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Soviet Crop Production on Reclaimed Lands: Problems and Prospects



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A Research Paper

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*GI 83-10204
September 1983*

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A Research Paper

This paper was prepared by [redacted] of the
Strategic Resources Division, Office of Global Issues.
Comments and queries are welcome and may be
directed to the Chief, Agricultural Assessments
Branch, OGI, [redacted]

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*GI 83-10204
September 1983*

**Soviet Crop Production
on Reclaimed Lands:
Problems and Prospects**



Summary

*Information available
as of 30 July 1983
was used in this report.*

Faced with increasing demands for more and better foods, lagging agricultural production, and finite land resources, the USSR has opted to continue a very expensive program of land reclamation through the 1980s. With 75.7 billion rubles already invested to this end in the period 1966-80, Soviet planners have earmarked an additional 39 billion rubles—the largest sum ever—for reclamation during the current plan period, 1981-85. Although data have not been released for 1986-90, it is clear that, to have any chance of realizing stated goals, continued emphasis of investment—which since 1966 has amounted to some 27 percent of the total allocated to production in the agricultural sector—will be necessary.

Reclamation activities in the 1980s are aimed at increasing farm output by improving the existing 34.3 million hectares of drained and irrigated land and by adding 7-10 million hectares to the reclaimed land network by 1990. While some reclamation work will be scheduled during this decade in all of the USSR republics, the bulk of the effort will take place in the RSFSR, the Ukraine, and Central Asia, with investments in the RSFSR and the Ukraine accounting for almost two-thirds of the gross additions planned. These objectives, if realized, will further strengthen the position of the reclaimed lands in Soviet agriculture. Although the reclaimed lands comprised only 10 percent of the cultivated area in 1976-80, these new fields accounted for all of the USSR's cotton and rice, three-fourths of its vegetables, one-eleventh of its sugar beets, and one-twelfth of its grain.

Planned investments for reclamation underscore the Soviet intent to emphasize the development of grain and forage production in the 1980s. By 1990 the Soviets expect reclaimed lands to produce about 35 million tons of grain, some 18 million tons more than in 1980. Together, the 1990 plans for grain and forage are to double reclaimed land output of all livestock feed over the 1976-80 level. At the same time, the increased output of some specialty crops is expected to parallel the growth anticipated in Soviet consumer demand. Among the specialty crops, substantial increases in the production of fruit and vegetables are slated, while the output of cotton, a leading crop grown under irrigation, is to remain at current levels.

Judged from the perspective of past reclamation accomplishments and performance thus far during the 1981-85 plan period, the complete achievement of five-year plan goals in either 1985 or 1990 seems unlikely. Expansion and improvement of reclaimed land fell far short of the 1976-80 plan, and progress toward current goals has been exceedingly slow. The poor performance reflects incomplete or untimely funding, unrealistic scheduling of work, the nonfulfillment of resource inputs by the state, and the failure of the involved ministries to coordinate their work.

Nevertheless, the USSR will continue to emphasize land reclamation in the remaining years of this decade. The program has the potential to make a significant contribution to the realization of major ongoing Soviet goals, including the increase and stabilization of farm production, improved regional self-sufficiency, and the overall reduction of Soviet dependence on agricultural imports. Hence, despite the complications that now afflict the effort, add to its costliness, and place the full achievement of reclamation plans in jeopardy, we expect the continued expansion of reclaimed land in the USSR. On balance, however, the present program does not appear to have the capacity—given constantly increased levels of population and demand—to provide the insurance against the widely varying agricultural output sought by the Soviet leadership.



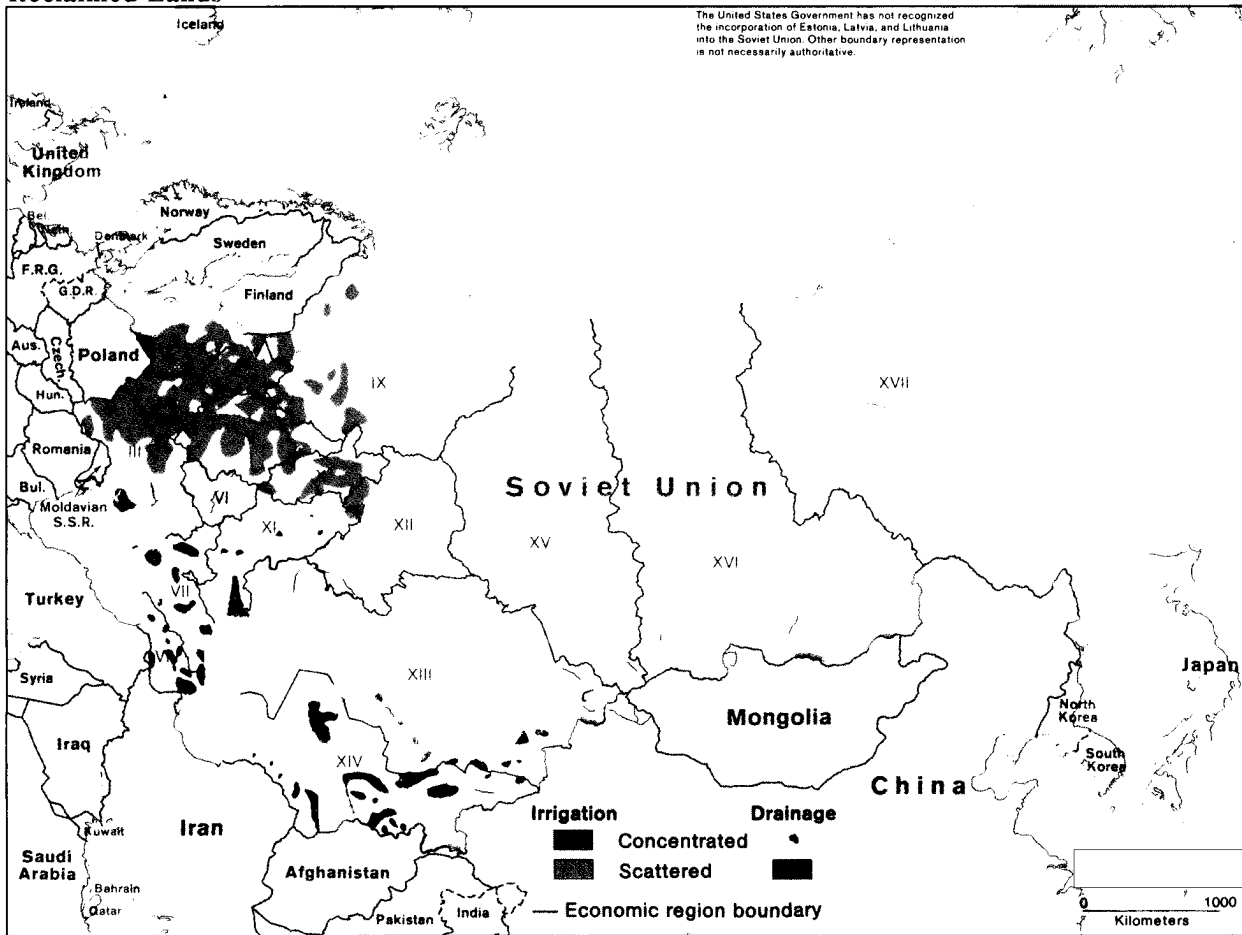
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**Figure 1
Reclaimed Lands**



