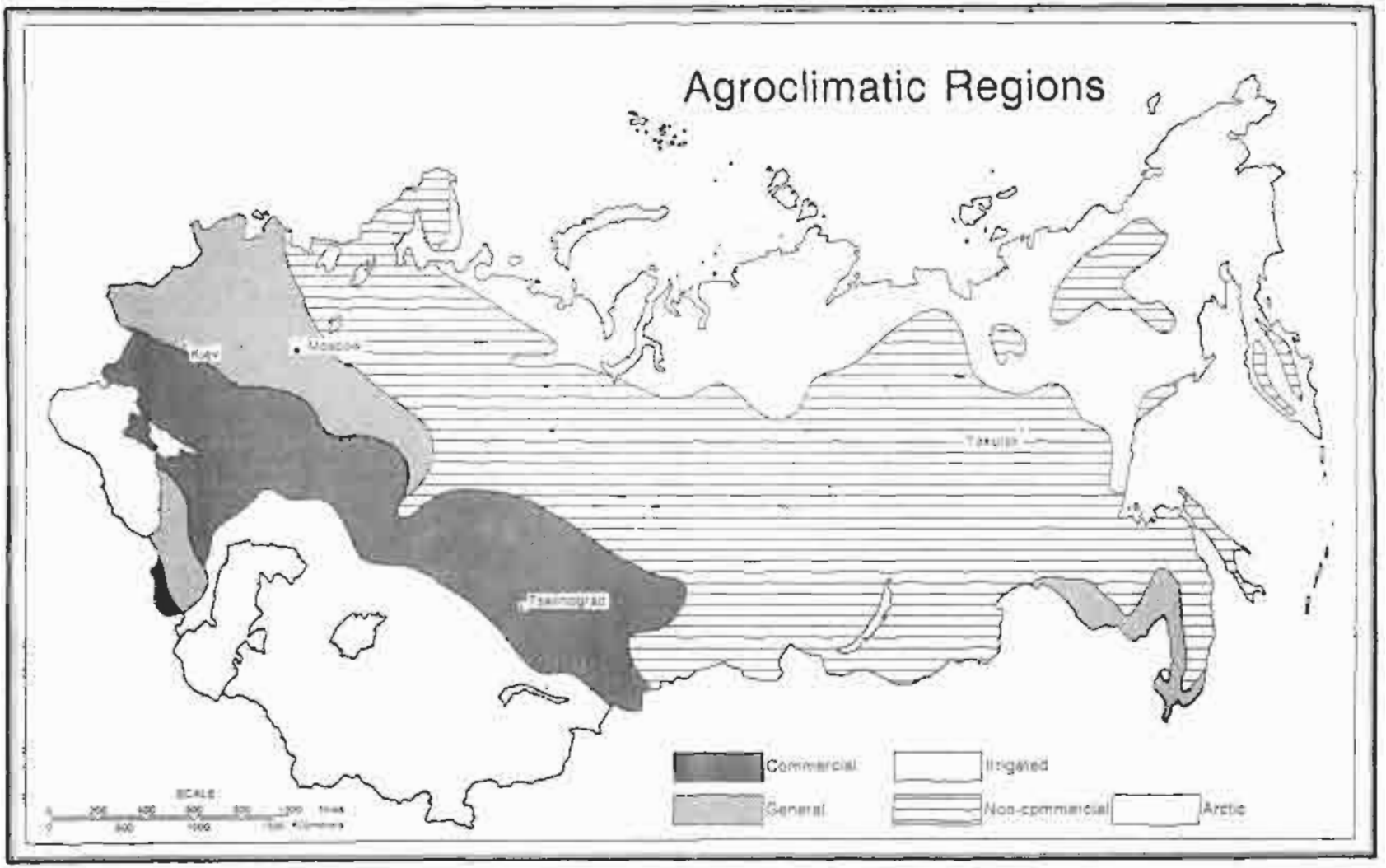
Weather and climatic conditions in the Soviet Union are far from ideal for maximum agricultural production (Table 5). Productive cropland is constrained to the north by cold, to the south by aridity, and to the east by poor soils and rugged terrain. Extending the boundaries of today's zone of agriculture is a risky and capital intensive venture--but one the Soviets are willing to take in order to meet growing internal food demands.

While the most extensive agricultural land resources in the world are found in the Soviet Union, there are a number of weather and climate variables which impede, by varying degrees, agricultural advancement (Map 5). The short growing season is a major problem in much of the USSR. Thirty-three percent of the land area is too cold for agriculture, with an additional 39 percent so cold only hardy early maturing crops, such as buckwheat or fiber flax, can be grown (Map 6). Compared with this 72 percent total, only 21 percent of the United States is agricul-

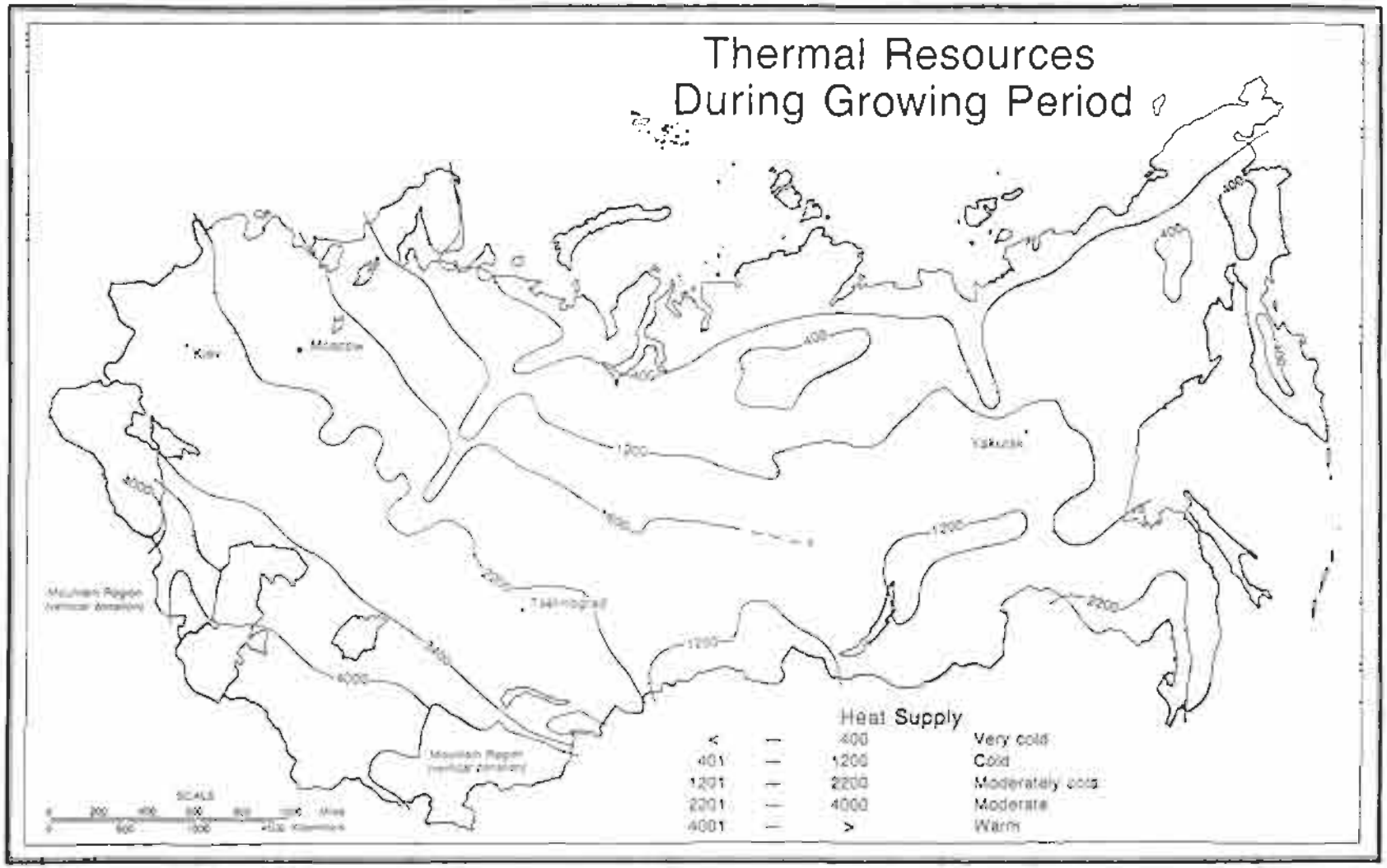
Table 5. YIELD OF AGRICULTURAL CROPS
(in all categories of agricultural enterprises: centners per hectare)

Year	Cotton	Sugar-beet (factory)	Sunflower	Long fibre flax	Potatoes	Vegetables
1940	10.8	146	7.4	1.7	99	91
1960	19.6	191	9.4	2.6	92	111
1965	23.2	188	11.1	3.3	103	123
1970	25.1	237	12.8	3.6	120	138
1975	26.9	181	12.3	4.1	112	135
1980	31.7	218	10.6	2.5	96	150
1981	30.4	168	11.0	2.8	105	150
1982	29.1	202	12.5	4.1	114	165
1983	28.9	234	11.8	4.4	120	161
1984	25.8	246	11.5	3.8	125	165

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 125.


Agroclimatic Regions
Kiev
Moscow
Yakutsk
Tashkent
Commercial
General
Irrigated
Non-commercial
Arctic
SCALE

Map 5.


Thermal Resources
During Growing Period
Heat Supply
< — 400 Very cold
401 — 1200 Cold
1201 — 2200 Moderately cold
2201 — 4000 Moderate
4001 — > Warm
SCALE

Map 6.

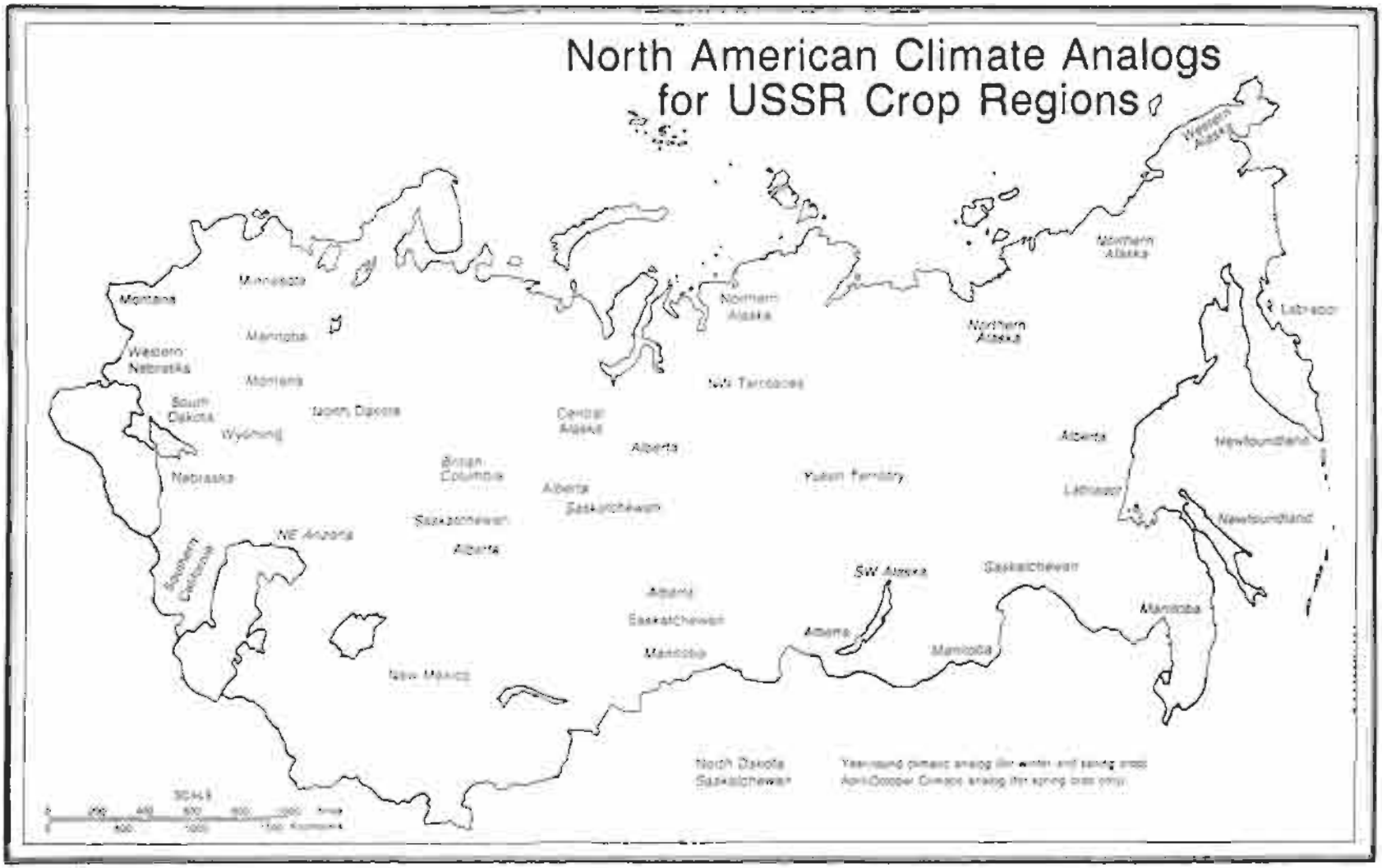
turally limited by cold temperatures (Map 7).

Of equal importance is inadequate and unreliable moisture, a condition which is experienced on over half of the arable land in the Soviet Union (Map 8). In order to minimize this agriculturally limiting natural condition, agricultural techniques such as irrigation, dryfarming, shelterbelts, runoff and erosion control, and snow retention are employed. The United States has similar problems in areas of the sub-humid Great Plains and the arid West.

