MAKING NATURE MODERN: ECONOMIC TRANSFORMATION AND THE ENVIRONMENT IN THE SOVIET NORTH

BY

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DISSERTATION

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Abstract

How should we understand the economic relationship of the Soviet Union to the natural environment? This dissertation explores this broad question through a fine-grained study of the environmental history of one particular Russian region in the far north throughout the entire twentieth century. It emphasizes the commonalities embedded in different political economies that existed in Russia: the state capitalism of the late imperial era, Soviet communism, and post-Soviet neo-liberalism. It suggests that a unified, but deeply political, process of seeking to make the natural world modern belongs at the center of an account of Soviet environmental history. It also highlights the significant role of the physical environment itself in shaping the trajectories of Soviet economic development.

The study focuses on the Arctic territory of the Kola Peninsula or the Murmansk region and considers five different economic branches that emerged there during the twentieth century. A discussion of efforts to use a railroad line to enliven a desolate periphery and of the difficult experiences of wartime construction elaborates some of the overarching methods and visions of modernization. An examination of phosphate mining and processing in the Khibiny Mountains stresses the place of the environment in the Stalinist system and the anthropocentric holism of many Soviet planners. The campaigns to transform reindeer herding into a productive socialist industry and to protect wild caribou reveal how diverse ways of knowing nature influenced the behavior of elite and marginal actors. An investigation into the development of the Kola nickel industry suggests that excessive pollution in the Soviet Union is best accounted for by specific historical contexts instead of by structural factors. Finally, a review of the energy economy of the Kola Peninsula points to the tremendous transformation of human relations with the environment during modernization, while also exposing abiding, though reconfigured, connections between nature and society.
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Acknowledgements are one of the most rigidly structured genres of literature. As a way of shaking it up a tiny bit, let me begin with the personal before proceeding to the more formal and professional. No one has contributed more intellectual and emotional support to this project than Sarah Frohardt-Lane. Even before we fell in love, she encouraged my interest in environmental history and challenged my thinking about the Kola Peninsula. Since that wonderful moment, she has spent an adventurous month in the Arctic with me, proofread my writing more times than reasonable, served as an intelligent interlocutor about ideas for this project on an almost daily basis, supported and encouraged me when research and writing were not going well, and done too many other things than can even fit in these acknowledgements. Indeed, it would double the length of this dissertation to thank her properly.

My family has also tremendously assisted me in this endeavor. My twin brother, Mike Bruno, has always been quick to challenge the soundness of any claim that leaves my mouth and in doing so has helped refine my thinking about the world in more ways than I can even comprehend. I know that this dissertation would never have been written without him. My parents, Carol Jarema and Dennis Bruno, have lovingly enabled me to pursue my goals by supporting my education, financially and emotionally. They have been encouraging throughout this long process and have helped me overcome the logistical difficulties of doing research in Russia on more than one occasion. I have also benefited from my large extended family, my wonderful in-laws, and the more recent members of my immediate family, Polly Bruno, Charlie Goins, and Mike Jarema. Thank you all!

I began talking about the environmental history of the Soviet Union in my last year as an undergraduate at Reed College. All of my friends since that time have endured my nerding out about history and have helped keep me grounded. There are too many of you to name, so I would just like to thank you all. I should single out, however, my entire cohort of fellow Russianists at the University of Illinois. Jesse Murray, Steven Jug, Anna Bateman, and Rebecca Mitchell in particular offered helpful feedback during our dissertation writing group sessions. Elana Jakel graciously proofread the dissertation for me. Rebecca Mitchell has been a close friend throughout all of graduate school and
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The logistics of doing research in Russia have always been a bit challenging. I have had the fortune to be assisted by many kind scholars, librarians, and archivists in Russia. Early on Boris Kolonitskii helped me learn the ropes of working in Russian libraries. A number of scholars on the Kola Peninsula vitally contributed to my ability to successfully conduct research there, including Aleksandr Portsel’, Nikolai Voronin, Pavel Fedorov, Dmitrii Fokin, Elena Makarova, and Valerii Berlin. The generous staff at the Murmansk State Technical University provided essential institutional support and helped keep me in good spirits during the many months of the Arctic winter. The library staff in the regional studies reading room of the Murmansk State Regional Universal Scientific Library was absolutely wonderful. Svetlana Salivova greatly assisted me in preparing a presentation for a conference in Murmansk. Paul Josephson helped me overcome some difficulties getting archival access early on during my time in Murmansk and Jenny Leigh Smith explored Lovozero with me. The staff of Praxis International took care of visa support and registration in Moscow. Finally, I am very grateful for the rich collection of the Slavic Library at the University of Illinois, which has made writing this dissertation a much less arduous task.