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Economic regions

- | | | |
|----------------------|--------------------|------------------|
| I Baltic | VII North Caucasus | XIII Kazakhstan |
| II Belorussia | VIII Transcaucasus | XIV Central Asia |
| III Ukraine | IX Northern | XV West Siberia |
| IV Northwest | X Volga-Vyatka | XVI East Siberia |
| V Central | XI Volga | XVII Far East |
| VI Central Chernozem | XII Ural | |

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**Soviet Crop Production
 on Reclaimed Lands:
 Problems and Prospects**

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Introduction

In conjunction with the formal adoption in May 1982 of the USSR Food Program,¹ the Central Committee of the CPSU and the Council of Ministers of the USSR resolved to continue support of costly land reclamation² policies. In addition, Soviet authorities have authorized initiation of work on the interregional transfer of surface water. In taking these actions, the leadership has specifically endorsed efforts:

- To expand agricultural production by irrigating or draining an additional 7.1-7.5 million gross hectares of land by 1985, with another 4.7-7.7 million net hectares to be reclaimed by 1990.
- To increase the production potential of existing reclaimed land by taking measures to improve soil conditions and to preserve and improve irrigation and drainage facilities already in place.
- To complete the initial phase of the diversion of rivers in the north European USSR to the Volga Basin by 1990.
- To complete by 1990 the planning and design of a project to use Siberian waters for irrigation in Central Asia.

These decisions underscore continued Soviet concern over how to satisfy increasing demands for quality foods while reducing overall dependency of the USSR on Western imports.

Growth of the Reclamation Program

Reclaimed lands in the USSR increased from 20.5 million hectares in 1965 to 34.3 million hectares in 1980 (table 1).³ During these years, the irrigation

¹ This program refers to the current set of Soviet agrarian policy measures, planned through 1990 and collectively designed to achieve a better coordinated, more efficient, overall development of the agroindustrial complex. In this way, within resource limits, the Soviets hope to increase farm output and also to reduce losses of agricultural commodities en route to customers. The institutional changes announced at the May 1982 plenum were in support of production plans and resource allocations primarily adopted earlier.

² In this paper, the term reclaimed lands refers to lands improved for crop production through the installation of facilities to drain away surplus moisture or to irrigate crops where precipitation is deficient. Other reclamation measures are concentrated on improving drained and irrigated lands. In the reclamation processes, some but not all of the lands become upgraded from nonagricultural to agricultural land or from nonarable to cultivated land.

³ Data in this report are based on published Soviet statistics.

Table 1 *Million hectares*
USSR: Planned 1985 and 1990
Reclaimed Land Networks,
Compared With Selected Years

| Type of Land | 1965 | 1970 | 1975 | 1980 | 1985 Plan | 1990 Plan |
|------------------------------|------|------|------|------|-----------|-----------|
| Total reclaimed ^a | 20.5 | 21.3 | 28.1 | 34.3 | 36.3 | 41.0-44.0 |
| Irrigated | 9.9 | 11.1 | 14.5 | 17.5 | 20.8 | 23.0-25.0 |
| Drained | 10.6 | 10.2 | 13.7 | 16.9 | 15.5 | 18.0-19.0 |

^a Components may not add to the totals shown because of rounding.

network increased by 7.6 million hectares, and 6.3 million hectares were added to the inventory of drained lands. Nevertheless, as of 1980, reclaimed lands still comprised less than 6 percent of all Soviet agricultural lands and almost 10 percent of all arable land (table 2). Although the expansion and improvement of reclaimed lands have not met Soviet expectations, particularly during the period 1976-80, the regime remains committed to a program that calls for 36.3 million hectares of reclaimed land by 1985 and 41-44 million hectares by 1990.

The irrigated land area is to increase 19 percent during 1981-85 and 10 to 20 percent in 1986-90, reaching 23-25 million hectares by 1990. In contrast, the 1985 goal for drained land, 15.5 million hectares, represents an 8-percent decrease in the total amount of land in this category—even though some 3.7-3.9 million hectares of newly developed drainage are to be put into operation during 1981-85. More importantly, in 1986 the Soviets will launch an effort to bring the total network of drained lands to 18-19 million hectares by 1990.