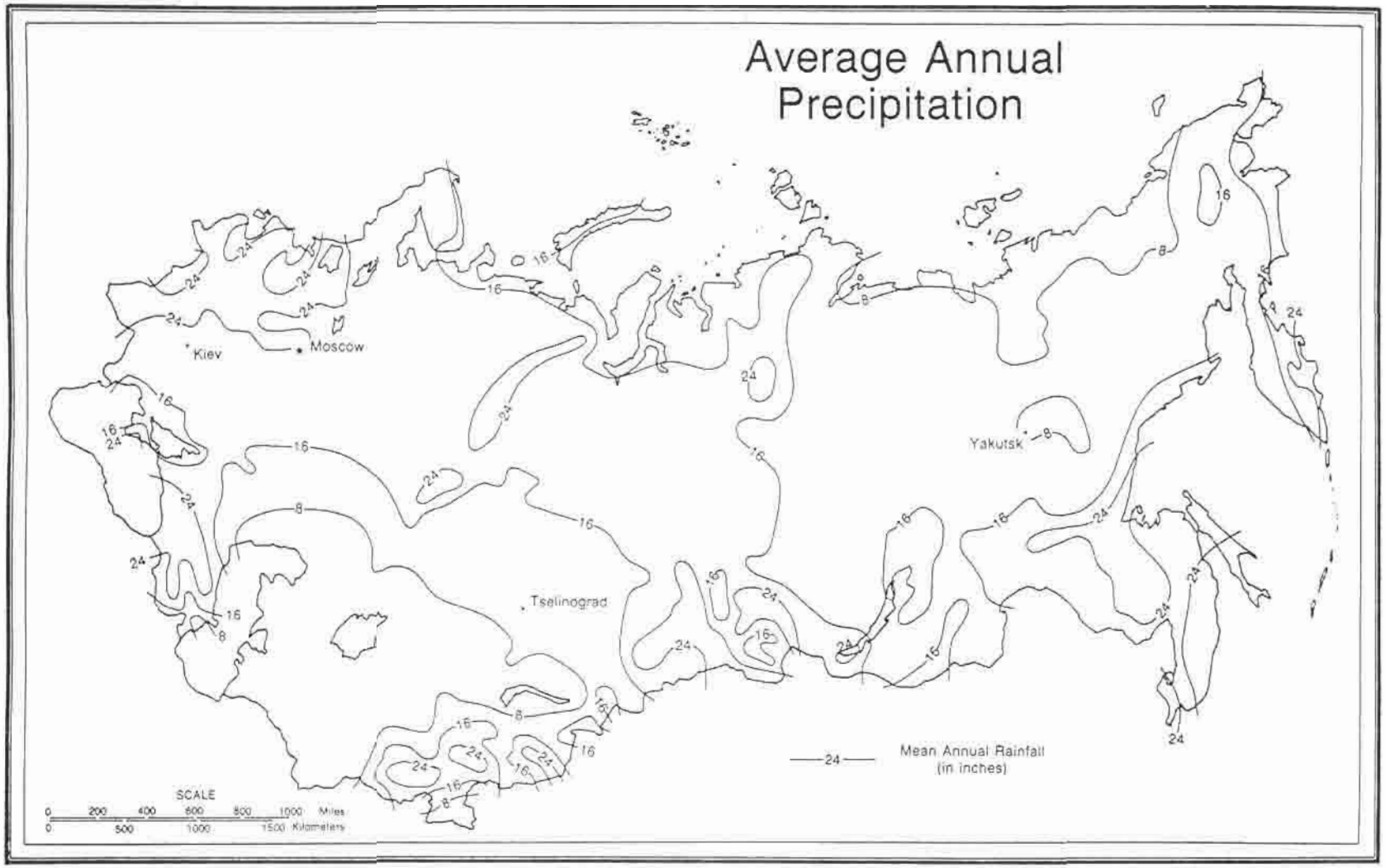
Where adequate moisture is available, agriculturalists experience other limiting factors. Much of the moist relatively drought-free zone lies north of the fertile chernozem and chestnut soils, in a region where late frosts and early freezes inhibit agriculture. Where there is sufficient warmth, water drainage problems reduce yields, depending upon soil and topography.

Precipitation is light to moderate over most of the east-west zone of Soviet agriculture. Moisture is carried into the western Soviet Union by the prevailing westerly winds originating over the Atlantic. Precipitation becomes lighter as the maritime air mass moves eastward and deeper within the Asian continent. Much of Soviet Central Asia, east of the Caspian, receives less than 200 millimeters of rainfall per year. The Caucasus Mountains and eastern coastal area of the Black Sea are the wettest areas, receiving as much as 3750 millimeters of precipitation annually.

Snowfall and wintering conditions are also critical factors for winter crops and soil moisture. Nearly all of the Soviet


North American Climate Analogs
for USSR Crop Regions
Montana
Minnesota
Manitoba
Western Nebraska
Montana
South Dakota
North Dakota
Wyoming
Nebraska
NE Arizona
New Mexico
Northern Alaska
Northern Alaska
Northern Alaska
Mackenzie
Alberta
Alberta
Saskatchewan
Alberta
Saskatchewan
Alberta
Saskatchewan
Manitoba
Yukon Territory
Alberta
Saskatchewan
SW Alaska
Alberta
Manitoba
Saskatchewan
Manitoba
Labrador
Newfoundland
Labrador
Newfoundland
North Dakota
Saskatchewan

Map 7.


Average Annual
Precipitation
Kiev
Moscow
Tselinograd
Yakutsk
24
Mean Annual Rainfall
(in inches)
SCALE
0 200 400 600 800 1000 Miles
0 500 1000 1500 Kilometers

Map 8.

Union is covered by snow during the winter, but depth and duration vary greatly from region to region and year to year. Snow depth should be at least 3050 millimeters in Soviet Europe and 4060 millimeters in Siberia to protect fall sown plants from winterkill, caused largely by intense cold, icing, thawing, and refreezing. A stable insulating blanket of snow is critical for winter wheat survival, and winter wheat comprises an important segment of total Soviet grain production. Winter generally lasts from four to five months in the major grain producing areas and varies in severity depending upon which air mass is dominant--either arctic or marine.

Due to its vast land mass, many types of climate are found in the Soviet Union, from desert to subtropical and boreal forest to tundra. But two distinct continental climates exist within the zone of agriculture: a moist midlatitude continental climate is dominant over the northern and western regions, and a dry midlatitude continental climate prevails over much of the Black Earth and Virgin Lands area.

Poor harvests and crop failures have been repeatedly recorded throughout Russian and Soviet history. In part, rapid, extreme, fluctuating weather conditions have been to blame. It is ironic that the regions most often and most severely affected by drought, sukhovey, and thunderstorms are those regions which are also most agriculturally important. Large-scale droughts are observed in the Soviet Union every three to four years, and local droughts are an annual occurrence. Drought is the single most cited official reason for poor agricultural production or a crop

failure in any given region. Droughts usually begin during the winter months, with below average amounts of snowfall, leaving a soil moisture deficit in the spring after the ground begins to thaw. The most severely affected areas are the southern Ukraine, southwest Russian republic, and most of Soviet Central Asia. While droughts occur all too frequently, they usually appear on a regional basis. According to statistics kept during a 62 year period, drought occurred 26 times in the Ukraine and 28 times in Kazakhstan; drought occurred simultaneously in those two regions only three times. This was a significant factor in Khrushchev's decision to plow up 40 million hectares of virgin and idle land in northern Kazakhstan in 1954, thus ensuring a successful harvest in at least one of these two vital food producing areas.

A unique natural hazard affecting the drought-prone wheat growing plains of the eastern Ukraine and lower Volga, is the dry, hot, desicating easterly or southeasterly wind called sukhovey. During a sukhovey, relative humidity falls below 20 percent, wind velocity varies from 10 to 50 kilometers per hour, temperatures increase rapidly, and can exceed 40 degrees Celsius. These conditions greatly increase stress on plants as they try to transpire moisture faster than they are absorbing water through their root system. Though a sukhovey can occur anytime between April and October, they are most frequent in late summer when crops are ripening. While a sukhovey may last only a few hours, the most damage is done when the period of duration extends for two or more days.

AGRICULTURE in an ATOMIC ERA

and the AFFECTS of a NUCLEAR WINTER

Approximately ten years ago, the Central Intelligence Agency published a study of Soviet crop growing conditions and concluded that agroclimatic elements in the Soviet Union would be unfavorable for at least the following five years. This study concluded that grain production would fall short of official goals by a minimum of 15 to 20 million metric tons each year, and this grain shortfall would require the Soviet Union to buy these amounts on the world grain market. The Soviet Union did experience unfavorable agricultural weather in that time period, and similar upper atmospheric patterns have persisted to this day. In addition, atmospheric scientists' prediction of steadily worsening global weather and climate conditions in the next 25 to 100 years has spurred new interest in the effect of agroclimatic elements upon further food production in the Soviet Union. Undoubtedly, the Soviet Union is a critical piece in the world food supply and demand puzzle.

Most researchers conclude that small shifts in climatic boundaries could make great differences in Soviet crop yields, especially in the relatively dry spring wheat region of northern Kazakhstan. These shifts are being produced by contractions in the Arctic circumpolar air mass, which determines much of the Soviet Union's summer weather. This change in climate is pulling northward various semi-arid regions such as those found in southern Kazakhstan and Soviet Central Asia. The resulting drier

weather along the southern margin of the major spring wheat producing area in the Russian republic and northern Kazakhstan has reduced Soviet grain production.

Knowledgeable agronomists agree that agriculture in the Soviet Union is extremely sensitive to fluctuations in seasonal weather, and many speculate on the ramifications of natural periodic climate changes. At this time there is considerable interest in estimating the total environmental consequences of a nuclear war; a human-generated catastrophy that would trigger vast changes in weather and climate. Since the Soviet Union is covered by vast forests and grasslands, it has been suggested that nuclear explosions could ignite large-scale forest and grassland fires along with urban firestorms. Widespread burning would inject large quantities of smoke into the middle and upper troposphere, and possibly even into the lower stratosphere. A cloud of dust and smoke generated by the fires would envelop the northern hemisphere, blocking out 90 percent or more of the sun's rays, and cooling the earth's surface. Surface temperatures would cool to as low as minus 25 degrees Celsius and remain below freezing for a minimum of three months. Most plant life would cease and nothing would grow in the high latitude agricultural regions of the Soviet Union. Most of the Soviet citizens who might survive the nuclear blast and radiation from the explosion would either quickly freeze or slowly starve to death. Life forms in most parts of the Soviet Union would have difficulty renewing themselves after the dark clouds disappeared and the earth began to gain heat from the sun, for the protective ozone

layer in the upper atmosphere would have been burned off. Ultraviolet radiation from the sun would destroy the capability of most surviving plants and animals to regenerate or reproduce. At the same time, unprotected and denuded soils could not generate a vegetal cover in time before the topsoil has blown away and vast areas of the Soviet Union would become sterile wastelands.

There appear to be new human-generated weather and climate hazards that could reduce Soviet agricultural productivity in the atomic era. A nuclear winter affecting a place, a region, or the entire nation could be generated in some form from a limited exchange of nuclear missiles or a massive explosion (non-nuclear) of a large nuclear power generating complex. A devastating nuclear explosion or series of explosions would produce shock waves, excessive heat, radiation plumes, and fallout that would kill vast numbers of people and livestock within or near the impacted area. Airborne dust and thick layers of smoke would then block the sun from large areas of the Soviet Union. The unbearable cold induced by the restriction of the sun's rays would destroy crops in the field, harmful cloud-borne radiation precipitated far from the impacted area would contaminate stored food and water, and fear of eating radiation-laden food would doom millions of people to a period of hunger and possibly famine. In this atomic era, a nation's ability to grow food can be drastically reduced, agroclimatic elements modified, climates permanently changed, and rural ways-of-life destroyed by human actions and by human accidents.

THE IMPACT of NUCLEAR ACCIDENTS UPON SOVIET AGRICULTURE: THE CHERNOBYL REACTOR DISASTER

Basic to human survival on earth is an adequate food supply. Closely related and necessary to produce this food needed by humans is adequate energy. Over the centuries, humans have used energy in agriculture from many sources. Beginning with their own energy and sunlight, humans progressed to draft-animal power, wood fuel, and water and wind power. Later, mechanical power was developed and fueled by wood, coal, petroleum, and nuclear energy. Controlling and using energy has enabled humans to progress from a simple primitive life to a complex settled society.

Recognizing that agriculture in the Soviet Union was less mechanized than that in the United States, the Soviet government in the early 1970s increased funding for rural electrification projects and for the application of labor-saving machines to all agricultural operations. Electrification and mechanization of integrated livestock complexes are emphasized in the current Five-Year Plan. Their objective is to increase labor productivity, lower production costs, and substantially improve the uniform quality of all agricultural products. In order to supply electricity to agricultural enterprises and rural inhabitants in the fuel deficient regions of the Soviet Union, nuclear power plants were and are being constructed.

In 1954, the Soviet Union became the first country to use nuclear power to generate electricity. Untroubled by antinuclear protests and environmentalists, the Soviets now have one of the

most active nuclear power construction programs in the world. In early 1984, the Soviet Union had twelve nuclear power stations with one or more operating reactors, with additional reactors under construction at six operating stations. Also, eleven new nuclear power stations and two district heat stations were under construction. Electricity generated from a total of forty-one nuclear reactors account for approximately eleven percent of the total Soviet electricity output.

The Soviets have designed two basic types of power reactors, the pressurized water reactor (PWR) and the graphite-moderated pressure-tube boiling water reactor (GMPTR). Concerns regarding safety precautions and protective design features in the Soviet nuclear power industry had been expressed by scientists all over the world, and concerns were also expressed regarding shoddy workmanship and maintenance of older plants. Unexpectedly, a nuclear power plant catastrophe occurred at the Chernobyl Nuclear Power Station, 130 kilometers north of Kiev, in the beautiful gently rolling northern Ukrainian countryside. Fueled by the white-hot graphite core of reactor number 4, the runaway hydrogen explosion and fire burned at temperatures in excess of 2800 degrees Celsius. Radioactive gases and particles immediately spread over a vast segment of one of the Soviet Union's most important food grain regions--the eastern Ukraine along with the southern Belorussian dairy region--contaminating water supplies for more than six million people (Table 6). In the first few hours of this man-made nuclear disaster, lethal forms of strontium-90, iodine-131, and cesium-137 were released into the

Table 6. CHERNOBYL' NUCLEAR ACCIDENT: SHARE OF NATIONAL AGRICULTURAL PRODUCTION BY IMPACTED OBLASTS

Republic	Gross Agricultural output	Grain	Potatoes	Meat	Milk	Sugarbeets	Sunflower
				Percent			
Ukraine							
Total	18.0	21.3	25.1	22.6	22.9	61.6	45.5
Selected Oblasts							
Kiev	1.3	1.0	2.2	1.2	1.3	4.5	0.2
Chernigov	1.1	0.8	3.5	1.2	1.2	2.7	0.1
Zhitomir	0.6	0.6	2.2	0.9	1.0	1.8	---
Belorussia							
Total	5.4	3.5	14.8	5.7	6.6	1.8	---
Gomel Oblast	0.9	0.5	3.0	1.		1.2	NA
Russia							
Selected Oblasts							
Bryansk	NA	0.5	2.9	0.8	0.9	0.1	---
Kaluga	NA	0.2	1.0	0.4	0.7	---	---
Orel	NA	0.8	1.1	0.6	0.7	0.9	---
Kursk	NA	1.1	1.3	0.9	1.1	3.5	NA
Tula	NA	0.7	0.9	0.7	0.8	0.5	---
Latvia	1.4	0.6	1.9	1.8	1.8	0.5	---
Lithuania	2.1	1.3	2.4	2.7	2.9	1.2	---
Estonia	0.9	0.6	1.2	1.2	1.3	---	---

Source: Estimates by the Economic Research Service, based upon data in USSR and republic statistical yearbooks; Kathryn Zeimetz, International Economics Division, USDA.
--- = less than 0.1 percent. NA = not available.

atmosphere. Slowly a deadly plume of highly dangerous materials drifted over some regions of the Soviet Union's, Poland's, Hungary's, and Romania's best farmlands. In greatest and immediate danger were those rural and small town inhabitants nearest the nuclear power station. At distances of about half a mile, victims had a fifty-fifty chance of surviving. Up to 2600 square kilometers of farmland around the plant is likely to remain contaminated for decades. The total death toll for humans may never be known, but thirty-one people died within a matter of weeks and possibly more than one thousand will die within a year. Total number of individuals who will suffer health problems from the Chernobyl disaster may eventually exceed 100,000.

This nuclear catastophe has generated social, economic, political, and diplomatic repercussions that reach far beyond that small Ukrainian town. Soviet agricultural losses are estimated to be from two to four percent of total production; radiation from Chernobyl tainted and made unusable up to 20 percent of the milk, 10 percent of the meat, 25 percent of the potatoes, 10 percent of the wheat, and 20 percent of the sugar beets produced in the Soviet Union (Table 7). Replacement of the contaminated foodstuffs and agricultural raw materials, along with resettlement of at least 135,000 people, clean-up, repair activities, cost of producing needed electricity in this fuel deficient region, and loss of income from sale of exported electricity will drain resources from the rest of the Soviet economy; estimated total losses may exceed six to eight billion rubles. It will reduce the amount of oil, natural gas, and coal that might have

been exported. Food and grain to replenish lost stores must be purchased on the international market. The Soviet Union, if funds are available, will eventually turn to the United States and/or other non-communist nations for a high percentage of the necessary grains and foodstuffs.