I recognize that I have probably overlooked many people who really belong in these acknowledgements. Let me end, though, by expressing my appreciation to the many sources of financial support I have received for this research. At the University of Illinois I have benefited from large and small levels of funding from the Department of History, the Thomas M. Siebel Fellowship in the History of Science, the Russian, East European, and Eurasian Center, the Human Dimensions of Environmental Systems program, the Social Dimensions of Environmental Policy initiative at the Beckman Institute, and two Foreign Language and Area Studies fellowships. An International Dissertation Research Fellowship from the Social Science Research Council with funds from the Andrew W. Mellon Foundation and a fellowship from the U.S. Student Fulbright Program enabled my research in Russia.
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# List of Abbreviations, Acronyms, and Russian Terms

- **Apatit**: *Apatit* Trust/Combine
- **ARAN**: Archive of the Russian Academy of Science
- **BBK**: White Sea-Baltic Combine
- **bedniak**: a poor peasant
- **Bol’shevik**: Bolshevik collective farm
- **d.**: *delo*, file
- **desiatina**: roughly equivalent to eleven squared kilometers
- **Dobrovolets**: Volunteer collective farm
- **f.**: *fond*, collection
- **GARF**: State Archive of the Russian Federation
- **GAMO**: State Archive of the Murmansk Region
- **GES**: hydroelectric station
- **GIPKh**: State Institute of Applied Chemistry
- **Gosplan**: State Planning Committee
- **guberniia**: province
- **Gulag**: Main Administration of Corrective Labor Camps
- **Imeni V. I. Lenina**: In the Name of Lenin state farm
- **INCO**: International Nickel Company of Canada
- **Industriia**: Industry state farm
- **Kedd’k**: Kedd’k reindeer-herding commune
- **KF GAMO**: Kirovsk Branch of the State Archive of the Murmansk Region
- **KNTs**: Kola Science Center
- **Kola AES**: Kola Nuclear Power Plant
- **Kola GMK**: Kola Mining and Metallurgy Company
- **Kolenergo**: Kola Production Association of Energy and Electrification
- **kolkhoz**: collective farm
- **Kol’stroi**: Kola Construction Trust
- **Krasnaia Tundra**: Red Tundra collective farm
- **Krasnoe Pulozero**: Red Pulozero collective farm
- **kulak**: a wealthy peasant
Lenin  *Lenin* nuclear icebreaker

Lepse  *Lepse* refueling vessel for nuclear icebreakers

Lovozero GOK  Lovozero Mining and Enrichment Combine

l./ll.  *list/listy*, sheet(s)