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Table 2
USSR: Reclaimed Lands Share of All Farmland
and Crop Areas, 1965-80

Percent

| Types of Land or Crops | 1965 | | | 1975 | | | 1980 | | |
|--|---------|-----------|---------------------------------|---------|-----------|---------------------------------|---------|-----------|---------------------------------|
| | Drained | Irrigated | Total Reclaimed ^a | Drained | Irrigated | Total Reclaimed ^a | Drained | Irrigated | Total Reclaimed ^a |
| All USSR agricultural lands | 1.7 | 1.6 | 3.4 | 2.3 | 2.4 | 4.7 | 2.8 | 2.9 | 5.7 |
| Land used by agricultural enterprises | | | | | | | | | |
| Agricultural land | 1.3 | 1.7 | 3.0 | 1.7 | 2.5 | 4.2 | 2.2 | 3.0 | 5.2 |
| Arable land | 1.6 | 3.7 | 5.3 | 2.2 | 5.6 | 7.8 | 2.9 | 6.7 | 9.6 |
| Areas devoted to crops | | | | | | | | | |
| Natural meadows and pastures ^b | 8.3 | 1.2 | 9.5 | 12.2 | 2.3 | 14.5 | 15.0 | 3.1 | 18.1 |
| Orchards and vineyards | 1.3 | 19.0 | 20.3 | 1.0 | 21.7 | 22.7 | 1.0 | 25.3 | 26.4 |
| Private farming plots | 1.4 | 5.9 | 7.3 | 1.7 | 6.1 | 7.8 | 2.1 | 6.4 | 8.5 |
| Cultivated forage crops | 2.6 | 3.2 | 5.8 | 3.5 | 5.7 | 9.3 | 4.5 | 8.9 | 13.4 |
| Technical crops | 1.3 | 17.8 | 19.1 | 2.1 | 22.9 | 25.0 | 2.6 | 24.2 | 26.8 |
| Potatoes, vegetables, melons | 2.1 | 5.8 | 8.0 | 2.7 | 8.9 | 11.6 | 3.6 | 11.4 | 15.1 |
| Grain | 1.1 | 1.7 | 2.9 | 1.7 | 2.2 | 4.0 | 2.4 | 2.6 | 5.0 |

^a Components may not add to the totals shown because of rounding.

^b Percentages based only on all-USSR natural meadows.

Distribution of Reclaimed Lands

As of 1980 the reclaimed lands of the USSR were located primarily in RSFSR (almost 10.9 million hectares) and the Asian republics (about 8 million hectares). Elsewhere, reclaimed lands totaled more than 8.4 million hectares in Belorussia and the Baltic republics, roughly 4.8 million hectares in the Ukraine and Moldavia, and more than 2 million hectares in the Transcaucasus (table 3).

Baltic republics include some drained land and practically all those in Central Asia have some irrigated land, but at least a third of the farms in every economic region include some reclaimed land. In 1980, for example, 40.3 percent of all Soviet farms included irrigated land and 21.7 percent contained drained land.

Despite the regional concentration of improved lands, the drained and irrigated lands of the USSR are widespread geographically. All of the farms in the

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Table 3
USSR: Distribution of Reclaimed Lands, Selected Years

Thousand hectares

| Oblast (Region, Republic) | Irrigated Lands ^a | | | Drained Lands ^b | | |
|---------------------------------|------------------------------|-----------------|-----------------|----------------------------|-----------------|-----------------|
| | 1965 | 1975 | 1980 | 1965 | 1975 | 1980 |
| USSR, total ^c | 9,812.0 | 14,241.0 | 17,256.0 | 8,872.9 | 13,651.5 | 16,850.9 |
| RSFSR total | 1,510.4 | 3,684.0 | 4,994.0 | 2,816.7 | 4,526.8 | 5,891.4 |
| Kaliningrad | 0.4 | 1.6 | NA | 898.4 | 982.0 | NA |
| Northwest (and Northern) | 5.7 | 26.2 | NA | 637.2 | 1,212.6 | NA |
| Central Nonchernozem | 32.1 | 178.4 | NA | 523.8 | 1,039.5 | NA |
| Volga-Vyatsk | 1.2 | 122.2 | NA | 145.4 | 186.8 | NA |
| Central Chernozem | 5.0 | 203.9 | NA | 25.3 | 80.1 | NA |
| Volga | 174.0 | 947.3 | NA | 26.4 | 82.5 | NA |
| North Caucasus | 917.6 | 1,462.3 | NA | 41.4 | 41.7 | NA |
| Urals | 32.5 | 179.5 | NA | 22.8 | 76.4 | NA |
| West Siberia | 32.0 | 143.2 | NA | 218.5 | 216.2 | NA |
| East Siberia | 295.8 | 348.3 | NA | 66.2 | 94.0 | NA |
| Far East | 14.1 | 71.1 | NA | 211.3 | 515.0 | NA |
| Belorussia-Baltics | | 176.0 | 218.0 | 4,604.8 | 6,895.2 | 8,220.0 |
| Ukraine-Moldavia | 577.0 | 1,639.0 | 2,230.0 | 1,335.4 | 2,071.7 | 2,580.5 |
| Asian republics total | 5,850.0 | 6,950.0 | 7,936.0 | | | |
| Uzbek | 2,639.0 | 3,006.0 | 3,476.0 | | | |
| Kirgiz | 861.0 | 910.0 | 955.0 | | | |
| Tadzik | 468.0 | 567.0 | 617.0 | | | |
| Turkmen | 514.0 | 819.0 | 927.0 | | | |
| Kazakhstan | 1,368.0 | 1,648.0 | 1,961.0 | | | |
| Transcaucasus total | 1,875.0 | 1,792.0 | 1,878.0 | 116.0 | 157.8 | 159.0 |
| Georgia | 348.0 | 368.0 | 409.0 | 116.0 | 151.3 | 152.5 |
| Azerbaijan | 1,278.0 | 1,141.0 | 1,195.0 | | | |
| Armenia | 249.0 | 283.0 | 274.0 | | 6.5 | 6.5 |

^a Includes reclaimed agricultural lands available to *kolkhozes*, interfarm enterprises, *sovokhozes*, and other state farms; excludes reclaimed lands outside the agricultural sector and nonagricultural lands outside the agricultural sector and nonagricultural lands within reclaimed land networks.

^b Does not include lands equipped with drainage to facilitate irrigation.

^c Columns may not add due to rounding.