Table 7. CHERNOBYL' NUCLEAR ACCIDENT: AGRICULTURAL PRODUCTS CONTAMINATED BY RADIOACTIVITY

Agricultural Products in which a Higher than Permissible Level of Radioactive Contamination was Detected

Oblast	Meat	Milk[1]	Vegetables		Berries	Fish
			Green	Root		
		Percent				
Bolorussia						
Minsk	10	5	--	--	--	--
Gomel	40	30	15	10	5	90
Brest	10	50	5	3	5	--
Mogilev	20	10	--	--	--	--
Grodno	--	5	--	--	--	--
Russia						
Tula	--	15	--	--	--	--
Bryan	--	30	--	--	--	--
Kaluga	--	20	--	--	--	--
Kursk	--	30	--	--	--	--
Orel	--	10	--	--	--	--
Ukraine						
Kiev	--	10	20	--	20	--

-- = data not available.
1 = includes milk products.

USSR State Committee Report to the International Atomic Energy Association (IAEA)

CHAPTER II

CONTEMPORARY INSTITUTIONAL PROBLEMS IN SOVIET AGRICULTURE

SOVIET AGRICULTURAL THEORY

The Communist Party of the Soviet Union has guided the socialist transformation of agriculture under the principles of Marxism-Leninism since the October 1917 Revolution. But the prelude to modern Soviet agricultural programs began in 1893, when Lenin wrote his first Marxist work, "New Economic Developments in Peasant Life." For the first time, agricultural problems and questions were dealt with and answered by applying Marxist ideology. By addressing agrarian questions, it was Lenin's hope to link the revolutionary-democratic movement of the peasant majority with the socialist movement of the urban working class minority. Agrarian transformations formally began with the "Decree on Land," adopted by the 2nd All-Russia Congress of Soviets on the day following the October Revolution. This act abolished forever and without compensation all private ownership of land. The "Peasant Mandate on Land" followed, declaring land to be the common property of the people, which could be worked by any one or group of citizens who wished, but with the stipulation that the use of hired labor was strictly prohibited. Thus, land would be divided equally among those who till it. Equalitarian land tenure, though not a principle of the Communists' agrarian program, was necessary in order that the peasant mandates be carried out, if only superficially. The reasoning behind this move was clever, if not brilliant. It was important that the peasants "fail" on their own--becoming convinced through their own experience that an excess of land parcelling would not over-

come their poverty or agricultural backwardness. At the same time, this measure would serve to undermine the interests of the relatively wealthy class of farmers known as kulaks, who the Bolsheviks viewed to be antagonistic to their cause. The mandates of the peasants were complete in February 1918, with the adoption of the "Law on Land Socialisation" which encouraged collective forms of land use and gave local government units the right to redistribute land and other facilities that had been privately owned.

In March 1919, a new agrarian program was developed by Lenin and the Communist Party. This program had two goals: 1) establish large state-owned socialist agricultural enterprises; and 2) support for those working in agricultural communes and cooperatives. Though the organization of collective or state farms as we now know them was still ten years away, this was the foundation for complete state control of the agricultural economic sector.

While there have been great strides in Soviet agriculture since the 1920s in mechanization, farm management, agrotechnology, and the rural quality of life, the tenet of Soviet socialized agriculture has changed little. Soviet agricultural theory is based upon strict governmental control of agriculture, loosening the reins only in times of much needed increased agricultural production.

Agriculture has always played a significant role in Communist Party program planning. The agro-industrial complex's economic function in the integrated national economy is to pro-

vide the state with a reliable, adequate, and uninterrupted supply of agricultural raw materials and foodstuffs. Availability of quality food has always been an important yardstick by which the Soviet people have measured the progress of their country. Ultimately, the survival of the Communist Party rests upon the prosperity of agriculture.

COLLECTIVIZATION, WORLD WAR II, and KHRUSHCHEV THROUGH PRESENT

After seizing power from the Tsarist government in late 1917, it was Lenin's and the Bolshevik Party's intent to eliminate private ownership of land and impose a system of organized industrial labor upon the agricultural sector. For the next decade, through the period of "War Communism" (1918-21) and the "New Economic Policy" (1922-28), the majority of farmers continued to operate their land holdings independent of the government, while the state maintained control of industry, foreign trade, banking, and transportation, in an effort to rebuild the country's economy.

By 1927, only two percent of farmers were enrolled in the socialized sector, specifically working on state farms and various types of collective enterprises. At the beginning of the First Five-Year Plan in 1928, Stalin called for mass national collectivization. The Stalin model for socialist agricultural development was forced upon the peasants, and was oftentimes brutal or deadly. By the end of the First Five-Year Plan in 1933, only five percent of all farmland remained under private

cultivation. Not only did collectivization effectively eliminate private farming, thus bringing the agricultural sector in line with communist ideology, but it also created a base for urban industrialization. The Soviet state was now able to generate capital by purchasing agricultural commodities at low, artificially set prices from collective farms and sell these commodities at a profit nationally or internationally.

Along with collectivization appeared the Machine and Tractor Station (MTS). The Machine and Tractor Stations were state owned and operated, and provided heavy machines and technical expertise to collective farms. Since one Machine and Tractor Station served several farms, it played an economic and decision-making role with its ability to determine planting, plowing, and harvesting schedules. The MTS also became the unit for channeling grain deliveries to the state. Their services were paid in kind, as a percentage of the harvest total of those fields where Machine and Tractor Station equipment had been used. By 1940, 7069 Machine and Tractor Stations served more than 235,000 collective farms, a 1 to 33 ratio; using 435,000 tractors, 153,000 grain harvesters, and 40,000 trucks. By 1958, the Machine and Tractor Stations were phased out and machinery was made available to individual collective farms.

Once initial collectivization was complete and peasant resistance eliminated in 1934, urgent recovery of rural living standards and capital investments were needed; particularly after the devastating 1933-34 famine. One of the first moves to improve the food sector, was to once again introduce private

production and marketing of agricultural output on a limited scale. Though agricultural production was beginning to increase by World War II, the effects of collectivization were still felt in production statistics. During World War II, governmental policy towards the private sector once again became even more lenient in order to meet the tremendous food demands of their military personnel at war and citizens under siege. Still there was acute hunger, mass starvation, and famine. The last stage of Stalin's agricultural program, from 1945 through 1952, was that of rebuilding. Even with strict control, the private sector continued to flourish, and in 1953 accounted for 45 percent of gross agricultural output. Collective farms equalled that level, and the remaining ten percent was produced on state farms. Stalin, in order to enhance centralized agricultural management by the state, reduced the number of collective farms (but not total hectares) in 1950 from 245,000 to 97,000 through a series of mergers.

When N. Khrushchev came to power in 1953, he implemented a sweeping agricultural policy designed to show immediate gains in agricultural production, thus helping to consolidate his power base. While initial moves were meant to eliminate extreme and economically unsound policies practiced during the Stalin period, new and detailed measures were formulated to assist the development of agricultural production and efficiency. In broad terms, there were four points: 1) <u>increase total output</u> through expansion of cultivated land and added capital inputs; 2) <u>modernize production</u> through greater organization, improved agricultural

techniques, and more efficient spatial allocation; 3) as an incentive for increased performance, raise incomes of farm managers and workers; and 4) increase production of the socialized sector to meet internal food demands, thus eliminate the need for the private sector's contribution. In effect, these measures were meant to raise the quality and quantity of foodstuffs, while decreasing production costs.

Made overconfident by some early production successes, Khrushchev lessened capital inputs thinking the agricultural economy and production were on solid footing. Capital earmarked for agriculture was diverted to expansion of the chemical industry on the basis that fertilizers for agriculture were produced there. Agricultural growth soon leveled, and in conjunction with a major drought in both the Ukraine and northern Kazakhstan in 1963, farm output dropped drastically. As a result, Khrushchev was removed from power and leadership of the Soviet Union was assumed by L. I. Brezhnev.

Brezhnev faced several agricultural problems during the mid-1960s and 1970s, including: 1) making adequate capital available in agriculture (Table 8); 2) acquiring new technology and applying it effectively throughout the country; 3) amending the imbalances in regional agriculture; 4) correcting continuing inefficiencies in the organization and management of farm work; and 5) coping with consumer demands for more and better food and with pressures for improving rural living conditions.

Brezhnev's main impact upon agriculture may well take place long after his death in November 1982. The new "Food Program for

Table 8. INVESTMENTS IN AGRICULTURAL FIXED ASSETS COVERING THE WHOLE COMPLEX OF WORK (in comparable prices; thousand million rubles)

	Total	of which	
		by the state	by collective farms
Seventh Five-Year Plan	54.6	31.3	23.3
Eighth Five-Year Plan	92.4	54.6	37.8
Ninth Five-Year Plan	147.9	94.2	53.7
Tenth Five-Year Plan	193.9	128.9	65.0
Four years of Eleventh Five-Year Plan	175.4	118.8	56.6
1981	41.8	28.4	13.4
1982	43.1	29.2	13.9
1983	45.6	30.8	14.8
1984	44.9	30.4	14.5

The share of investments in agricultural fixed assets covering the whole complex of work in total investments in the national economy made up 20 per cent of the Seventh Five-Year Plan period, 23 per cent in the Eighth Five-Year Plan period, 26 per cent in the Ninth Five-Year Plan period, 27 per cent in the Tenth Five-Year Plan period and four years of the Eleventh Five-Year Plan period.

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 170-171.

the Period up to 1990," which was developed by Brezhnev, was adopted by the plenary session of the Communist Party of the Soviet Union's Central Committee on 24 May 1982. The goal of this program was agricultural self-sufficiency by 1990. By early 1986 it was evident to the Soviet leadership, and substantiated by published statistics, that the program would fall short of its goals. On 1 June 1986, Mikhail Gorbachev announced measures to increase food production, including the promise to return part of the decision-making process to farm management in 1987. A similar program of decentralization has been very successful in Hungary.

COLLECTIVE and STATE FARMS

Within one year after the October Revolution, the first collective associations were formed and the first state farms were created by nationalizing large private agricultural estates. By 1922, there were approximately 11,000 collective farms and 4,316 state farms. According to Lenin, state farms were to serve as model enterprises, assisting both individual farmers and the early cooperatives in recognizing the advantages of large-scale socialized production. Of the two systems, the state farm was (and currently is) viewed as the ultimate socialized agricultural enterprise, while the collective farm was envisioned only as a transitional form.

During the early 1920s, three forms of collective farms emerged, each on a different level of socialist-communist evolu-

tion. The highest form was the agricultural commune. On a commune all members pooled their property, except personal effects, and the members lived and worked as one, equally sharing the proceeds and benefits of their labor. Next was the agricultural artel, similar to the agricultural commune, but differing in two important respects: 1) proceeds and benefits of their work were divided proportionally to the amount of labor each member performed; and 2) they lived in the traditional rural village rather than in a communal setting. Artel members were also allowed a small private plot and some livestock. Lastly, in the TOZ or "association for the joint cultivation of the land," the workers pooled their resources only to do heavy fieldwork.

While Party leaders believed that the farm peasants would naturally evolve from the TOZ to the agricultural commune upon learning of the "natural" advantages of a socialized system, this did not occur. In 1927, only 9 percent of the collective farms were categorized as agricultural communes, while 48 percent were artels and 43 percent were classified as TOZ.

Although the number of collective farms has decreased tremendously through a series of mergers to enhance central control, from a high of 245,600 in 1935 to 25,900 in 1986, they still serve much the same function as nearly sixty years ago (Table 9). Collective farmers are typically conservative; they resist change and try to maintain traditional values with the family as the nucleus. By birthright, children become members of their collective farm. While transferring membership from one collective to another is possible, it is difficult to leave the

Table 9. BASIC INDICATORS OF COLLECTIVE FARM DEVELOPMENT
(excluding fishing co-operatives)

	1970	1980	1984
Total number of collective farms (end-of-year figures)*, thousands	33.0	25.9	26.2
Number of households at the collective farms, millions	14.4	12.8	12.6
Average annual number of persons engaged at the collective farms, million people	16.7	13.3	12.7
Non-distributable assets of collective farms in fixed and circulating assets (end-of-year figures), thousand million rubles	60.0	109.8	130.0
Gross income of collective farms (in actual prices)**, thousand million rubles	22.8	19.6	34.0
Payments in cash and kind for collective farmers' work in the collective economy--total, thousand million rubles	15.0	19.0	22.3
Remuneration of collective farmers from the collective economy, rubles:			
average monthly	74.9	118.5	145
daily	3.90	5.52	6.52

Continued

	1970	1980	1984
Productive mutually-owned livestock (end-of-year figures)*, million head:			
cattle	41.7	47.9	50.7
of which cows	13.5	16.1	16.0
pigs	29.6	28.1	29.3
sheep and goats	54.1	45.5	44.5
of which sheep	53.5	45.2	44.2
Tractors (end-of-year figures):			
thousand units	942	1057	1121
aggregate capacity of tractor engines, million horse-powers	50	76	88
Number of grain harvesters (end-of-year figures), thousand units	292	300	355

* The reduction in number of collective farms up to 1982 was due to their merger and reorganization of some into state farms.

** Gross income (net product) of the collective farms is the value of the gross output (without capital construction and capital repairs) minus material production inputs (seeds, fodder, fuel, fertilizers, depreciation, etc.)

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 142-144.

collective in order to move to urban areas. Conversely, few people leave the cities to work on a collective farm. Most collective farm families live in single family homes with a garden plot and a few animals. A collective farm averages about 500 households, but many support several thousand (Table 10). Farm workers live with their families in small villages within or near the boundaries of the farm. Collective farm worker's wages are low in comparison to state farms or industrial workers, but increases in salary and benefits have been recently approved by the government. It was not until Brezhnev announced his agricultural program in 1965 that collective farm workers even received a guaranteed wage. Payment was usually in kind and just once each year. The greatest source of income for the collective worker has always been from products grown or raised on private plots and sold on the open or collective market.

State farms, in physical appearance may seem similar to collectives, but differ in administrative organization and social purpose (Table 11). State farms may best be described as industrial agricultural factories, with workers being state employees and paid wages from state funds. All means of production and all products are state property. The purpose of the state farm initially was to act as a model which would demonstrate advanced scientific techniques and emphasize high return of labor productivity gained from large-scale mechanization; in practice today they have evolved beyond "models" and must contribute substantially to total national agricultural production. Stalin's industrial agricultural factories have not been as productive as

Table 10. COLLECTIVE FARMS IN AVERAGE
(excluding fishing co-operatives)
(per one collective farm)

	1970	1975	1980	1981	1982	1983	1984
Collective farm household	435	473	492	489	487	484	482
Non-distributable assets of collective farms in fixed and circulating assets, thousand rubles	1815	3216	4238	4391	4363	4678	4970
Gross income of collective farms, thousand rubles	689	781	755	777	840	1360	1300
Agricultural area, thousand hectares	6.1	6.4	6.6	6.5	6.5	6.5	6.4
Mutually-owned sowing, thousand hectares . . .	3.0	3.4	3.7	3.6	3.6	3.5	3.5
Mutually-owned livestock, head:							
cattle	1258	1664	1844	1850	1853	1889	1933
of which cows	409	535	621	623	618	614	609
pigs	891	844	1085	1067	1086	1124	1120
sheep and goats	1633	1813	1755	1733	1698	1716	1695
Number of tractors, units	29	37	41	41	41	43	43

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 145.