mazut  unrefined diesel

Mekhanobr  Institute of Mechanical Processing of Mineral Resources

MGPU  Murmansk State Pedagogical University

Monchelag  Gulag camp serving Monchegorsk

NARA  National Archives and Records Administration

NEP  New Economic Policy

NIU  Scientific Institute for Fertilizer

NKTP  People’s Commissariat of Heavy Industry

NKVD  People’s Commissariat of Internal Affairs

Noril’sk Nikel’  Norilsk Nickel Mining and Metallurgy Company

oblast’  region

OGPU  Unified State Political Organization

okrug  county

Olenevod  Reindeer Herder collective farm

op.  *opis’, inventory*

Pechenganikel’  *Pechenganikel’* Combine

pogost  parish

pop.  population

POW  Prisoner of War

RAN  Russian Academy of Sciences

RBKM  high power channel-type reactor

RGAE  Russian State Archive of the Economy

RGASPI  Russian State Archive of Social and Political History

RSFSR  Russian Soviet Federated Socialist Republic

Severonikel’  *Severonikel’* Combine

shalman  barn-like structure built with thin boards and wood beams

SKhPK  Agricultural Production Cooperative
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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>sovkhoz</td>
<td>state farm</td>
<td></td>
</tr>
<tr>
<td>sredniak</td>
<td>a middle income peasant</td>
<td></td>
</tr>
<tr>
<td>SSSR</td>
<td>Union of Soviet Socialist Republics</td>
<td></td>
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<tr>
<td>STO</td>
<td>Council of Labor and Defense</td>
<td></td>
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<tr>
<td>Tundra</td>
<td>Tundra collective/state farm</td>
<td></td>
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<tr>
<td>uezd</td>
<td>district</td>
<td></td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
<td></td>
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<tr>
<td>USLON</td>
<td>Administration of the Solovki Camps of Special Designation</td>
<td></td>
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<tr>
<td>USSR</td>
<td>Union of Soviet Socialist Republics</td>
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<tr>
<td>versta</td>
<td>roughly equivalent to a kilometer</td>
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<tr>
<td>Vpered</td>
<td>Forward collective farm</td>
<td></td>
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<tr>
<td>Vsekhimprom</td>
<td>All-Union Association of the Chemical Industry</td>
<td></td>
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<tr>
<td>VSNKh</td>
<td>Supreme Council of the National Economy</td>
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<tr>
<td>VVER</td>
<td>water-water energetic reactor</td>
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<tr>
<td>zapovednik</td>
<td>nature reserve</td>
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<tr>
<td>Zhelles</td>
<td>Murmansk Railroad Timber Trust</td>
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<td>Zhelyryba</td>
<td>Murmansk Railroad Fishing Trust</td>
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<td>Zhelsilikat</td>
<td>Murmansk Railroad Silicate Trust</td>
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<tr>
<td>Zhelstroy</td>
<td>Murmansk Railroad Construction Trust</td>
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Map of the Kola Peninsula
Introduction: An Environmental History of Soviet Modernization

Dangling out in the White and Barents Seas sat an old, but largely unassimilated, territory of the Russian Empire at the beginning of the twentieth century. The Kola Peninsula in the far northwest corner of the country mirrored the much larger Scandinavian Peninsula, where Russia’s empire gave way to a combined union of Sweden and Norway. The Kola Peninsula included several mountain ranges in the interior, a large number of fresh water lakes and rivers, and coniferous forests that thinned out with altitude and latitude. The entire region, also known as Russian Lapland, was north of the Arctic Circle, except for a small portion of the peninsula along the eastern side of the southern Tersk coast. This polar location meant that the region endured long periods of darkness during the snowy winters and enjoyed weeks of perennial light in the brief, but vivacious, summers. Despite its extreme northern position, the Gulf Stream current brought warm waters to the northern Murman coast of the Kola Peninsula, leaving many of the steep rocky inlets with unfrozen bays year-round. As a territory comprised of tundra and taiga lands, the region possessed significantly less biomass than temperate or tropical zones. However, it was rich with unique biodiversity, including avian species, mammalian fauna, fish, insects, lichen, and various types of flora. Fewer than ten thousand representatives of the species *Homo sapiens* resided on the Kola Peninsula at the time. These people lived in a number of coastal settlements, including many temporary homes for seasonal migrants and the recently established commercial port of Aleksandrovsk. In the interior of the peninsula a group known as the Sami dominated in highly disperse settlements, though a recent influx of Komi and Nenets was deeply affecting their occupational patterns. Throughout the entire territory no cities, military installations, or large industrial enterprises existed.