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The regional distribution of planned gross additions ⁴ to the reclaimed land networks during 1981-90, in million hectares, are as follows:

| Region | Irrigated Land | Drained Land |
|------------------|----------------|--------------|
| RSFSR | 3.3 | 3.7 |
| Ukraine | 1.0 | 1.3 |
| Belorussia | 0.11 | 0.95-0.97 |
| Baltic republics | NA | 1.6 |
| Kazakhstan | 0.82 | NA |
| Central Asia | 1.3-1.5 | NA |
| Transcaucasus | 0.34 | NA |

These goals serve to document the leading role to be played by the RSFSR in land reclamation during the 1980s. The drainage effort there is to focus primarily on improvements in the nonchernozem zone. Elsewhere, a substantial area of land drainage is planned for the Baltic republics, Belorussia, and the adjacent nonchernozem region of the Ukraine. [redacted]

New irrigation development in the 1980s will also emphasize installations planned for the RSFSR, particularly in the North Caucasus and the Volga regions. The 2.2 million hectares of new irrigation planned for Central Asia and Kazakhstan involve not only smaller areas but also portend much smaller rates of growth than those planned for the RSFSR and the Ukraine. Least significant of all, in an area sense, are plans for the further irrigation of lands in the Transcaucasus. [redacted]

Reclamation: Investments and Returns

Investments. Of a total of 287.4 billion rubles invested to increase agricultural production in the USSR during the period 1966-80, 75.7 billion rubles—or slightly more than 26 percent—were earmarked for

⁴ Gross additions are the areas of newly irrigated and drained lands reportedly placed into operation during respective periods (years). In contrast, net additions are the differences in the size of irrigation and drainage networks, based on the total areas reportedly existing as of specific beginning and ending dates (years). Gross additions exceed net increases by the extent that existing networks are abandoned (fall into disrepair) or because development of newly irrigated or drained tracts requires some overlapping or reconstruction of existing networks. [redacted]

reclamation (table 4).⁵ During the current planning period, 1981-85, it is anticipated that another 39 billion rubles, about 29 percent of the total allocated to agricultural production, will be similarly channeled. While investment data for 1986-90 have not as yet been released, it is clear that the successful implementation of any of the projects already planned or now under study will demand investments that are of at least proportional magnitude. [redacted]

A comparison of land reclamation investment with the increase in land area reclaimed in the USSR reveals that reclamation costs have escalated sharply in the past two decades. Investment in land reclamation during the years 1976-80 was 5.1 times greater than in 1961-65, and 2.3 times greater than in 1966-70. Meanwhile, between 1965 and 1980, the drainage network area increased only 59 percent and the irrigation network only 77 percent. Soviet data indicate that investment per hectare (gross addition basis) increased from 2,525 rubles in 1966-70 to 4,587 rubles in 1976-80, and such investment is expected to reach 5,000 rubles per hectare in 1981-85. Calculated on a net addition basis, investments per hectare in the same periods amount to 8,671, 6,873, and 20,000 rubles, respectively. [redacted]

Returns. The Soviets claim high returns for their investments in reclaimed lands relative to those derived from all USSR cropland (table 5). They state that the aggregate value of output on the reclaimed lands is equal to about one-third of the gross value of all crops produced in the USSR. Moreover, according to official Soviet data, crops grown on the reclaimed lands comprise an estimated one-fifth of the net output of all Soviet farms, that is, of all agricultural commodities, crop or livestock, sold outside the agricultural sector or consumed by farm worker households.⁶ [redacted]

⁵ Investments that directly affect output of agricultural commodities—such as farm machines and equipment, livestock raising facilities, storage and repair buildings, new orchards, and land reclamation—in contrast to so-called nonproductive improvements—including farm worker housing, administration buildings, roads, schools, and community facilities. [redacted]

⁶ Gross output of crops less quantities used as livestock feed, seeds, and other resources for further agricultural production. [redacted]

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Table 4
USSR: Investments in Land Reclamation,
Compared With Other Investment Categories,
Selected Periods

| Category | 1961-65 | 1966-70 | 1971-75 | 1976-80 | 1981-85 Plan |
|-----------------------------|--------------|--------------|--------------|--------------|-----------------|
| <i>Billion rubles</i> | | | | | |
| Total economy | 243.5 | 347.9 | 493.0 | 634.1 | 670.7 |
| Agroindustrial complex | 48.2 | 81.5 | 130.5 | 171.0 | 233.0 |
| Agricultural sector | 45.3 | 74.1 | 118.4 | 155.2 | 172.5 |
| Productive investment | 37.7 | 59.7 | 99.2 | 128.5 | 132.2 |
| Land reclamation | 6.7 | 15.0 | 26.2 | 34.5 | 38.6 |
| <i>Index, 1961-65 = 100</i> | | | | | |
| Total economy | 100 | 143 | 202 | 260 | 275 |
| Agroindustrial complex | 100 | 169 | 271 | 355 | 483 |
| Agricultural sector | 100 | 164 | 261 | 343 | 381 |
| Productive investment | 100 | 158 | 263 | 341 | 351 |
| Land reclamation | 100 | 224 | 391 | 515 | 576 |

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Table 5
USSR: Gross Output per Unit of Labor and Investment
From Reclaimed and All Cropland, 1976-79

| Republic | Rubles per Hour of Labor | | | Kopecks per Ruble of Investment | | |
|-------------------|--------------------------|-------------------|--|---------------------------------|-------------------|--|
| | All Cropland | Reclaimed Land | Ratio: Reclaimed to All Cropland | All Cropland | Reclaimed Land | Ratio: Reclaimed to All Cropland |
| Total USSR | NA | NA | NA | 24 | 49 | 2.0 |
| RSFSR | 2.48 | 4.63 | 1.9 | 12 | 42 | 3.5 |
| Ukraine | 2.40 | 3.72 | 1.6 | 25 | 65 | 2.6 |
| Belorussia | 2.12 | 4.31 | 2.0 | NA | NA | NA |
| Latvia | 1.89 | 3.96 | 2.1 | 11 | 36 | 3.3 |