Table 11. BASIC INDICATORS OF STATE FARM DEVELOPMENT

	1970	1975	1980	1981	1982	1983	1984
Number of state farms (end-of-year figures), thouands	15.0	18.1	21.1	21.6	22.0	22.3	22.5
Average annual number of persons engaged in all branches of production, million people	8.9	10.3	11.6	11.6	11.8	11.9	12.0
of whom workers	7.0	8.0	8.8	8.8	8.9	9.0	9.0
Productive fixed assets for agricultural purposes (by balance sheet cost gross value; end-of-year figures), thousand million rubles . .	36.9	70.0	110.8	119.2	127.1	135.4	144.9
Total crop area, million hectares	91.7	107.3	111.8	110.7	110.4	109.5	109.3
Livestock (end-of-year figures), million head:							
cattle	29.1	35.6	40.1	40.7	40.8	41.5	42.2
of which cows	10.0	12.1	13.6	13.7	13.7	13.7	13.7
pigs	16.6	16.2	23.6	23.8	24.5	25.4	25.9
sheep and goats	53.5	63.1	69.0	69.8	69.5	70.6	69.4
of which sheep	53.1	62.4	68.1	68.8	68.5	69.5	68.3
Tractors (end-of-year figures):							
thousand units	803	1038	1190	1207	1228	1258	1283
Number of grain harvesters (end-of-year figures), thousand units	294	351	373	381	394	408	420

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 146-147.

envisioned, and yields per unit of area tend to be lower than on collective farms. There are over 22,500 state farms, each averaging 5,000 hectares sown (Table 12). State farms are usually better equipped, but less intensively cultivated than collectives. Each year, there are more state farms and fewer collectives, as the leaders of the Soviet Union move forward in bringing the forms of agricultural organization closer to the basic tenets of Marxist-Leninist ideology.

PRIVATE PLOTS

Today in the Soviet Union, there are three main agricultural production divisions. State farms account for approximately 53 percent of the total arable land, collective farms 42 percent, and the remaining 5 percent is under private production. The private sector in Soviet agriculture is the most productive division per capita. In 1983, 60 percent of total potato production, 32 percent of vegetable production, 30 percent of egg production, and 29 percent of meat and milk production came from private plots. Approximately 30 percent of the total agricultural output in the Soviet Union is by the private sector, thus playing an extremely important role in Soviet food production.

Since the object of Marxist-Leninist ideology is to further the development of socialism-communism, private food production has always been limited except in times of dire food needs. The Soviet government prefers to describe private plots as personal

Table 12. STATE FARMS IN AVERAGE
(per one state farm)

	1970	1975	1980	1981	1982	1983	1984
Agricultural area, thousand hectares . . .	20.8	18.9	17.2	16.9	16.6	16.3	16.2
Crop area, thousand hectares	6.2	5.9	5.3	5.3	5.0	4.9	5.0
Cattle, head . .	1944	1973	1906	1885	1858	1858	1880
of which cows	669	670	645	636	622	613	608
Pigs, head . . .	1116	892	1120	1104	1113	1138	1151
Sheep and goat, head	3607	3494	3281	3238	3162	3161	3090
Number of tractor, units	54	57	57	56	56	56	57

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 148.

subsidiary plots, thus not inferring the capitalist element of personal land ownership.

Eligibility for use of land and the actual size of the land parcel are determined by occupation. Permanently employed families of collective farms, state farms, and other agricultural institutions that live and work in rural areas are eligible for the maximum allotment of 0.5 hectares. The majority of private farming is done by collective farm workers. An allotment of 0.25 hectares is given to rural people in management, educational institutions, medicine, library science, energy, and police. Retired and other individuals who do not meet specific qualifications may be allocated 0.15 hectare of land per family. A Soviet citizen living in an urban area wanting to plant a small plot of land in the countryside must first belong to a horticultural cooperative before becoming eligible for a parcel of land. Not all families or individuals qualify or are eligible to receive permission to plant private plots.

The Soviet government has recently established a diverse program of incentives to aid private producers increase food production. Credit funds available for buying or constructing garden cottages and for improving garden plots increased from 1,000 to 3,000 rubles. The loan repayment period can extend up to ten years at two percent interest. Collective and state farm managers have been directed to provide individuals greater access to pasture and hay cutting lands, and help in transporting and procuring agricultural products, construction materials, fertilizers, and veterinary services.

Located in urban areas, collective farm markets play an extremely important role in the sale of fresh, high-quality agricultural products. With the new Food Program of 1982 specifically stressing the need to improve collective farm markets, the Soviet government has invested a great deal of capital in these markets over the past four years. Today, the collective farmer has better access to weighing equipment and refrigeration units; if farmers must travel a long distance to market, they may reserve hotel rooms in advance.

Beginning 1 June 1986, private producers of beef and poultry were allowed to sell their products directly to local stores and restaurants. This decree was issued to help prevent waste and spoilage, but designed mainly to lower the price of farmers' products by eliminating the Soviet government as the inefficient middleman.

Private plot agricultural products also prove beneficial to collective and state farm managers, for items sold to the state from private plots can be included in the farms' total production figures. This helps guarantee that the farm will fulfill its production quotas for the year, and contribute needed input towards achieving the goals of the current five-year plan period.

CAPITAL INVESTMENTS

An obvious discrepancy exists between the tremendous growth rate of Soviet heavy industry and Soviet military hardware, and the extremely poor growth rate of Soviet agriculture. True,

most Americans' understanding of Soviet power is based upon relative military strength--the number of missiles, nuclear warheads and submarines for example--but many other factors also determine a nation's overall political abilities and influence in world affairs. The most basic factor in determining a nation's ability to grow socially and politically, and to develop a lifestyle deemed ideal, is its ability to feed its citizens.

Soviet agriculture has served as the "capital generator" for industrial development and as the "stepchild" of the Soviet economic system; it has never been funded at a level that would have enabled farmers to produce the food needed by the nation nor adequately compensate farmers for their work. One reason for the scantiness of capital investment in agriculture was that the Soviet leaders have never given high priority to rural economic development or rural life; the focus of Soviet leaders has been upon urban affairs and urban economic development. For decades the greater portion of the country's capital investment and skilled manpower went into expanding heavy industry, while agriculture received miserly allocations. An increase in total state investments in the socialized agricultural system represents one of the most important conditions for developing a sound material and technical base for agriculture. Failure of the state to provide adequate capital is more serious when one considers that state and collective farms are nothing more than state implanted institutions designed primarily to deliver a fixed quota of farm products to the state at a set procurement price.

Recognizing the potential consequences of urban Communist Party members' dissatisfaction with their basic diets and the quality of available food, and observing the reaction to urban food shortages in Hungary, Czechoslovakia, East Germany and Poland, the Soviet government has begun to rectify the long-term investment capital shortages in Soviet agriculture. Capital investment in agriculture during three of the most recent five-year plans accounted for 85 percent of all capital investment in agriculture up to that time; that is, 383 out of a total of 451 billion rubles were invested between 1966 and 1980. Still agricultural production did not meet state needs, and in the early 1980s, the Soviet Union imported more grain than any country in history. Approximately one-fourth of all grain used for feeding people and livestock came from outside the Soviet Union. Acknowledging failure within the agricultural system itself, the Soviet government approved the new Food Program of 1982, and state capital allocations to agriculture increased. The increase in capital has proved inadequate, indicated by shortages of grain, meat, milk, and other products during the Eleventh Five-Year Plan, from 1981 through 1985.

In a presentation to the 26th Congress of the Communist Party of the Soviet Union, L.I. Brezhnev emphasized that "...the center of gravity today--and this is a distinctive feature of the agrarian policies during the 1980s--is shifting over to the return being realized from capital investments, to growth in agricultural productivity and to strengthening and improving its links with all branches of the agro-industrial complex." Brezh-

nev stressed agriculture; Brezhnev believed, however, that funds expended by the state in fixed capital in agriculture were not compensating the state with adequate returns. He stated that the number of machines, for example, had doubled in the 1966 to 1980 period, yet the operational reliability of the machines remains low. Gorbachev stresses intensification and understands that a modern agricultural system requires a great deal of capital if it is to be successful. He also realizes that a ruble spent on the acquisition of tractors, combines, and other implements, and a ruble spent on the construction of livestock buildings or equipment sheds contribute to agriculture in different ways and bring in a different return. As a former farm manager, he knows that many tractors are being replaced by new, high-powered machines and the cost of each new tractor is roughly twice as much as the old. However, he also knows that the economic return for the rubles invested is reduced for there are few new implements and new attachments for the new tractors; farmers must harness these new tractors to plows and other pieces of equipment intended for tractors produced twenty years ago.

Years of capital famine in agriculture combined with recent spurts of large investments in restricted sectors of agriculture has led to rubles being squandered. The current capital investments made by the state in Soviet socialized agriculture are being used inefficiently. Funds are being wasted upon poorly designed, low quality, and inefficient equipment and machinery. Collective and state farm economies also are being adversely affected by their inadequate material base and backwardness in

the social sphere--housing, roads, schools, hospitals, and recreational facilities. Those who lived and now live in rural areas in the Soviet Union have made extraordinary sacrifices to develop the nation's industrial and military complexes, and have enjoyed few benefits. Poor performance and low productivity are not an inherent feature of Soviet farms and Soviet farmers. The overall economic and social development of the Soviet Union would have been even greater in the past fifty years had agriculture received its fair share of state capital investments and waste in agriculture been controlled.

CHAPTER III

FARMING TECHNIQUES and MECHANIZATION

AGROTECHNOLOGY

An important aspect in the current stage of collective and state farm growth and development is the contribution science can make. High technology is increasingly becoming a means for qualitative and quantitative improvement in Soviet agricultural production, thus providing necessary foodstuffs the population demands. Becoming agriculturally self-sufficient not only means severing dependence from foreign agricultural sources--often unreliable and expensive--but the hard currency saved on foreign purchases can be converted and funneled back into the nation's internal economy.

Within the Soviet Union, the recently established State Agro-industrial Committee (Gosagroprom) is responsible for all agricultural research and for introducing new scientific and technological advances to collective and state farms. More than 40,000 agricultural scientists are currently working for the Soviet state. Over 100 years ago, Friedrich Engels, a German socialist, noted that "...the productivity of the soil can be increased 'ad infinitum' by the application of capital, labor, and science." The Soviets have always felt humans had the power to control or harness nature, and have tried with varying degrees of success. For example, since marginal amounts of precipitation are received on about 80 percent of total Soviet agricultural lands, major irrigation programs have been undertaken. The most ambitious of these are the river reversal projects. Many of the major rivers which flow northward through Siberia empty into the

Arctic Ocean without having made any substantial contribution through irrigation to agriculture. The Soviets had hoped that through a series of diversions, canals, dams, and pump stations, water can be channeled southward to the arid and semi-arid regions of Central Asia and northern Kazakhstan. Environmental concerns aside, engineering technology appears available but the amount of capital required and the number of workers involved could seriously hamper construction projects in other parts of the country. After reviewing the costs and the impact upon a number of delicate environments, the Soviet government has canceled the most ambitious of these projects.

Plant hybridization, as promoted by Soviet programs, has progressed rapidly in the last twenty-five years. Soviet advances in this field have resulted in the breeding of high yield wheat and sunflower varieties. An objective of Soviet plant breeders was to produce a high yield wheat variety with drought and disease resistance, and non-lodging characteristics. The result was Bezostaya-1, a winter wheat with excellent bread baking qualities, sought by even foreign millers. The development of a new hybrid called Rostovchanka, is an excellent example of the difficulties and time involved in the development and testing of a new grain variety. Crossbreeding of two different grains began in 1961 in the Rostov Oblast, with the new plant being isolated in 1964. Experimental farm testing for yield, disease, pest, and drought resistance took place in 1967 and 1968. Between 1969 and 1972, field testing was conducted at six different stations throughout the region. Field test results

demonstrate that when Rostovchanka is sown after clean fallow, average yields are 3.4 to 12.2 centners per hectare greater than the standard variety. On the basis of these tests, the Soviet Ministry of Agriculture certified the new variety. In 1973, it was sown where appropriate on state and collective farms nationwide.

It has been shown on collective and state farms that harvests are higher where crop rotation plans have been followed, scientifically proved field preparation techniques employed, high quality seeds planted at correct depth and density, proper application of appropriate fertilizers--pesticides--herbicides, and plants cultivated then harvested with sufficient quantities of reliable equipment. There is a constant search in the Soviet Union for improved technology through agricultural engineering. However, the focus of the current problem is not research or technology development, but rather the application of available technology on the farm. Each new technology places greater demands upon the rigid Soviet agricultural system--from the Minister of Agriculture, to the farm manager, to the field worker. The upcoming period of technological assimilation will not progress smoothly in a nation where farm innovations are frowned upon and individual initiative restricted.

DRYLAND FARMING

In a nation as large as the Soviet Union, land use, agrotechniques, machinery, and crop mix vary substantially from one

location to another. Many factors--physical, cultural, social, and economic--influence farming practices and crop combinations. However, weather and climate are the prime controlling physical factors within which all other factors operate. In terms of agroclimatic resources, the Soviet Union can be divided into five broad regions. The differences between the northernmost and southernmost regions are as great as those observed between Alaska and southern California in the United States.

The significant zone of agriculture in the Soviet Union extends from the western border to Lake Baikal in Siberia. It coincides with the mixed forest, deciduous forest, and wooded steppe vegetal zones. Soils here, including the rich chernozem, are easily tilled and can yield abundantly when handled properly and given sufficient moisture. This region is climatically similar to the Great Plains of the United States and Canada. The main agroclimatic problem in this zone is extreme variability in rainfall. Various dryland farming practices for accumulating and conserving soil moisture are employed, and supplemental irrigation utilized.

All dryland farming practices in the Soviet Union are focused upon conserving the scant moisture supply by reducing or eliminating runoff and evaporation, and increasing the absorbtion and retention of moisture by the soil. Traditionally, it was believed that this could be accomplished by summer fallowing, by maintaining a dust mulch, and by a "three-field" crop rotation. It was discovered through trial and error that the mechanical treatment considered necessary for soil moisture

conservation resulted in rapid deterioration of soil structure and the destruction of humus, creating a topsoil layer very susceptible to massive wind erosion.

Dryland farming techniques are employed in most nonirrigated grain producing areas. The specific combinations of techniques used by Soviet farms are closely tied to seasonal conditions. On the majority of agricultural units, the nature and amount of winter snowfall can be an indicator to potential yields. A wet and deep snowfall in late autumn normally remains on the field until the next spring. Dry snow is blown from most fields and piles in the shelterbelts and ditches. Stubble fields (not plowed in the fall), chiseled fields, fields of unharvested flax or sunflower strips, and shovel-plowed fields retain a high percentage of wet and dry snow. If a snowfall is followed by thaw-and-freeze periods, the uppermost layer of snow melts, then freezes enough to form an ice crust. Snow will then remain in place on the open field despite strong winds. With constant low temperatures and light snow cover, frost can penetrate 1.2 to 2.4 meters, retarding fieldwork in early spring. As a result, surface melt-water can accumulate in late spring and make tillage difficult. A field planted late in the spring may be damaged by summer drought and desiccating winds, insect pests and plant diseases, be killed by an August frost, or require harvesting after the first snowfall. If soil moisture is not adequate and June too dry, seeds may fail to germinate and strong winds may blow away the fertile topsoil. Reseeding often becomes necessary as a result of winterkill, early frosts, paucity of rainfall, or

soil deflation.