By the end of the twentieth century, the Kola Peninsula had become a very different place. Campaigns to industrially develop and militarize the region had immensely affected the local environment and human society. Extreme seasonal fluctuations and the mollifying effect of the Gulf Stream remained, but the physical terrain and the collection of life forms there had been transformed radically. Numerous dense cities, industrial plants for extracting and processing the mineral wealth below the surface, and military testing facilities filled the interior of the peninsula. The mountain
ranges now included large hollow areas. Many of the lakes and rivers of the region were dammed and regulated; large reservoirs added new areas of surface water to the terrain and a nuclear power plant increased the temperature of Lake Imandra by using it as a cooling pond. A network of railroad lines and highways cut through and across the western section of the peninsula, while the eastern enclaves continued to be difficult for humans to access. Pollution and other forms of industrial human influence significantly reduced the fish population in many water bodies and denuded large areas of vegetation near production units. Considerable biodiversity, nevertheless, flourished in limited protected zones. Along the Murman coast an array of objects controlled by the Northern Fleet of the Russian Navy, including a myriad of nuclear submarines and closed cities, made this space one of the most militarized areas of the world. In the Kola Bay the metropolis of Murmansk captured the title of the most populated Arctic city in the world. The Kola Peninsula on the whole was the most industrialized and densely populated Arctic region with approximately nine hundred thousand human residents (down from 1.1 million a decade earlier).

How do we understand the disparity between these two moments? What caused the Kola landscape and human life there to change so dramatically? The intervening century witnessed two massive military conflicts and the Cold War; global trends of population growth, urbanization, and technological advancement; and the rise and fall of the world’s first communist state. These overlapping political and sociological developments accompanied a rapid process of economic transformation of the natural world. For reasons I will explain shortly, I call this reorganization of the relationship between humans and nature “modernization.” This dissertation is a study of the environmental history of twentieth-century economic modernization in the Soviet Union based on an investigation of a single northern region. It aspires to contribute to the environmental history of communism, which is a political and economic system that has received considerably less attention than capitalism. It does so by comparing Soviet socialism with the state capitalism of the preceding late imperial era and the neoliberal reform efforts of the post-Soviet Russian Federation. It argues that a continual and unified process of attempting to make nature modern that cuts across variations in political economy played a pivotal role in reshaping environment and society.
Illusions of Modernity and the Influence of Modernization

Over the past decades the logic of development has been roundly and rightly criticized by numerous scholars and theorists who challenge the faulty teleology embedded in social evolutionist thinking and point to the complicated manifestations of power that have accompanied an insistence on historical directionality toward the modern. While public policy remains predicated on analytic frameworks that take economic and technological growth as potentially continual, this scholarship raises serious doubts about the epistemologies underlying the process of modernization. Such critical theorists of modernity often root their arguments in the dynamics of knowledge production. They occasionally interrogate the configurations of the natural and the social that are entrenched in modernist imagination. This project began as an investigation into the campaign of the Soviet Union to overcome the alleged “backwardness” of certain forms of treating the natural world and accordingly shares these theorists’ critical disposition toward modernization.

One articulation of this critique of modernity stresses the ambivalence and ultimately the totalitarian potential of the extension of the philosophical principles of the European Scientific Revolution and the Enlightenment. Influenced by the atrocities of Nazism and the Second World War, Max Horkheimer and Theodor Adorno theorized that the dialectic counter of increased science, technology, and economic progress was the heightened oppression of human beings. At the root of their philosophy, the impulse to attain mastery over nature implies a drive to dominate humankind more fully. In the 1970s, William Leiss elaborated some environmental implications of this perspective of the Frankfurt School. For Leiss, “the vision of the human domination of nature becomes a fundamental ideology of a social system” in both capitalism and socialism. It “sets for itself as a primary task the development of productive forces for the satisfaction of human material wants,” but inadvertently leads to environmental destruction and structures of oppression. In her attempt to diagnose what went wrong with the Soviet Union and


brought about its collapse, Susan Buck-Morss similarly points to a pathos embedded in a common logic of modernity that applied to communism and capitalism.