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Table 6
USSR: Returns From Irrigated, Drained, and Nonreclaimed
Agricultural Land, 1976-80 Annual Average

| Republic | Rubles per Hectare | | | Ratio to Nonreclaimed | | Irrigated as a Ratio to Drained |
|--------------|--------------------|---------|--------------|-----------------------|---------|---------------------------------|
| | Irrigated | Drained | Nonreclaimed | Irrigated | Drained | |
| USSR average | 792 | 204 | 136 | 5.8 | 1.5 | 3.9 |
| RSFSR | 460 | 145 | 110 | 4.2 | 1.3 | 3.2 |
| Ukraine | 698 | 283 | 290 | 2.4 | 1.0 | 2.5 |
| Moldavia | 1,535 | | 681 | 2.3 | | |
| Belorussia | 458 | 213 | 283 | 1.6 | 0.8 | 2.2 |
| Lithuania | 698 | 222 | 160 | 4.4 | 1.4 | 3.1 |
| Latvia | 652 | 199 | 140 | 4.7 | 1.4 | 3.3 |
| Estonia | 223 | 220 | 203 | 1.1 | 1.1 | 1.0 |
| Uzbek | 1,263 | | 84 | 15.0 | | |
| Kirgiz | 597 | | 89 | 6.7 | | |
| Tadzik | 1,391 | | 109 | 12.8 | | |
| Turkmen | 921 | | 27 | 34.1 | | |
| Kazakhstan | 498 | | 66 | 7.5 | | |
| Azerbaydzan | 836 | | 280 | 3.0 | | |
| Georgia | 939 | 964 | 708 | 1.3 | 1.4 | 1.0 |
| Armenia | 1,091 | | 142 | 7.7 | | |

According to Soviet calculations, the gross value of production on irrigated land was 5.8 times that of production on nonreclaimed lands during the period 1976-80 (table 6). The superior productivity of the irrigated lands during this period, as measured by the value of gross output, was due not only to higher yields but also to the emphasis on producing crops of high unit value. On the other hand, the crop mix on the drained lands approximated that which prevailed on adjacent unreclaimed lands, and their relative advantage, in terms of value of output, was less pronounced. []

Assessment of the profitability of the USSR reclamation program is complicated by Soviet costs and returns seemingly assigned arbitrarily and evaluations consistently based on gross rather than net returns.

Given full allocation of all production costs, including reclamation, it is probable that returns from production on the returned lands would not compensate all of the inputs involved. Furthermore, the rate of return, even by Soviet admission, is also slowing; the recovery of investment in land reclamation, at one time officially claimed possible in 5 to 6 years, now requires 9 to 11 years. []

In the USSR the rate of recovery of investment is accorded less attention than is the achievement of agricultural self-sufficiency, particularly as the latter pertains to the provision of specialized food crops, technical crops, and feed crops and forage essential to

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Table 7
USSR: Planned 1985 Reclaimed Land Production
Compared With 1965 and 1980 Levels

Million tons

| Crop | 1965 | 1980 | 1985 Plan ^a | Remarks |
|--------------------------|------------|-------------|------------------------|--|
| | | | Quantity | |
| Total grain | 5.0 | 16.5 | 25.6 | 1.5 to 1.6 times 1980 level |
| Wheat | NA | 5.2 | 8.0 | 55-percent increase over 1980 |
| Corn | 0.5 | 3.0 | 6.0 | Double 1980 level |
| Rice | 0.6 | 2.8 | 3.0 | Further development of output |
| Other | NA | 5.6 | 8.6 | 55-percent increase over 1980 |
| Cotton, raw | 5.7 | 10.0 | NA | Average 9.2 million during 1981-85; to produce more fine staple cotton |
| Sugar beets | 5.6 | 7.2 | NA | Increased area only in European USSR |
| Soybeans | NA | NA | NA | Up by a considerable volume |
| Vegetables ^b | 5.6 | 12.7 | 16.8 | 32-percent increase |
| Fruits | 0.5 | 1.5 | NA | |
| Grapes | 0.9 | 2.4 | NA | |
| Forage crops, feed units | 8.2 | 42.6 | 63.9 | 1.5 times 1980 level |

^a Quantities are estimated according to Soviet press statements.

^b Excluding private plot production.

the stabilization of output in the livestock sector.⁷ When viewed from these perspectives, which reflect the preoccupation of the USSR on the reduction of its agricultural imports, the potential of the Soviet reclamation program—particularly the development of irrigation—seems good when compared to the less certain promise afforded by competing agricultural proposals.⁸ Hence, Soviet emphasis on land reclamation appears, on balance, to be both necessary and justified. Despite complications that will afflict the effort and undoubtedly prevent the timely achievement of all that is planned, significant progress in draining and irrigating unused land may be expected in the USSR during this decade.

Production Plans. Projected increases in production on reclaimed lands during the 1980s will stress the output of grain and forage. Indeed, by 1990 the

⁷ Grain and forage crops, including pastures, provide more than 90 percent of all USSR livestock feed.

output of all livestock feed from reclaimed lands is to double the 1976-80 level. The emphasis of these crops evolves out of Soviet plans to expand and stabilize livestock feed supplies. Although all specific goals for the entire decade are not available, they are generally suggested by announced production plans through 1985 (table 7). By 1985 the reclaimed lands are expected to produce about 26 million tons of grain, some 9 million tons more than in 1980; apparently, another 9-million-ton increase is expected by 1990. The output of irrigated corn is to double by 1985, thereby increasing its share of all grain output in reclaimed land to 23.4 percent, compared with 14.7 percent in the 1976-80 period (tables 8 and 9). By 1990 the all-USSR output of corn is to double, to 20 million tons, largely by replacing other grains with corn on irrigated land. Because of the relatively low official prices established for grain and forage crops, compared with the high per unit value assigned

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Table 8
USSR: Production From Reclaimed Lands,
Annual Average, Selected Periods