Intense heat in late June and July in itself does not reduce yields, but intense heat without summer rains destroys crops. Excessive heat and moisture can lead to complete crop failure from various forms of rusts or blights. Often a superb looking field with a potentially good crop is destroyed by hail or winds associated with a tornado in a matter of minutes. More spectacular are the frequent plagues of grasshoppers, which in dry years do enormous damage. Chinch bug, smut and other pests and diseases also menace crops as do birds, ducks, and geese.

Having their major agricultural region concentrated in one long but narrow east-west belt creates greater fluctuations in output than are experienced in the United States. (The major grain producing regions of the United States stretch from Canada to Mexico, a north-south alignment.) In the Soviet Union during the past two decades, vast shelterbelt forests, summer fallow, three year rotations of two crops then fallow, stubble mulch, variations in plowing times (fall or spring), shovel and chisel plowing, no-till, chemical weed control for summer fallow, and careful seed selection have helped to increase small grain production. However, lack of high-quality equipment, proper fertilizers, other agricultural chemicals, and the incentive necessary to induce collective and state farmers to do the tasks necessary to ensure a successful farming year, constrains efforts to increase agricultural productivity in the dryfarming areas of the Soviet Union.

IRRIGATION and DRAINAGE

Essential to the expansion and improvement of agriculturally productive land in the Soviet Union, is the development and implementation of major planned irrigation and drainage systems (Table 13 and 15). In the fall of 1984 General Secretary Konstantin Chernenko said in a speech to the Communist Party Central Committee, "Comrades! Today a question is being considered that has a direct bearing on what constitutes the supreme goal of the CPSU's activity--a steady rise in Soviet people's standard of living. The matter at hand is major additional measures aimed at solving the food problem on the basis of the consistent intensification of agricultural production and wide-scale land reclamation."

Agriculture operates under many climatic conditions in the Soviet Union, with more than 60 percent of the country's sown land and nearly 70 percent of all its agricultural land located in sub-humid and semi-arid regions. Agricultural lands found north of the chernozem zone and in Siberia are overly moist; lands south of the chernozem and chestnut soil zones are excessively dry and require irrigation; droughts have become increasingly frequent in recent years. As a result, during the Tenth Five-Year Plan from 1976 through 1980, grain production fluctuated 58 million metric tons between high and low total production figures.

Between 1966 and 1984, nearly 115 billion rubles in capital investment has been poured into land reclamation (Table 14).

Table 13. AREAS AND THE USE OF IRRIGATED AND DRAINAGE LANDS AT COLLECTIVE FARMS, STATE FARMS, INTER-FARM AND OTHER INDUSTRIAL AGRICULTURAL ENTERPRISES
(million hectares)

	1970	1975	1980	1981	1982	1983	1984
Farm Area, Total:							
irrigated land	10.8	14.2	17.2	17.7	18.3	18.9	19.2
drainage land	7.4	10.1	12.6	13.0	13.4	13.8	14.2
Farm Area, Under Cultivation:							
irrigated land	10.4	13.7	16.7	17.2	17.8	18.3	18.7
drainage land	6.9	9.6	12.0	12.4	12.9	13.3	13.7

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 136.

Table 14. INVESTMENTS IN MELIORATION MEASURES AND DEVELOPMENT OF RECLAIMED LANDS BY THE STATE AND COLLECTIVE FARMS
(in comparable prices; thousand million rubles)

1966-70		1971-75		1976-80		1981-84	
Total	Annual average	Total	Annual average	Total	Annual average	Total	Annual average
16.2	3.2	29.6	5.9	40.0	8.0	34.7	8.7

Table 15. NEWLY IRRIGATED AND DRAINAGE AREAS, CULTURAL AND TECHNICAL WORK BY THE STATE AND COLLECTIVE FARMS
(million hectares)

	1966-70		1971-75		1976-80		1981-84	
	Total	Annual average	Total	Annual average	Total	Annual average	Total	Annual average
Irrigated Areas	1.8	0.4	4.6	0.9	3.8	0.8	2.6	0.7
Drainage Areas	3.9	0.8	4.4	0.9	3.6	0.7	2.8	0.7
Culture and technical work on watered pastures	7.4	1.5	9.1	1.8	8.2	1.6	5.5	1.4

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 135.

During this period, the total area of drained and irrigated land increased from 17 million to 33 million hectares (Table 13). The value of crop production on the ameliorated land exceeded 66 billion rubles in the 1983 agricultural year alone, whereas only 6 billion rubles of agricultural products were produced on such land in 1965. Average annual grain production on reclaimed land has tripled since 1966, and in 1983 totaled in excess of 20 million tons, including 4.5 million metric tons of corn (Table 16).

Today, all of the Soviet Union's cotton and rice, 75 percent of the vegetables, approximately 50 percent of the fruits and grapes, and about 40 percent of the corn are produced on either irrigated or drained land. In 1983, 37 million metric tons of fodder was cut on reclaimed land--six times as much as in 1966. By 1990 it is planned that the gross grain harvest on reclaimed land will increase to 32 million metric tons, and by the year 2000, to approximately 60 million metric tons. This figure includes a boost in the corn harvest of between 18 and 20 million metric tons. By 1990, production of fodder on reclaimed land will rise to 80 million metric tons, and by 2000, to almost 120 million metric tons. To achieve a better protein balance in fodder, areas sown in alfalfa and other pulse crops will be expanded. Corn and fodder are viewed as important cattle feed, and needed to rectify the serious shortages in Soviet meat production.

While these figures sound impressive, harvests in a number of irrigated areas fall short of expectations, with yields equal to nonirrigated land. In some major irrigation systems, where

Table 16. GROSS CROP OUTPUT ON IRRIGATED AND DRAINAGE LANDS AT COLLECTIVE FARMS, STATE FARMS INTER-FARM AND OTHER INDUSTRIAL AGRICULTURAL ENTERPRISES
(in comparable prices of 1973)

Year	Thousand million rubles	Share of crop output on all lands, per cent
1966-70 (annual average)	7.4	20.0
1970	8.7	21.8
1971-75 (annual average)	10.5	25.7
1975	11.4	30.0
1976-80 (annual average)	14.0	30.3
1980	14.9	33.3
1981-84 (annual average)	15.9	33.9
1981	15.0	35.2
1982	15.5	33.1
1983	16.4	32.9
1984	16.8	34.7

At the present time all cotton and rice, 75 percent vegetables, about 50 percent fruit and grapes, about 40 percent maize are produced both on irrigated and drainage lands.

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 137.

millions of rubles have been invested, yields are unacceptably low. The Volgograd irrigation system in 1983 yielded only 1,900 kilograms of grain per hectare, half the level envisioned. Corn for silage yielded only 16,033 kilograms per hectare instead of 40,000 kilograms per hectare. Soviet government officials believe that low harvests are the result of mismanagement, slow introduction of agrotechnologies, poor use of mineral fertilizers, and the disorganization of watering irrigated lands.

Still, the Soviets believe results are impressive enough to embark on further large-scale reclamation projects. By the year 2000, it is projected that 32 million hectares of irrigated land and 21 million hectares of drained land will be significantly productive. Low technology still plagues reclamation efforts with nearly two-thirds of all irrigated land watered by the surface method, employing tens of thousands of people using shovels and hoes. Soviet planners report that comprehensive mechanized methods of land reclamation requires 673 types of machines, only 349 of which are currently in production--with 235 yet to be designed. Developing new land for irrigation costs on average up to 5,000 rubles per hectare. Capital investments required for land reclamation are large, and lead to high costs per unit output. However, when a nation's agricultural regions are situated in marginal agroclimatic zones, great expenses are incurred and tolerated to satisfy internal food demands.

FERTILIZERS, PESTICIDES, and HERBICIDES

Farmers in the United States understand the contribution that technological advances in fertilizers, pesticides, and herbicides have made in terms of yield, both qualitatively and quantitatively, over the past thirty years. In the Soviet Union, sufficient quantities, proper types, and correct application of fertilizers, pesticides, and herbicides can hardly be taken for granted by the collective or state farm manager. Many Soviet agricultural scientists are world renowned for their research efforts and findings, but it is another matter entirely to see this new knowledge applied on the farm.

In an effort to correct this situation, the New Food Program of 1982 outlines goals for the chemicalization of Soviet agriculture. The manufacture of fertilizer is to be increased from its 1984 level of 23 million metric tons to 27 million metric tons by 1985 and 31 million metric tons by 1990 (Table 17). It is planned that higher quality fertilizers, including highly concentrated and complex fertilizers, will comprise a minimum of 90 percent of the total future output. Total national output of pesticides and herbicides will be increased to 680,000 metric tons in 1985 and 780,000 metric tons in 1990. These figures represent what Soviet planners believe they can achieve--but in reality often do not.

In order to bridge the gap between supply and need, the Soviets since 1979 have purchased more than 570 million rubles worth of fertilizers and 2.9 million rubles worth of pesticides

Table 17. SUPPLY OF MINERAL FERTILIZERS TO AGRICULTURE
(in terms of 100 percent content of nutrients;
thousand tons)

Year	Mineral fertilizers--total	of which			
		nitrogenous	phosphate	phosphorite meal	potash
1940	727	162	256	90	219
1960	2624	769	823	265	766
1970	10317	4605	2160	973	2574
1975	17251	7339	3829	899	5176
1980	18763	8262	4760	830	4904
1981	19176	8383	5098	781	4905
1982	20152	9038	5344	771	4991
1983	22977	10302	5691	774	6201
1984	23089	10277	5872	768	6163

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 138.

from the United States. In 1982 alone, the Soviets bought a total of 464 million rubles of mineral fertilizers, pesticides, and herbicides on the world market for use at home.

The Soviet average fertilizer application rate per cultivated hectare is approximately equal to that in the United States, but only one-half as much as applied in some Western European nations. In terms of content, the nutrient quality of Soviet fertilizers is relatively low, and multinutrient fertilizers represent only a fraction of total production. According to Soviet data, on the average each 100 kilograms of mineral fertilizer will yield an extra 100 to 200 kilograms of grain and 600 to 1,200 kilograms of potatoes and vegetables per hectare. Each ruble spent in fertilizer manufacturing, transporting, and application, will produce a return of 3 to 5 rubles in additional agricultural output. Today, it is often not a matter of the collective or state farm failing to receive its allotment of fertilizer, but rather of receiving the incorrect fertilizer for the specific conditions found on a farm. Analysis of soils, type of crop planted, amount of moisture in the ground, and other factors which determine fertilzer selection is best done by the farm manager rather than an official at the State Planning Agency in Moscow. It is not uncommon for farm managers to trade supplies with each other in order to maximize fertilzer effectiveness.

In 1981, pesticides and herbicides were applied to more than 97 million hectares of cropland, providing additional yield worth eight billion rubles. Today, nearly 680,000 metric tons of chemicals used for the protection of agricultural products are

being applied to over 110 million hectares of land. However, only 55 percent of Soviet agriculture's pesticide needs are being met, and according to state agricultural plans, sufficient quantities will not be available before the year 2000. This deficit is due to the planners' failure in the past to recognize the significance of pesticides and herbicides. Therefore, large-scale production has only recently begun. As of 1982, the Soviet chemical industry was producing only one-third of the 160 chemical preparations needed. Only 20 percent of the herbicides manufactured are capable of combating more than one variety of weeds at one time. While there are shortages of pesticides for cotton, sugar beets, and some grains, the oil seed crops--sunflower, rape, and soybean--are even more severely affected by inadequate supplies.

The task of building a chemical industry that will support the needs of Soviet agriculture is a slow one. Even when chemical production increases, there are setbacks--shortages of chemical containers for storage and shipment, shortages of trucks to deliver chemicals to the marketplace, or shortages of specialized machinery to apply the chemicals. Soviet scientists need to develop more effective fertilizers, pesticides, and herbicides and improved methods of applying them in smaller quantities. Under the "more must be better" theory, excessive dosages of agricultural chemicals are currently being applied when available, often endangering the surrounding environment. Almost one-third of the entire Soviet harvest is lost to pests, weeds, and disease, which demonstrates the potential impact a highly developed and efficient chemical industry can have on agriculture.

MECHANIZATION

The lack of mechanization has been a contributing factor in the inability of agriculture to provide all Soviet citizens a nutritionally balanced diet. Realizing the potential of a highly mechanized agricultural sector, every Soviet leader from Lenin to Gorbachev has stressed the need to mechanize. The 1982 New Food Program calls for the following deliveries to be made to agriculture by 1990: 3.75 million tractors; 215,000 bulldozers; and 1.2 million grain harvesting combines. It emphasizes comprehensive mechanization of farming and animal husbandry, along with total modernization of equipment used in the food industry. High technology, quality, and reliability of new equipment are stressed by Soviet agricultural planners as absolute essentials if the Program is to fulfill its goal of national agricultural self-sufficiency (Table 18).

As a means of increasing their technical and mechanical base as rapidly as possible, the Soviets have tapped the world agrotechnology market, spending nearly one billion rubles on agricultural machinery, equipment, and tractor spare parts in 1982 alone. Soviet leaders and farm managers are frustrated with unreliable farm machinery. Estimates indicate that anywhere from 20 to 45 percent of the farm machinery fleet may be inoperable at any given time. Spare parts are expensive, of poor quality, and

Table 18. TRACTOR AND HARVESTER FLEET IN AGRICULTURE
(end-of-year figures)

Year	Tractors[1]		Grain harvesters, thousand units
	thousand units	aggregate capacity of tractor engines, million horse-power	
1940	531	18	182
1960	1122	48	497
1970	1977	112	623
1975	2334	152	680
1980	2562	191	722
1984	2735	226	815

[1] The data are given without tractors on which meliorative and other arrangements are fitted. In 1984 in agriculture there were 370,000 such tractors, with an aggregate engine capacity of 28 million horse-power.

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 139.

Table 19. SUPPLY OF TRACTORS AND AGRICULTURAL MACHINES TO AGRICULTURE
(thousand units)

	1940	1960	1980	1984
Tractors:				
thousand units	20.3	157.0	347.6	381.7
aggregate capacity of tractor engines, million horse-power	0.9	6.7	28.9	33.3
Tractor ploughs	38.4	142.4	196.6	203.0
Tractor stubbler ploughs	12.8	32.3	24.7	27.3
Tractor drills	21.4	104.5	229.7	222.2
Tractor cultivators	32.3	79.2	200.2	245.6
Windrowers	--	55.1	98.3	98.9
Grain harvesters	12.8	57.0	117.5	115.5
Maize harvesters	--	3.6	0.7	2.1
including self-propelled	--	--	0.7	2.1
Potato harvesters	--	--	10.5	8.5
Beet harvesters	--	4.6	9.3	6.5
Silage and field forage harvesters	--	13.0	46.6	31.6
Cotton-pickers	--	3.2	8.9	10.1
Grinders for production of vitamin grass flour	--	--	4.9	2.4
Tractor mowers	3.3	87.1	85.5	98.8
Spreaders of mineral fertilizers	--	...	48.7	47.6
Machines for putting hard organic fertilizers into the soil	--	--	35.4	40.5
Milking machines	--	13.0	58.4	67.8

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 140-141.

extremely difficult to find. Twelve to thirteen percent of the Soviet tractor fleet is scrapped each year, indicating the average life expectancy to be only eight years (Table 19).