Thousand metric tons

| Crop | Drained Land | | | Irrigated Land | | | All Reclaimed Land | | |
|------------------------------|--------------|---------|---------|------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 |
| All grain | 2,563 | 4,444 | 6,472 | 4,118 | 6,536 | 10,078 | 6,681 | 10,980 | 16,549 |
| Wheat | 674 | 1,222 | 1,630 | 1,956 | 2,528 | 3,595 | 2,630 | 3,750 | 5,225 |
| Corn ^a | | | | 456 | 1,104 | 2,434 | 456 | 1,104 | 2,434 |
| Rice ^a | | | | 1,011 | 1,753 | 2,302 | 1,011 | 1,753 | 2,302 |
| Rye | 435 | 578 | 797 | | | | | | |
| Barley | 954 | 1,859 | 2,997 | 695 ^b | 1,151 ^b | 1,747 ^b | 2,584 ^b | 4,373 ^b | 6,589 ^b |
| Other | 500 | 785 | 1,048 | | | | | | |
| Potatoes ^c | 2,175 | 2,788 | 3,447 | NA | NA | NA | NA | NA | NA |
| Vegetables ^c | NA | NA | 3,556 | 5,958 | 8,327 | 11,544 | NA | NA | 15,100 |
| Sugar beets | 1,501 | 2,017 | 2,827 | 4,893 | 4,833 | 5,248 | 6,394 | 6,850 | 8,075 |
| Sunflower seeds ^a | | | | 29 | 47 | 63 | 29 | 47 | 63 |
| Cotton, raw ^a | | | | 6,049 | 7,667 | 8,932 | 6,099 | 7,667 | 8,932 |
| Flax, fiber ^d | 24.5 | 41.3 | 61.9 | | | | 24.5 | 41.3 | 61.9 |

^a Not grown on drained land.^b Includes rye, barley, and other grains.^c Excluding private plot production.^d Not grown on irrigated land.

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Table 9
USSR: Crops From Reclaimed Lands,
Selected Periods, Percent of All USSR Output

| Type of Crop | Drained Lands | | | Irrigated Lands | | | All Reclaimed Lands | | |
|------------------------------|---------------|------------|------------|-----------------|------------|------------|---------------------|------------|------------|
| | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 |
| Total grain | 1.5 | 2.4 | 3.2 | 2.5 | 3.6 | 4.9 | 4.0 | 6.0 | 8.1 |
| Wheat | 0.7 | 1.4 | 1.6 | 2.2 | 2.8 | 3.6 | 2.9 | 4.2 | 5.2 |
| Corn ^a | | | | 4.8 | 10.8 | 25.4 | 4.8 | 10.8 | 25.4 |
| Rice ^a | | | | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Rye | 3.3 | 5.0 | 7.3 | NA | NA | NA | NA | NA | NA |
| Barley | 3.1 | 4.3 | 5.4 | NA | NA | NA | NA | NA | NA |
| Potatoes ^b | 2.3 | 3.1 | 4.2 | NA | NA | NA | NA | NA | NA |
| Vegetables ^b | NA | NA | NA | 30.6 | 36.2 | 43.9 | NA | NA | NA |
| Sugar beets | 1.9 | 2.7 | 3.2 | 6.0 | 6.4 | 5.9 | 7.9 | 9.0 | 9.1 |
| Sunflower seeds ^a | | | | 0.5 | 0.8 | 1.2 | 0.5 | 0.8 | 1.2 |
| Cotton, raw ^a | | | | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Flax, fiber ^c | 5.3 | 9.1 | 15.8 | | | | 5.3 | 9.1 | 15.8 |

^a Not grown on drained land.^b Excluding private plot production.^c Not grown on irrigated land.

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Table 10
Comparison of Crop Yields,
Selected Periods, Annual Average

Centners per hectare

| Crop | All Cropland | | | Irrigated Land | | | Drained Land | | |
|--------------------------|--------------|-------------|-------------|----------------|-------------|-------------|--------------|-------------|-------------|
| | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 | 1966-70 | 1971-75 | 1976-80 |
| Total grain | 13.7 | 14.7 | 16.0 | 19.1 | 25.4 | 31.5 | 19.6 | 23.6 | 23.3 |
| Wheat, winter | 19.6 | 22.5 | 24.7 | 21.6 | 23.0 | 23.4 | NA | NA | NA |
| Corn, grain ^a | 27.2 | 28.2 | 32.2 | 27.0 | 36.5 | 48.0 | | | |
| Rice ^a | 33.3 | 38.6 | 39.3 | 33.3 | 38.6 | 39.3 | | | |
| Other grain | 12.1 | 12.6 | 13.7 | 8.9 | 15.7 | 20.8 | NA | NA | NA |
| Cotton ^a | 24.1 | 27.3 | 29.3 | 24.1 | 27.3 | 29.3 | | | |
| Sugar beets | 228.0 | 217.0 | 237.0 | 327.0 | 313.0 | 310.0 | NA | NA | NA |
| Potatoes | 115.0 | 113.0 | 117.0 | NA | NA | NA | NA | NA | 130.0 |
| Vegetables | 132.0 | 138.0 | 153.0 | NA | NA | NA | NA | NA | 161.0 |

^a Drained lands do not produce corn, grain, rice, and cotton.

[Redacted]

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specialty crops, the increase in value of output on the reclaimed lands will be limited. Nevertheless, the need for more livestock feed is an urgent problem that must be addressed. [Redacted]

The Soviets would like to produce more rice, but to do so would require expansion of the cultivated hectareage in southern areas, where the water is already in short supply. Hence, increased output of this valuable crop, which amounted to 2.3 million tons per annum in the period 1976-80, will depend primarily on improving yields on lands already in production. Nevertheless, the Soviets anticipate that rice output will exceed the annual average for the period 1976-80 by 20 percent in 1985 and 40 percent in 1990. [Redacted]

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Soviet expectations for greater production on irrigated and drained lands are boosted by the yield records (table 10). The per hectare output of irrigated grain increased 65 percent from 1966 to 1980, compared to the 19-percent increase recorded for grain on drained lands and a 17-percent increase for all USSR grain. Most significantly, the 1976-80 irrigated corn crop yield was 50 percent greater than the all-USSR corn yield, 70 percent above the yield of irrigated wheat, and 2.3 times the yield of other irrigated grain. These differences suggest how output might increase if corn were to be widely substituted for other irrigated grains. [Redacted]

At present, almost all of the Soviet crop of soybeans, typically totaling about 0.5 million tons, is grown on the drained lands in the southernmost regions of the Far East. A desired gradual extension of the crop into the irrigated areas of Central Asia (mainly southern Kazakhstan), the Crimea, and the Kuban will require revisions in soybean growing technology and is handicapped by limited water supplies in these areas. In recent years, to offset the shortfall in indigenous production of vegetable oils for human food and of high protein oilseed meals for livestock feed, soybean imports have been four times as great as domestic production. [Redacted]

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Specialty crops will continue to receive priority allocation of choice lands and other resources, but their share of the total area of reclaimed land will remain small. Because Soviet interests are focused more on improving the quality (length and strength of fiber) than the quantity of cotton, no increase in cotton production is planned. [Redacted]

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Soviet plans for sugar beet production provide for only a slight expansion of the crop on the irrigated lands in the European USSR. This plan reflects Soviet decisions to continue sugar imports and to produce more sweeteners domestically by corn starch hydrolysis. [redacted]

Also slated for development in the 1980s are specialized seed farms on the irrigated lands of the south. Success in seed development, which has been long neglected in the USSR, could contribute importantly to the stabilization and expansion of agricultural production throughout the USSR. Progress will be slow, however, because of the poor organization and administration of plant breeding and seed growing efforts overall. [redacted]

Outlook for the 1980s and Beyond

Past Soviet performance suggests that reclamation plans for the 1980s will probably not be completely fulfilled. Expansion and improvement of reclaimed land fell far short of the 1976-80 plan, and drainage work, which should be completed under the current plan, is already seriously behind schedule. Furthermore, prospects for irrigation, particularly in the south, are hampered by a growing scarcity of water resources. Even in European areas—such as Rostov Oblast and Krasnodar Kray—local water reserves are virtually exhausted. We also believe that the persistent lag between original investment and ultimate increases in production on reclaimed lands in the USSR will probably continue. Only 28.7 million of the 34.3 million hectares of the available reclaimed land are currently being used, largely because of inadequate inputs of fertilizer, pesticides, and machinery (table 11). Soviet failure to modernize overall farming practices is restricting yields on reclaimed lands to a greater degree than on most other farmlands. Fundamental improvements in Soviet agrotechnology, however, are not likely to occur before the end of this decade. [redacted]

Current Constraints on the Reclaimed Lands

Program. Despite generous financial inputs, escalating costs continue to hamper the improvement and expansion of irrigated and drained land in the USSR. For example, current drainage techniques involve more than cutting open ditches through marshy lands.

Most drainage is effected by the installation of buried tile, which is relatively expensive to procure and install. Moreover, tiles do not completely eliminate the necessity for supplemental surface drainage facilities. Although the share of the drained lands served by buried tile increased from 19 to 53 percent between the years 1965 and 1981, almost half of the existing network has yet to be improved. [redacted]

The need to reconstruct the existing irrigation network in many areas also demands large inputs of capital. Seepage and evaporation from open and unlined canals, particularly in Central Asia and the Transcaucasus, cause the loss of as much as one-half of the water diverted to crops. At the same time, flat terrain makes it difficult to install drainage collection canals—essential to lowering the water table and facilitating the removal of harmful salts. Furthermore, the reconstruction of existing systems—by lining the canals with cement, improving the control gates and distribution laterals, and adding drain collectors—often requires idling the irrigation network while the work is in progress. [redacted]

Long-Term Water Requirements. The implementation of reclamation plans is complicated by the necessity to acquire large amounts of additional water, particularly in areas south of the European RSFSR and in Central Asia. In these areas the need is growing for water to satisfy municipal and industrial needs as well as agricultural requirements. The situation is particularly acute in Central Asia, which annually consumes some 143.2 km³ of water. In some years consumption there exceeds the supply of renewable water available, and when that happens there is an inevitable drawdown of reservoirs, an increased recycling of drainage waters, and limited or no watering of crops other than cotton. The Soviets calculate that their southern European and Central Asian territories each now need 20 km³ of diverted water per year and over a longer term will need an additional 30 to 40 km³ per year. Ultimately, they state, it will be necessary to divert more than 200 km³ of Siberian water into Central Asia alone. [redacted]

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Table 11
USSR: Utilization of Reclaimed Lands,
Selected Years

Thousand hectares

| | Drained Land | | | | | | Irrigated Land | | | | | |
|---|---------------|------------------|---------------|------------------|---------------|------------------|----------------|------------------|---------------|------------------|---------------|------------------|
| | 1965 | Percent of Total | 1975 | Percent of Total | 1980 | Percent of Total | 1965 | Percent of Total | 1975 | Percent of Total | 1980 | Percent of Total |
| Total | 10,600 | 100.0 | 13,652 | 100.0 | 16,851 | 100.0 | 9,897 | 100.0 | 14,486 | 100.0 | 17,487 | 100.0 |
| Agricultural lands used by agricultural enterprises * | 7,150 | 67.5 | 9,561 | 70.0 | 12,039 | 71.4 | 9,270 | 93.7 | 13,736 | 94.8 | 16,643 | 95.2 |
| Natural meadows and pastures | 3,486 | 32.9 | 4,429 | 32.4 | 5,252 | 31.2 | 526 | 5.3 | 837 | 5.8 | 1,068 | 6.1 |
| Orchards and vineyards | 62 | 0.6 | 46 | 0.3 | 50 | 0.3 | 889 | 9.0 | 1,049 | 7.2 | 1,213 | 6.9 |
| Private farming plots | 104 | 1.0 | 137 | 1.0 | 167 | 1.0 | 448 | 4.5 | 489 | 3.4 | 507 | 2.9 |
| Cultivated forage crops | 1,431 | 13.5 | 2,329 | 17.1 | 3,012 | 17.9 | 1,772 | 17.9 | 3,756 | 25.9 | 5,925 | 33.9 |
| Technical crops | 198 | 1.9 | 300 | 2.2 | 385 | 2.3 | 2,718 | 27.5 | 3,228 | 22.3 | 3,538 | 20.2 |
| Potatoes, vegetables, melons | 227 | 2.1 | 271 | 2.0 | 334 | 2.0 | 617 | 6.2 | 896 | 6.2 | 1,052 | 6.0 |
| Grain | 1,441 | 13.6 | 2,224 | 16.3 | 3,042 | 18.1 | 2,229 | 22.5 | 2,866 | 19.8 | 3,352 | 19.2 |

* Total includes tilled fallow lands not planted but excludes inter-row and double cropping. For this reason, and also because of rounding, the sum of the individual uses does not equal the total used.