Conversely, the United States, having reached a high level of farm mechanization nearly thirty years ago, has entered a new stage of technical intensification. Demand for tractors in the United States is basically for replacement of old models by more fuel efficient and higher horsepower tractors. Total number of tractors in rural America is declining, and the reduced need for agricultural equipment has created a severe financial strain on implement manufacturers. Today, the Soviet Union is still in the growth stage and has a tractor fleet roughly 75 percent as large as that in the United States.

At this time, the lack of trucks may be more detrimental to Soviet agriculture than that of any other piece of equipment. The Soviet farm truck fleet is only 40 percent of that now registered in rural America. Soviet-made trucks can not realistically be compared to those manufactured in the United States in terms of capacity or durability. Low quality, poor design, and intensive use coupled with inadequate maintenance and repair lead to a short and unreliable truck life span. Transportation, in terms of the quantity and quality of both vehicles and roads, presents the largest single obstacle in moving produce from the farm to the processing factory or urban marketplace. As much as 60 to 70 percent of some harvests are lost due to spoilage related in some way to transportation problems.

Soviet agriculture, with its low per capita productivity, is "labor intensive." Ten times the number of people work in Soviet agriculture as in American agriculture. An American farmer supports eight times the number of people supported by a farmer in the Soviet Union. Soviet agriculture will remain labor intensive for at least 15 to 20 years, for it will take at least two decades for the Soviet government to provide the quantity and quality of needed agricultural equipment.

CHAPTER IV

LIFESTYLES of SOVIET FARMERS

WORKING CONDITIONS

Claimed advantages of collectivization in the late 1920s include facilitation of the modernization of the countryside, and improvement of working conditions for all who were involved in agriculture. According to Soviet agricultural planners, the existing farming units were too small and fragmented for cost-effective utilization of labor-saving devises and the rural population too dispersed for quality educational and social activities. The First Five-Year Plan stressed collectivization and placed great emphasis upon the manufacturing of agricultural machinery. Farmers were forced to join collective farms or work on state farms. Initially, working conditions were deplorable and wages nonexistant for collective farm workers; state farm workers were paid a small salary.

The Second Five-Year Plan focused upon expanding the agricultural machine building industry and improving rural working conditions. Continued rural resistance to forced collectivization led to the horrible famine of 1933 and 1934 and eliminated the most vocal opponents to socialized agriculture on a national scale. Farm life became enmeshed in rules and goals, and activities scrutinized by a hierarchy of political and social organizations.

During World War II, many of the agricultural buildings, equipment, and farm workers' homes in the western part of the Soviet Union were destoyed. All production of agricultural equipment from plants in occupied territories ceased. Working with

little in terms of supplies, equipment, and comfort, Soviet farmers supplied food to the Red Army and to the citizens of the nation free from fascist control. In the postwar period, replacement of destroyed agricultural machinery proceeded very slowly until the death of Stalin in 1953. Great strides have been taken since then in agricultural mechanization although the poor quality of the equipment, lack of spare parts, and paucity of skilled mechanics are still bemoaned by farm directors and farm employees. In the extensive grain-based agricultural system of the Soviet Union where much of farm life is involved in plowing, planting, cultivating, and harvesting, the quantity and quality of agricultural equipment is a vital facet in the farm workers' evaluation of working conditions.

To most Soviet farmers, the land commands more respect and regard than the state-created agricultural system. Agricultural decisions and all farm work planning at every level have a significant political component. Farm party leaders and committees implement overall party decisions and work to stimulate enthusiasm for increased production from each farm worker. The basic work units on both collective and state farms are the "brigade" or "section," the "firm," and the "link." "Brigades" generally have permanently assigned personnel, and are organized on a field or crop basis. A "firm" is a productive unit that specializes in meat, poultry, or dairy products. "Links" are small teams of workers assigned responsibility for a designated area and crop, from planting to harvest. Working with friends makes all tasks easier and all constraining rules bearable.

Striving to work while coping with poor equipment, sowing uncertified seeds, attempting to increase yields without adequate fertilizers, pesticides, and herbicides, and being assigned tasks by individuals who either do not understand agriculture or are simply following orders, kills personal incentives to succeed. Attempts to improve working conditions without changing the basic socialized agricultural structure have failed. All farm workers now receive pensions, wages have been raised, rewards are given for exceeding production quotas, paid vacations to good recreational areas are provided, health benefits have been expanded and greatly improved, and grants for rural housebuilding have been distributed; yet outmigration from rural areas by the young and the skilled continues at an alarming rate.

Safety codes, usually written in some urban center, are not enforced on most farms. Protective glasses, gloves, boots, and clothing are provided only when available. Instructional programs in the proper and safe use of fertilizers, pesticides, herbicides, and fungicides are considered secondary in importance to party cell or party propaganda meetings. First aid and basic medical assistance in times of an emergency or accident are rudimental or non-existent. Care and concern for an individual that has had an accident or is sick is based upon impersonal-unenforceable state legislation, party membership, or a family-friend relationship.

Overall, working conditions on state farms are superior to those on collective farms. In both forms of socialized agricultural organization, the farmer's on-the-job environment is not

conducive to bringing out the best in an individual. Working conditions in rural areas of the Soviet Union reflect the overall social disdain for agriculturalists and agriculture in an urban-industrial focused political dictatorship (Table 20).

INCOME LEVELS

Payments to workers in the Soviet agricultural sector, both in terms of salaries and benefits, have always been low, and at times nonexistant (Table 21). Improvements were initiated under Khrushchev in the mid-1950s, but substantial gains only began to be reached during the past ten years.

The state farm worker draws a monthly fixed cash salary, mainly piece-rate based upon the importance and degree of difficulty of the job. Bonuses are often paid when farm quotas are met or exceeded. Since state farm workers are state employees, their salaries and benefits have been modeled after those in state industrial enterprises, only at a much lower level. In 1955, state farm workers' salaries were 40 percent below the level of industrial salaries. Since the 1960s, there has been great improvement, and by 1978 workers' salaries had risen to 81 percent of industry salaries. An average state farmer earned 143 rubles per month. As compared to collective farm employee remuneration, state farm wages have always been higher and state farm worker considered to be in a more privileged position. State farms, as the premier example of socialized agriculture, are supplied with greater capital, and in

Table 20. AVERAGE ANNUAL NUMBER OF WORKERS AND EMPLOYEES BY BRANCHES OF THE NATIONAL ECONOMY
(thousand people)

	1940	1960	1970	1980	1984
Total number of workers and employees in the national economy	33926	62032	90186	112498	116720
Industry (industrial production personnel) . . .	13079	22620	31593	36891	37950
of which workers	9971	18887	25631	29497	30200
Agricultural	2703	6964	9419	11650	12200
of which state farms, interfarm enterprises and other production agricultural enterprises:					
all workers and employees	1760	6193	8833	10693	11130
of whom workers . . .	1558	5871	8087	9572	9910
Forestry	280	359	433	458	459
Transport	3525	6279	7985	10324	10825
railway	1767	2358	2331	2616	2680
waterway	206	322	370	433	450
motor, urban electrified and other types of transport; loading and unloading enterprises	1552	3599	5284	7275	7695
Communications	484	738	1330	1634	1678

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 180-181.

Table 21. AVERAGE MONTHLY MONEY WAGES AND SALARIES OF WORKERS AND EMPLOYEES BY BRANCHES OF THE NATIONAL ECONOMY (rubles)

	1940	1960	1970	1975	1980	1981	1982	1983	1984
In the total national economy	33.1	80.6	122.0	145.8	168.9	172.5	177.3	180.5	185
Agriculture	23.3	55.2	101.0	126.8	149.2	153.1	158.7	168.5	175.0
of which state farms, interfarm and other production agricultural enterprises:									
of whom workers	20.7	51.9	98.5	124.7	148.5	152.6	158.3	167.1	173.0
Transport	34.8	87.0	136.7	173.5	199.9	204.3	210.1	212.7	216.0
railway	34.2	82.9	123.4	158.1	187.4	191.0	198.0	201.9	206.0
waterway	41.2	106.9	169.5	212.8	232.0	241.7	248.9	252.8	257.5
motor, urban electrified and other types of transport; loading and unloading enterprises	34.5	88.0	140.3	177.1	202.5	206.8	212.2	214.1	246.5
Communications	28.2	62.7	96.8	123.6	145.8	148.1	150.5	152.5	156.0

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, pp. 192-193.

effect, greater agrotechnology. Therefore, it should follow that state farms are more efficient and productive--but this is not the case. Not only are labor costs higher, but productivity on state farms is generally less than on collectives; that is, per-unit cost is higher. As the number of collective farms continues to decrease, being converted into state farms, the agricultural sector will continue to burden and drain the national economy.

Payments to collective farm workers are based on either time or piece-work, with bonuses for production totals that meet or exceed state set quotas. A fully employed collective farm worker earned little or no salary before the mid-1950s, a monthly salary of approximately 50 rubles in 1960, almost 90 rubles in 1970, and about 110 rubles in 1976. During the 1970s, the great differences that had existed between collective and state farm salaries decreased significantly. In 1978, collective farm salaries were 84 percent of state farm salaries. Historically, the collective farm worker received only payment in kind from total farm production. Cash earnings came mainly from excess produce grown on private plots and sold at the market. Money earned from the private plot often equalled or exceeded the income made by state farm workers. It is expected that the average collective farm worker's salary will be about 340 rubles a month by 1990, and when combined with earning from private plots, should total about 420 rubles a month, roughly equal to an industrial worker's salary.

Low labor productivity has always plagued the Soviet agricultural sector--a problem which in 1965 prompted Brezhnev to

begin a series of large state capital investment programs in agriculture. It was clear at this time that agricultural salaries and benefits needed to catch up to the industrial workers' salaries and benefits. It was anticipated that wages would increase faster than productivity during the 1960s, leading to increased productivity in the 1970s. To Brezhnev's consternation, not only did agricultural productivity lag behind wage increases during the 1970s, but also behind productivity increases in industry. Sound economic policy dictates that wage increases cannot surpass productivity increases for any length of time without economic detriment. It is difficult for the Soviet state to justify bringing agricultural salaries and benefits into line with those of the industrial sector, if the industrial sector's productivity increases are substantially greater than those in agriculture.

RURAL LIVING CONDITIONS

The Soviet Union's newest plan to improve the living conditions of its people repeats the promises made so many times in the past. It strives for gains in housing, recreation, and consumer goods, and especially quality foods. The Soviet government is taking a more sober view of its past accomplishments, and is reevaluating on a realistic scale its capabilities to fulfill future goals. It is conceded by the Kremlin that the present Soviet socialist/communist economic system cannot provide adequately the goods and services demanded by a highly developed

consumer society. The Soviet socialist/communist economic system was designed to provide for only the basic needs and requirements of citizens in a developing country. Even by the turn of the century, the output of consumer goods in the Soviet Union, as measured by quality or quantity, will not be comparable to that in the United States. Today, Soviet per capita consumption of goods and services is only about one-third that of the United States. A portion of the problem is inherent to the system, specifically that industrial output is centrally planned at least five years in advance.

When an American reads an article in the newspaper, sees a documentary on television, or hears a report on the radio about low Soviet living standards, most of the time the article-documentary-report is focused upon living conditions in urban centers. In the countryside, per capita consumption of goods and services is only two-thirds to three-quarters that in urban centers: yet to improve rural living conditions and stimulate farm workers to take more interest in their work, capital investments designed for social needs have been allocated to specific projects (Tables 22 and 23). For example, between 1980 and 1984, rural residential buildings with a total floor space of 132 million square meters were constructed, improving housing conditions of more than ten million people. Rural consumer services, in the form of schools, health institutions, and cultural facilities, have also been increased. According to the USSR Central Statistical Administration, 85 of every 100 rural families have television sets, 87 have radios, 73 have refrigerators, about 60

Table 22. CONSUMPTION OF ELECTRICITY IN AGRICULTURE (including that from state power stations; thousand million kWh)

1940	1960	1970	1975	1980	1981	1982	1983	1984
0.5	10.0	38.6	73.8	111	114	121	127	135

Table 23. POWER SUPPLY PER WORKER AND POWER CAPACITIES IN AGRICULTURE (horse power)

Year	Total power supply in state and collective farm enterprises	
	per worker	per 100 hectares of sown area
1940	1.7	36
1960	5.7	78
1970	12.7	161
1975	18.3	217
1980	25.6	286
1981	26.9	303
1982	28.3	320
1983	29.4	333
1984	30.6	346

Over 70 percent of the area under corn for grain, more than 60 percent of sugar beet and soybean and a third of the areas under sunflowers were cultivated by industrial technologies (without using manual labor) in 1984.

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 96.

have washing machines, and approximately half of the families own a car or motorcycle. Outmigration of the rural population to urban areas has also decreased during the past few years, dropping by eight percent between 1981 and 1984. All of these statistics point to the fact that the rural standard of living is drawing closer to that of the urban dweller.

AMENITIES and QUALITY of LIFE

In the early stages of collectivization, mere survival was the paramount concern of individuals and families in the Soviet countryside. The wealth and assets of generations were forcibly pooled into collective farm implement sheds, machine tractor stations, or common animal herds. At times even seed grain, breeding stock, and hand tools were seized. Millions of farmers died in the famine of 1933-34, the Second World War, and the famine of 1946-47. There were few amenities and the quality of life in rural areas of the Soviet Union was harsh--until recently. Khrushchev, a Soviet leader who experienced the hardships and the pain of rural life, directed state capital and urban personnel into improving the human and physical environment in which rural people live and work.

Khrushchev began in the mid-1950s by compensating farm workers for their labor, a first in years. Previously, farm workers had basically fed themselves and their families from their private plots and earned cash by selling products from their private plots to urban dwellers. The large increase in

wages and other forms of compensation eased the financial disparity between rural and urban areas and slowed the outmigration in some agricultural regions. Every Soviet leader since Khrushchev has stressed the importance of agriculture to the entire Soviet economic system, and in their own way, those leaders have all attempted to improve amenities and the quality of rural life. The change in high government officials' attitudes toward agriculture in the past fifteen years has led many urban dwellers to reevaluate rural life, and reconsider where the repository of their cultural heritage lies.

Many urban dwellers now contend that the farmers and the rural inhabitants of the Soviet Union are living the "good life." Urban apartment living is drab and confining; they equate quality of living in many instances with working out-of-doors, breathing fresh air, and drinking unpolluted water. Stress and strain appears linked with city life, and rural life appeals to many urbanites as almost ideal. The ability of individuals to own private homes, raise their own beef and poultry, grow their own fresh fruits and vegetables, make their own cheese and butter, and feel that they are a part of a community currently are valued amenities. Those who work from nine to five in a plant or office daydream of hiking in a bucolic environment, fishing or boating in a quiet country lake, and feeling the good earth in their hands as they plant something. They think of hunting, skiing, and ice skating with their children. Most urban dwellers believe that rural people eat and enjoy life more than they do.

Great changes have taken place in the cultural life and educational opportunities of those who live in rural Soviet villages. Farmers are educated and now demand greater social amenities. Cultural centers, libraries, cinemas, radio and television are part of a modern farmer's life--if he or she wants them. Traditional divisions between rural-type and city-type goods have disappeared. Spring and harvest festivals, elaborate gatherings, and birthday celebrations in rural areas are events to be remembered for their excellent food, the singing and dancing, and the warm fellowship.