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Long-Term Proposals. The satisfaction of such requirements has fostered the proposal of a number of projects. One of them envisions tapping the Neva, Onega, Severnaya Dvina (Sukhona), Pechora, and other streams to enhance the flow of the Volga River (figure 2). Also under discussion is the rerouting of water from the Danube to enhance irrigation in Moldavia. Most grandiose of all is the proposal to redirect southward some part of the Ob and Irtysh and, eventually, part of the Yenesei. In this plan, Ob-Irtysh waters would be diverted from just below the confluence of the two rivers and raised some 100 meters in elevation—via a series of pumping stations along a diversion canal—to bring them through the Turgay Gate. From there they will flow by gravity into Central Asia. Siberian water would be used for new irrigation in the Turan Depression, and eventually some of it is to be used to water crops in semitropical Turkmenistan—some 2,000 kilometers from the point of diversion. The conclusion of this work is allegedly the key to completion of the 1,100-kilometer Karakum irrigation and navigation canal across Turkmenistan. [redacted]

While the Soviet dialogue on river diversion has continued for decades without notable progress, construction on “first-stage” projects in the northern European USSR has apparently been initiated with the expectation that some flow might be diverted near the end of this decade. In the first stage, diversion of about 5.8 km³ of water per year is planned from Lakes Lacha, Vozhe, and Kubenskoye near the upper reaches of the Sukhona and Onega Rivers; later 3.5 km³ is to be diverted from Lake Onega; and finally, about 9 to 10 km³ per year from the Pechora Basin. About 5.5 km³ will be transferred from the Volga, via a new canal beginning somewhat north of Volgograd, to roughly double the flow and irrigated area of the Don. Construction on the new canal is to be started by 1985. Another proposed canal will supply water to southern areas of Rostov oblast and the northern parts of Krasnodar Kray. [redacted]

Siberian project proposals are still being debated, and it is probable that little more than the refinement of plans and designs will be effected during this decade. Impacting on the proposals is the growing pressure to further develop existing local irrigation potential before assuming the inherently high cost of diverting

Siberian waters to Central Asia. Nevertheless, diversion work could be initiated before the turn of the century. [redacted]

The outcome of Soviet river diversion proposals is still highly uncertain. The key question is how much of the diverted flow will be available for crops in southern regions after the expected severe losses en route. Diversion would allow expansion of irrigation beyond what is otherwise possible, but costs will be exorbitant, if not prohibitive, in relation to Soviet investment capability, the likely benefits to be derived, and other alternatives to the development of agriculture. The presumed extent of adverse ecological effects is a lesser concern, provided the proposed designs are not compromised. Claims of possible widespread ecological changes because of Siberian stream diversion are countered by assertions that the impact of diversion will be less adverse than the consequences of natural fluctuations in river flow. Concerns over river diversion in the European USSR focus on the existing pollution of some of the water to be diverted. Questions also are being raised about the problems that might result from ground water seepage along the diversion routes in both regions. [redacted]

USSR expectations of benefits to be derived from river reversal are nevertheless optimistic. Transferring 20 km³ into the Volga Basin, the Soviets claim, would allow the irrigation of up to 4.5 million hectares. However, considerable improvement in the efficiency of water use is essential if that amount of water is to properly irrigate an area that large. Claimed benefits for Siberian water diversion are also inconsistent with projected uses of water. An initial transfer of 25 km³ allegedly would add 25-30 million tons of grain (primarily corn), and the diversion of 60 km³ would add 50-60 million tons.⁹ Achieving even one-half of the projected output would require a significantly greater efficiency of water use than now prevails. [redacted]

⁹ In comparison, average annual production of all Soviet grain during 1976-80 was 205 million tons; the 1981-85 and 1986-90 plans call for output to increase to 238-243 million tons and 250-255 million tons, respectively. [redacted]

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Figure 2
Proposed Diversion of Northward-Flowing Rivers



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Moreover, Soviet cost projections for these projects are tentative at best and apparently understated. The first-stage European diversion (20 km³) is estimated by Soviet authorities to require at least several billion rubles, whereas the required investment for the first stage of the Siberian transfer (25 km³) has been estimated at 15-30 billion rubles. At the same time reclamation experts in Central Asia claim that the reconstruction of existing facilities there would probably cost at least 10 billion rubles, take 30 years to complete, remove large amounts of land from irrigation for up to two years, and yet result in saving only 2.5 to 4.0 km³ of water per year. [redacted]

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Conclusions

Full achievement of Soviet reclamation plans during the 1980-90 period, including the irrigation or drainage of 7-10 million hectares of land, the completion of plans and designs for the Siberian river diversion project, and the construction of parts of the European USSR river diversion project, is unlikely. These programs, by Soviet admission, are already well behind schedule, largely because of incomplete or untimely funding, unrealistic scheduling, nonfulfillment of critical resource inputs, and the failure of the Ministry of Land Reclamation and Water Resources to properly coordinate its work. Nevertheless it is presumed that Soviet pursuit of other agricultural policies, including the increase and stabilization of farm output, the improvement of regional self-sufficiency in agricultural production, and the reduction of USSR dependency on imports, will continue to drive the effort and ultimately add to the national store of reclaimed land. But additions of land thus derived, even if they prove to be larger than we now anticipate, will not alone assure either the level or stability of output that the USSR now seeks. [redacted]

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