Admittedly, there are problems that detract from the overall quality of rural life: inferior schools, limited access to medical services, housing that lacks indoor plumbing, restricted opportunities to attend the ballet or opera, and isolation from modern night-life, art galleries and museums.

But such problems are less important to rural dwellers than one might expect, because of major differences in how urban and rural dwellers view amenities. To a large extent, these differences relate to the role of family and friends in one's life. The support and joys of close family ties and trusting friends more than compensate for the paucity of certain types of entertainment and the limitations in educational opportunties found in rural areas. Rural dwellers have different cultural desires and requirements. They were brought-up placing higher values upon simpler things in life. In a system that for many years considered them inferior, their way of life archaic, and the fruits of their labor rather unimportant, rural dwellers and farm workers

in the Soviet Union not only survived as a class but have developed a way of life that blends the best of the old with what they want of the new.

RURAL WOMEN

"It is the men who do the administering and the women who do the work..."--so said Khrushchev in December 1961. Ninety percent of Soviet women work outside the home; 75 percent of medical doctors are women, 80 percent of the teachers, and half of the engineers. In rural areas, women are involved in all menial job categories to some degree. They hoe the fields, cut with scythes, shovel grain in storage sites, spray crops with hand operated sprayers, pick tea, drive small tractors, clean barns, collect eggs, and milk cows.

Caroline Dando, a graduate student in Soviet Studies and Russian Language at the University of North Dakota, has studied rural women in the Soviet Union and has made three trips to the Soviet Union to gain first-hand insights into the role of women in the rural work force. She says they have "equal rights and double work." In an interview with the chairman of a large grain farm, she asked whether women operated the larger and more complex machines such as combines. The farm chairman laughed and said, "No, women do not operate the large machines." They also do not receive the higher wages of those men who do. A combine operator, for example, is paid 100 rubles a month more than a farm laborer. Women are basically relegated to jobs with low pay. In the farm centers, women serve as librarians and cultural

directors, teachers in schools, doctors and nurses in clinics, and cooks in dining halls. They are conspicuously absent from upper levels of farm administration.

On one collective farm, Caroline Dando spent a morning with a female bookkeeper. The bookkeeper said their farm employed 250 women--150 work in the fields as laborers and 100 in animal husbandry. Most women employed on this farm were married, many had children, and all lived with their families in villages within or near the farm in modest houses built by the farm. Rent was five rubles, about seven dollars, per month. The rural homes had electricity and gas, but not indoor plumbing. Modern labor-saving household conveniences, such as a large refrigerator, automatic washer, and even wash-and-wear clothing were not readily available. Average age of the women on this farm was 35 to 37 years and the average number of children was two. Women receive six months paid maternity leave, but were allowed up to a year's leave from jobs. Nurseries were provided on the farm for mothers with young children. Children began formal education at age seven on farm schools. Shopping for many amenity items was difficult and required trips to large towns or cities. State stores in villages or on the farm provided basic goods and foodstuffs, but with low quality and limited selection. Women work hard and long hours on farms in the Soviet Union, and then must work at home. Their endless labor, essential to the family and the Soviet rural economy, is valued but not as much as the work of men. Rural women have not explored the opportunities, asserted their legal rights, nor demonstrated their capa-

bilities as thinkers and leaders as have urban women in the Soviet Union. Most remain firmly bound to traditional ways, in a way-of-life that they feel protects them. They have been taught since childhood to be submissive and to accept their lot. If they work hard, marry hard working men, and have children, they will gain a respectable place in their village.

Rural women in the Soviet Union still are trapped within a culture that for centuries rigidly determined their status and opportunities. Yet they also are affected by a western European Marxist ideology that espouses equality and responsibility. Thus they now endure both the everyday drudgery of traditional women's work, plus the menial farm labor, and will likely continue to do so in the future. Soviet rural women, according to Article 35 of the Soviet Constitution, "have equal rights"--but do double the work.

CHAPTER V

PROSPECTS FOR SOVIET AGRICULTURE IN THE TWENTY-FIRST CENTURY

PHYSICAL GEOGRAPHIC FACTORS WHICH INFLUENCE SOVIET AGRICULTURAL GROWTH and PRODUCTION

Harsh physical conditions found in vast areas of the Soviet Union restrict agriculture to about one-quarter of total land area. In most parts of this immense country, agriculture is handicapped by unfavorable weather and climate. Its high latitude location and position on the northeastern section of the world's largest land mass result in extreme continental weather conditions. Air masses, fronts, and winds generally move outward from the cold Siberian high pressure cell in winter, while inward-moving moist summer winds lose most of their moisture before penetrating far inland. Variations in weather, particularly killing frosts and very low temperatures in winter, along with droughts and hot desiccating winds in summer, lead to great fluctuations in yields from year to year. Of course, broad generalizations must be modified in varying degrees for different regions--and there are small areas with excellent agroclimatic resources that enable the Soviets to grow even tropical crops.

The diversity of climates found in the Soviet Union is matched by the diversity of landforms, vegetation and soils. Modern mechanized agriculture is affected by relief through slope and altitude of farm land. Slope directly affects agriculture through grades at which cultivation or animal grazing may be practiced and through susceptibility to soil erosion, flooding, and other natural hazards. However, in the basic east-west agricultural belts, mechanized agriculture has been retarded very

little by relief conditions. The close relationship between broad patterns of climate, vegetation, and soils was first recognized by Russian soil scientists over a century ago. Major differences in soil types on a farm in the Soviet Union reflect varying parent materials and micro-relief and exert critical limitations on agricultural practices.

Climatic change will probably be the physical factor which will have the greatest impact upon Soviet agriculture in the twenty-first century. Russian and Soviet agriculture has always been faced with a limited and unstable agroclimatic base. If the current basic weather patterns of the world change and if climatic boundaries shift northward or southward, the total agricultural system and food import needs would be modified. Two types of extreme climate change could have tremendous ramifications to agriculture. The first is the "Venus Theory," a conjecture that an increase in carbon dioxide within the atmosphere will result in the rapid rise of average annual temperatures, especially in continental climates--a positive factor in Soviet agriculture. The second is the "Mars Theory," a conjecture that an increase in atmospheric pollutants, combined with variations in basic earth-sun position, will result in less solar radiation reaching the surface of the earth. The decrease in temperature would affect atmospheric pressure cells and the general wind patterns which normally bring heat from the tropics to northern continental climate regions. The Soviet Union could become colder and drier--a negative factor for Soviet agriculture. Currently, the average annual temperature of the Soviet Union is

increasing. This warming trend has induced deserts to expand northward and agriculture is being forced to adjust. Wheat in Kazakhstan's "Zone of Virgin Lands" is being sown in more northerly and more moist locations. This rise in temperatures and the modification of the geography of Soviet agricultural regions may have a positive effect upon its agriculture; the areas sown to corn, for example, would increase and a critical limitation to the Soviet livestock industry could be eliminated.

HUMAN GEOGRAPHIC FACTORS WHICH INFLUENCE SOVIET AGRICULTURAL GROWTH and DEVELOPMENT

The low social status given to agricultural labor and the emphasis placed upon urban industrial employment in the Soviet Union have led to an outmigration of vast numbers of motivated, hard working, intelligent and skilled rural young men and women (Table 24). In some rural areas, the rural-to-urban migration since the 1930s has become so acute that it has endangered the entire agricultural sector. But in the late 1920s and early 1930s, there was a degree of overpopulation and underemployment in long-settled areas of the countryside, which became a vast reservoir of labor for Stalin to draw upon for urban industrialization during the First and Second Five-Year Plans. Even today, Soviet demographers contend that many western and southwestern agricultural regions have more people living in rural areas than are needed by the state. Soviet demographers note a severe shortage of skilled agricultural labor

Table 24. SOCIAL CLASS COMPOSITION OF THE POPULATION
(as a percentage)

	1939	1959	1970	1979	1984
Total population (including non-working dependants)	100	100	100	100	100
of whom:					
workers and employees	50.2	68.3	79.5	85.1	87.5
including workers	33.7	50.2	57.4	60.0	61.5
collective farmers and cooperative handicraftsmen	47.2	31.4	20.5	14.9	12.5
individual farmers and noncoopertive handicraftsmen	2.6	0.3	0.0	0.0	0.0

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 14.

in the European non-chernozem soil zone between Leningrad and Moscow, in the "Virgin Lands" of northern Kazakhstan and western Siberia, in selected areas along the Trans-Siberian Railroad, and in the Maritime Provinces of the Far East. As the rural labor force decreased, the percentage of women farm workers increased--particularly in the age group of men who were killed during World War II. Also, a high proportion of the men who remained in rural areas were unskilled, disabled, or old. From the beginning of World War II to the removal of Khrushchev as the Soviet leader in 1963, a decreasing number of farm workers had to cope with a 45 percent expansion in sown area without benefit of adequate machinery, good seed, fertilizers, herbicides, and pesticides (Table 25). This acute labor shortage in the "Zone of Virgin Lands" contributed to low yields and severe fluctuations in yearly harvests. From 1963 on, an influx of desperately needed farm machinery and materials helped to offset the continuous decline in the labor force, but problems remain in regional variations of labor supply and in the availability of more specialized and better trained farm workers.

Farm employment, for most of Soviet history, has not offered the rural worker security, respect, full-year employment, a reasonable wage, social amenities, or social status. Stalin funded internal industrial development and provided urban dwellers low-cost food at the personal expense of Soviet farmers. Farm workers suffered the burden of hard work, low prices for their products, high taxation, and little or no reward for their labor. Khrushchev began to rectify the worst aspects of rural

Table 25. DISTRIBUTION OF THE POPULATION ENGAGED IN THE NATIONAL ECONOMY BY BRANCHES (excluding pupils and students: as a percentage)

	1940	1960	1970	1975	1980	1984
Total number of the population engaged in the national economy	100	100	100	100	100	100
In industry and construction	23	32	38	38	39	39
In agriculture and forestry (including individual subsidiary farming)	54	39	25	23	20	20
In transport and communications	5	7	8	9	9	9
In trade, public catering, material and technical supply and distributions, procurements	5	6	7	8	8	8
In public health services, physical culture and social security, public education, culture and art, science and science services	6	11	16	16	17	17

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 177.

life in the late 1950s and early 1960s, but it was Brezhnev who basically modified the most blatant rural-worker/urban-worker differences. Those who work on farms in the Soviet Union today do receive a salary, but their salaries are low. The gap in income between collective farm employees and urban workers is supposedly filled by income that can be earned from "private plots" available to collective farmers.

Rural-to-urban migration has also been stimulated by the poor quality of life in most rural areas of the Soviet Union. The foundation of the Communist Party and the vanguard of the revolution was the urban industrial workers. Urban life was enhanced and rural life neglected for many decades. Lack of social amenities, poor medical services, deplorable educational systems, and isolation caused people to leave the farms. Today, recreational opportunities and facilities vary greatly, but there still is not much to do on a farm but work. Educational systems in sparsely settled rural areas are underfunded and poorly equipped. Young people who desire a more rigorous and more meaningful education or who wish to enter a trade school must travel to urban areas. Once a young person graduates from a technical school or learns a trade, the potential of securing a position on many state or collective farm management staffs is limited, for many farm directors and mid-level administrators resent or fear educated people. Universal military training also requires young men to leave the farm and travel: they see how other people live, work, and play. A high percentage of these young men enter the urban labor market when demobilized.

To ensure that Soviet agriculture in the twenty-first century is able to supply the basic food and technical crops needed for an urban society, substantial improvement in the total quality of rural life and greater social recognition for rural contributions to the Soviet system will be necessary. At this time, it is not worthwhile to remain on the average farm in the Soviet Union if a person is bright, young, and ambitious. The urban proletariat and the leaders of the Communist Party must recognize the major contributions those who work on farms make to their quality of life.

COMMUNIST PARTY IDEOLOGY and EVOLVING PRIORITIES

In all communist nations, the party is the ultimate controlling power, working through its own local, regional, and republic bodies, as well as through the Soviet government. The Russian Revolution of 1917 established the "dictatorship of the urban proletariat," which socialized total national means of production and systematically destroyed all classes and individuals who opposed "party" rule. Once the old order was destroyed, centralized state economic planning began, and the new country entered an era where all resources were devoted to building the nation's industrial base. Capitalist intervention into internal national politics and outside military threats were used to justify the establishment and continuation of a totalitarian government. Party theorists stated that, when the state had built a strong industrial base and when the differentiation of

all classes ended, the transition from socialism to communism could begin. At that time, there would be a gradual withering away of repressive government. The Communist Party of the Soviet Union, however, composed of truly conscious and dedicated Marxists, was to continue in its role of educating the workers and serving as the general staff of the revolutionary movement.

The urban-based and urban-led Communist Party instituted the world's first large-scale experiment in total government controlled farming. Its basis, the "Stalin Model for Socialist Agricultural Development," has been modified and applied in other countries where the communist "dictatorship of the urban proletariat" is in power (Table 26). All Soviet party leaders, from Lenin to Khrushchev, considered it essential to wipe-out all vestiges of private agriculture, to become self-sufficient in all agricultural products, and to maintain complete control of internal food supplies and technical raw materials. The revolutionary cry in 1917 was "bread and peace," and Lenin promised the citizens of the new socialist nation an improved standard of living, bread for everyone, and elimination of famine. One of the initial acts of the Bolsheviks in 1917, upon seizing control of Imperial Russia, was a decree confiscating the land of the church and large landlords. The Communist Party's first priority was to gain power. After consolidating their power and silencing the opposition, the Party in 1918 called for the organization of communes, collective farms, and state farms. Peasants were bitterly opposed to surrendering their land, and a civil war flared up in rural areas. Lenin countered by instituting a

Table 26. COMPOSITION OF DEPUTIES OF THE SUPREME SOVIET OF THE USSR IN ACCORDANCE WITH THEIR OCCUPATION

	Number of deputies	As a percentage of total
Total	1500	100
of whom:		
workers	527	35.2
collective farmers	242	16.1
managers of enterprises and specialists of all branches in the national economy	68	4.5
employees of State and Soviet bodies	198	13.2
workers of Party bodies	250	16.7
workers of Trade Union and Konsomol bodies	19	1.3
employees of science, culture, literature and art, public education, health services and press	141	9.4
military personnel	55	3.7

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 16.

period of "War Communism" (1918-21) where peasants were required to make compulsory deliveries of agricultural products to the state. They resisted and famine swept Soviet Russia in 1921 and 1922. The Communist Party's second priority was to remain in power. In a humiliating abandonment of Communist Party ideology, in order to restore national agricultural production and specifically food supplies to urban areas, Lenin's "New Economic Policy," from 1921 through 1928, made concessions to private enterprise and traditional peasant agriculture. The nation began to restore itself economically and private agriculture flourished. Obstinant Marxists lobbied to modify this program, for it was not in accord with stated party objectives. Continued urban food shortages and reduced grain exports that provided capital for industrial development led to Stalin's abolishment of Lenin's "New Economic Policy" and to forced collectivization in 1928. The Communist Party's third priority was to industrialize, and at the expense of rural dwellers. Stalin's agricultural policies were primarily concerned with strengthening the party's control of the countryside, and transferring income from rural into the urban sector, rather than increasing agricultural productivity. He decided to eliminate the small capitalist peasants and totally reorganize Soviet agriculture along large-scale socialist lines. Property was requisitioned, those who resisted were killed, and the collective farm-state farm system became universal within the Soviet Union.

Stalin refused to modify his unproductive agricultural program even though there was famine in 1933-34 and 1946-47.

After Stalin's death, Khrushchev attempted to reform the system, and to institute the Communist Party's fourth priority, feeding all the Soviet citizens reasonably. He introduced his "New Lands Program" and was successful in improving the diets of all Soviet citizens. As in 1917, political considerations remained paramount in all agricultural decisions. Khrushchev was removed from power in 1963 because of his failure in the agricultural sector. His successors, Brezhnev, Andropov, Chernenko, and Gorbachev, have attempted to revitalize, in their own way, socialized agriculture. Decisions involving investments, procurement prices for agricultural products, and even what is produced and where it is produced reflect the success or failure of the man who leads the Communist Party--and the continuous maneuvering and in-fighting among rival intra-party political factions. The Communist Party's fifth and current priority is to meet the dietary expectations of urban industrial workers for high-quality foods at subsidized low prices. Brezhnev and Gorbachev's "New Food Program," promulgated in 1982, plans to boost sagging farm production by loosening food price controls, allowing farmers to sell their produce directly to local stores, and giving regional agricultural officials greater decision-making autonomy.

Communist Party ideology has conflicted, at times, with reality. Socialization of agriculture in the Soviet Union has failed. However, radical modification or elimination of the "Stalin Model for Socialist Agricultural Development" could undermine the entire ideological framework of the Communist Party.

NATIONAL FOOD NEEDS and PRIORITIES

The population of the Soviet Union is increasing in number and in dietary expectations. Potential for increasing food supplies by expanding agriculture into vast areas of virgin land is nonexistant, and the crops produced by extensive agriculture are not what the more sophisticated urban dwellers want. Although more sugar beets, sunflowers, flax, and potatoes are grown, and more milk produced, the Soviet Union lags far behind the United States in feed grains, fruits, vegetables, and especially meat. As a result. the Communist Party has designated as the nation's most important social and economic objective, the increased production of food and agricultural raw materials (Table 27).

In the past twenty years, average monthly wages have doubled while the prices of staple foods in state stores have not changed. On the whole, the diet of an average Soviet citizen has gradually improved (Table 28). People have increased their consumption of protein-rich foods of animal origin, and of vegetables and fruits (Table 29). Yet, urban dwellers--and in parti cular the urban industrial proletariat--demand a much better and more diversified diet. They desire a diet similar to that in East European communist nations such as Czechoslovakia, East Germany, and Hungary; a diet somewhat like that of an American industrial worker. Meat, dairy products, fruits and vegetables are in insufficient supplies to satisfy the needs of urban dwellers (Tables 30 and 31). High-quality, protein-rich foods sold in

Table 27. PRODUCTION OF KEY PRODUCTS OF FOOD INDUSTRY

	1970	1975	1980	1984
Granulated sugar, million tons.	10.2	10.4	10.1	12.5
of which sugar-beet	8.1	7.4	6.6	7.9
Meat (including grade I edible by-products), million tons . .	7.1	9.9	9.1	10.6
Sausages, thousand tons	2286	2953	3074	3293
Fish and other marine products (catch), million tons	7.8	10.4	9.5	10.6
Fish products including canned fish, thousand million rubles	4.4	5.5	6.0	7.0
Butter, thousand tons	963	1231	1278	1497
Dairy products in terms of milk, million tons	19.8	23.7	25.5	28.6
Powder milk and powder cream, thousand tons	208	316	359	508
Cheese and brynza (fatty), thousand tons	466	547	648	782
Margarine products, thousand tons	762	999	1263	1427
Vegetable oil, thousand tons . .	2784	3344	2650	2678
Canned food, thousand million conventional cans	10.7	14.6	15.3	17.1
of which:				
canned fruit and vegetables	7.5	9.6	10.3	11.9
canned fish	1.4	2.2	2.8	3.0
Confectionery, thousand tons . .	2896	3247	3861	4153
Grape wine, million decalitres .	268	297	323	341

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 150.

Table 28. PRODUCTIVE LIVESTOCK
(as of January 1; million head)

Year	Cattle	of which cows	Pigs	Sheep and goats	of which sheep
			In all categories of agricultural enterprises		
1941	54.8	28.0	27.6	91.7	80.0
1961	75.8	34.5	58.7	140.3	133.0
1971	99.2	39.8	67.5	143.4	138.0
1976	111.0	41.9	57.9	147.1	141.4
1981	115.1	43.4	73.4	147.5	141.6
1982	115.9	43.7	73.3	148.5	142.4
1983	117.2	43.8	76.7	148.5	142.2
1984	119.6	43.9	78.7	151.8	145.3
1985	120.9	43.5	77.8	148.9	142.7
			In collective, state farms, inter-farm enterprises and other agro-industrial enterprises		
1941	23.6	7.0	11.5	49.2	46.3
1961	52.8	18.2	43.3	106.2	104.9
1971	74.3	24.3	50.9	110.2	109.2
1976	87.6	28.2	45.7	117.7	116.4
1981	92.1	30.2	59.4	117.3	116.0
1982	92.5	30.3	59.1	117.8	116.4
1983	93.0	30.3	60.9	116.6	115.2
1984	95.0	30.3	63.1	118.6	117.1
1985	97.0	30.2	63.7	116.7	115.3
			In individual subsidiary plots of the population		
1941	31.2	21.0	16.1	42.5	33.7
1961	23.0	16.3	15.4	34.1	28.1
1971	24.9	15.5	16.6	33.2	28.8
1976	23.4	13.7	12.2	29.4	25.0
1981	23.0	13.2	14.0	30.2	25.6
1982	23.4	13.4	14.2	30.7	26.0
1983	24.2	13.5	15.8	31.9	27.0
1984	24.6	13.6	15.6	33.2	28.2
1985	23.9	13.3	14.1	32.2	27.4

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 128.

Table 29. OUTPUT OF LIVESTOCK PRODUCTS

Year	Meat (slaughter weight), million tons	Milk, million tons	Eggs, thousand millions	Wool (physical weight), thousand tons
	In all categories of agricultural enterprises			
1940	4.7	33.6	12.2	161
1960	8.7	61.7	27.4	339
1970	12.3	83.0	40.7	402
1975	15.0	90.8	57.4	448
1980	15.1	90.9	67.9	443
1981	15.2	88.9	70.9	460
1982	15.4	91.0	72.4	452
1983	16.4	96.4	75.1	462
1984	16.7	97.6	76.0	463
	In collective, state farms, inter-farm enterprises and other agro-industrial enterprises			
1940	1.3	7.5	0.7	98
1960	5.1	32.6	5.3	262
1970	8.0	53.2	19.0	323
1975	10.3	62.9	34.8	358
1980	10.4	63.8	46.1	347
1981	10.6	63.4	48.8	357
1982	10.8	66.6	50.3	344
1983	11.7	72.3	52.7	350
1984	12.1	74.3	53.9	351
	In individual subsidiary plots of the population			
1940	3.4	26.1	11.5	63
1960	3.6	29.1	22.1	76
1970	4.3	29.8	21.7	79
1975	4.7	27.9	22.6	90
1980	4.7	27.1	21.8	96
1981	4.6	25.5	22.1	103
1982	4.6	24.4	22.1	108
1983	4.7	24.1	22.4	112
1984	4.6	23.3	22.1	112

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 129.

Table 30. MEAT PRODUCTION
(in all categories of agricultural enterprises; slaughter weight; million tons)

Year	Meat	of which			
		Beef and Veal	Pork	Mutton and Goat Meat	Poultry
1940	4.7	1.9	1.7	0.7	0.3
1960	8.7	3.3	3.3	1.0	0.8
1970	12.3	5.4	4.5	1.0	1.1
1975	15.0	6.4	5.6	1.1	1.5
1980	15.1	6.6	5.2	0.9	2.1
1981	15.2	6.6	5.2	0.9	2.3
1982	15.4	6.6	5.3	0.8	2.4
1983	16.4	7.0	5.8	0.8	2.6
1984	16.7	7.2	5.8	0.8	2.6

Table 31. AVERAGE ANNUAL MILK YIELD PER COW
(kilograms)

Year	In all categories of agricultural enterprises	In collective, state farms, inter-farm enterprises and other agro-industrial enterprises*	In collective farms and inter-farm enterprises	In state farms
1940	1185	1190	1017	1803
1960	1779	1941	1854	2185
1970	2110	2312	2266	2346
1975	2204	2367	2365	2330
1980	2149	2229	2202	2245
1981	2095	2160	2135	2172
1982	2134	2209	2192	2214
1983	2258	2369	2366	2356
1984	2289	2403	2403	2385

* The average annual milk yield per cow was 2613 kilograms in the inter-farm enterprises for 1984.

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 130.

urban areas are not sufficient for demands, and this is compounded by great losses during storage, processing, transportation, and sales (Table 32).

Cognizant of urban unrest related to food shortages and food rationing in selected Soviet cities, the 26th Communist Party Congress in 1982 introduced a "New Food Program." This program basically consisted of the following: 1) intensification in all phases of agriculture with special attention given to feed grain production; 2) improvement in food production, processing, transportation, and sales infrastructure to reduce the tremendous waste in the system; 3) restructuring methods of planning and management of the agricultural-industrial complex, plus large investments in every critical sector of agriculture that might result in more food delivery to urban areas; 4) complete mechanization and electrification of agriculture and creation of a new type of peasant, i.e. an educated person with technical know-how; 5) specialization on the farms to increase the quality and the amount of foodstuffs delivered to the state, plus make agriculture a highly mechanized branch of basic production run along industrial lines; and 6) liberalization of "personal subsidiary plots" size and scope, to take advantge of intensive small-scale food production capabilities and to impact upon local retail trade in high-quality foodstuffs.

This new agricultural program in many ways is similar to others tried in the past thirty years. For Soviet agriculture to meet the needs of a growing population and satisfy increasing demands for better quality and more diverse foods by urban

Table 32. CONSUMPTION OF FOODSTUFFS
(annual, kilograms per capita)

	1960	1970	1975	1980	1984	1990 (plan)
Meat and meat products in terms of meat (including fat and edible by-products in nature) . .	40	48	57	58	60	70
Milk and dairy products (in terms of milk) . .	240	307	316	314	317	330-340
Eggs, numbers	118	159	216	239	256	260-266
Fish and fish products .	9.9	15.4	16.8	17.6	17.5	19
Sugar	28.0	38.8	40.9	44.4	44.3	45.5
Vegetable oil	5.3	6.8	7.6	8.8	9.6	13.2
Potatoes	143	130	120	109	110	110
Vegetables and melons . .	70	82	89	97	103	126-135
Fruits and berries (excluding pressed into wine)	22	35	39	38	45	66-70
Bakery products (bread and macaroni products in terms of flour, cereals, pulses) . . .	164	149	141	138	135	135

The USSR in Figures for 1984, Brief Statistical Handbook. Central Statistical Board of the USSR, Moscow, Finansy i Statistika Publishers, 1985, p. 221.

dwellers in the twenty-first century, it must change. The "Stalin Model for Socialist Agricultural Development" does not work; it was not designed to provide the quality and variety of foods needed by a modern industrial society. Urban unrest and urban food rioting in the Soviet Union at the time of Stalin's death gave impetus to the 1950s and 1960s urban revolts in many Eastern European nations. Urban industrial workers are disturbed that they, the vanguard of the revolution, are so poorly fed by West European and East European standards. There exists a betrayal of expectations, for one of the fruits of the revolution was to be an increase in the overall quality of life. The stage is set for massive urban unrest. Urban industrial workers perceive that they are "relatively deprived" and contend that their Communist Party has failed them. Progressive deprivation of quality foods has led to an "intensification of expectations" and the potential for urban industrial workers' food strikes and urban dwellers' food riots. Internal disappointment and dissatisfaction, specifically in urban areas over food availability and quality, reflect only a small facet of social discontent. Urban dwellers' vocal grumblings provide a hint to the potentially catastrophic problems that exist within the Soviet system. Unfulfilled national food needs could result in the destruction of the "Stalin Model for Agricultural Development" in century twenty-one.

The Soviet Union, once the world's largest grain exporter, is being driven by urban dwellers' demands for dietary improvements into permanent dependence upon foreign food and grain imports. No less than one-fourth of the grain consumed within the Soviet Union is imported from diversified sources, and the amount may increase in the future. With more bad harvests than good harvests in recent years, continued growth in livestock numbers, and the inherent problems within Soviet socialized agriculture, massive imports of wheat, corn, soybeans, and other grain have slowly been woven into and accepted as a central aspect of the Soviet planned economy. Communist Party leaders have limited potential for reversing this trend and revitalizing their inefficient farm system. No other nation in history has had to buy so much foreign food, not even hunger and famine-stricken countries of south Asia or Africa. Soviet meat imports, mostly beef, have increased six-fold in five years. Foreign purchases of kitchen staples such as vegetable oils, butter, sugar, spices and fresh fruits vary each year in amount, but are increasing in overall magnitude. The United States' share of the Soviet agricultural trade is about twenty percent today, down from a high of almost eighty percent in the mid-1970s. Soviet agricultural imports threaten to drain their already limited financial resources. Average annual food-grain purchases require cash outlays from three to five billion rubles, at a time when oil and gold--prime Soviet exports--are commanding lower prices

on the international market.

If the Communist Party is unwilling to modify the current form of socialized agriculture, the Soviet Union will continue to be a major importer of agricultural products in the twenty-first century. Soviet socialized agriculture can produce adequate extensive grain crops that require limited labor and little personal inputs, but it is unable to produce adequate amounts of quality meats and poultry products, as well as fresh fruits and vegetables. The system can produce a survival diet, but not a diversified, well-balanced diet demanded by sophisticated and educated urban dwellers. On a per capita basis, for example, the Soviet Union currently produces about two-thirds as much meat as the United States, and most of this meat is of poorer quality. In response to the food riots of the early 1950s, the agricultural policies of the Communist Party have been oriented to rectify the shortages in meat and poultry products. A serious hindrance to increased livestock herds and more meat for human consumption is the lack of an adequate feed base. The Soviet Union conspicuously lacks the agroclimatic resources to produce large quantities of bulky feedstuffs such as corn and soybeans. Fresh fruits and vegetables can be produced in season and in sufficient amounts on private plots and specialized state farms. However, as much as sixty percent of the fresh fruits and vegetables produced in the Soviet Union are wasted, for the food processing, food transportation, and food marketing system is antiquated and underdeveloped.

Mass hunger and fear of famine are no longer the threat they were in the Soviet Union a few decades ago, but then, the agricultural system has failed to evolve as the rest of the nation has evolved. It has been unable to provide the urban industrial workers and urban technocrats with the variety of quality foods available in many East European nations and the United States, or with agricultural raw materials for internal use and export. To stimulate Soviet agriculture, to provide the types and quality of foodstuffs demanded by urban dwellers, and to generate foreign exchange via agricultural exports, the Communist Party must: 1) radically reorganize socialist agriculture along either the Hungarian or Chinese model, or develop a new system based, in part, upon a blend of the successful "private plots" and successful state farms; 2) intensify production, especially output per acre in the more fertile areas of the Ukraine, Transcaucasus, and Central Asia; 3) enhance and improve the status of rural workers, making them equal to an urban worker in all socio-economic terms, plus increase social incentives and financial rewards to farm workers; and 4) increase farm workers' morale and confidence by providing modern equipment, seed, fertilizer, and technical advice that will enable them to do their jobs in an efficient and timely manner. If the "top priority task" is to provide a modern industrial nation with a national diet comparable to that of other industrial nations, the Soviet Union must either modify its agricultural system or become permanently dependent upon food-grain imports from foreign sources.

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