By adopting the capitalist heavy-industry definition of economic modernization, however, Soviet socialism had no alternative but to try to produce a utopia out of the production process itself. In making this choice, the Soviets missed the opportunity to transform the very idea of economic ‘development,’ and of the ecological preconditions through which it might be realized.3

Another approach to the problem of the modern relies on the combined insights of post-modern philosophy, post-colonial studies, and cultural anthropology. Carrying Michel Foucault-inspired concerns about the ways that discourses of scientific knowledge infiltrate power dynamics down to the level of the individual subject and Jacques Derrida-influenced skepticism about meta-narratives and historicist universalism, scholars such as Johannes Fabian, Maria Todorova, and Dipesh Chakrabarty have interrogated the imposition of a modernist temporal ordering on regions and peoples outside of mainstream Western Europe. The assignment of a lower rank on a scale of development became a technique of European rule in many colonial contexts that functioned by justifying hierarchical distancing and promising eventual evolution.4 James Ferguson brings similar concerns to an assessment of economic development policies in Africa. Focusing both on “modernist metanarrative as dubious theoretical model and modernist metanarrative as indubitable ethnographic fact,” Ferguson probes how the agonizing experience of Zambians living in the country’s declining copper belt intersect

with earlier mythical promises of industrial modernity. These promises had served to entrench state power in the de-politicized guise of “development.” Nikolai Ssorin-Chaikov and Niobe Thompson fruitfully explore the life of such modernist metanarratives in Arctic Russia, historically and in the present, in articulations of state and economic power. They also both highlight the variegated and negotiated uses of local ecologies by communities, authorities, experts, and entrepreneurs during moments of economic transformation. Finally, James Scott offers a more generalist view of the governing tactics of states bent on achieving “high-modernism” through social engineering projects. While pursuing an “administrative ordering of nature and society” that enabled development, modern states classified, simplified, made legible, and overall reduced the complexity of social and environmental realities, ultimately to the detriment of their own utopian schemes.

Theorists who are sometimes classified as post-constructivist or post-humanist challenge the ostensible distinction between the “natural” and the “social” that has been a fundamental element of the project of modernity. They do not stop at calling attention to the arbitrary and historically contingent character of this division, but go further in advocating for future scholars to surmount it by paying attention to hybrids, quasi-objects, the agency of non-humans, and networks. Tim Ingold approaches the issue by disputing the separation of biological evolution, which applies to all species, and cultural change, which only applies to human history. Claiming that there is “no species-specific, essential form of humanity, no way of saying what an ‘anatomically modern human’ is apart from the manifold ways in which humans actually become,” he endorses

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“refocusing on the human-being-in-its-environment” and dispensing with “the opposition between species and culture.” Bruno Latour extends a similar line of analysis to what he supposes was an untenable, and ultimately unstable, classification between objects and subjects and between nature and society in the sciences over the past several centuries. He defines modernization as ultimately a project of attempting, but failing, to create this separation:

“The asymmetry between nature and culture then becomes an asymmetry between past and future. The past was the confusion of things and men; the future is what will no longer confuse them. Modernization consists in continually exiting from an obscure age that mingled the needs of society with scientific truth, in order to enter a new age that will finally distinguish clearly what belongs to atemporal nature and what comes from humans, what depends on things and what belongs to signs. Modern temporality arises from a superposition of the difference between past and future with another difference, so much more important, between mediation and purification.”

Timothy Mitchell offers a comparable argument for the inevitable limitations of the evolving transcendence of the social over the natural in modernity. “Elements that appear incompatible with what is modern, Western, or capitalist are systematically subordinated and marginalized, placed in a position outside the unfolding of history. Yet in the very processes of their subordination and exclusion, it can be shown, such elements infiltrate and compromise that history.” In his own research Mitchell demonstrates how the “hybrid agency” possessed by the mosquito contributed to and undermined the modernization of colonial Egypt.

All of these discussions of the relationship between nature and modernity posit modernization as a process that generates its influence from human conceptions of the world. While the supposed transcendence of modernity should be seen as fictive, as Latour and others insist, the changes wrought by modernization have been very real and indeed very physical. In order to capture this significant facet of modernization, it is

helpful to return, ironic though it may seem, to classic modernization theory of the 1960s and 1970s. Its initial advocates saw modernization as a systematic trajectory toward industrial expansion, increased education, urbanization, technological innovation, and economic development. Whatever wavering and nuances in its unfolding, these phenomena did create, in environmental historian John McNeill’s words, “something new under the sun” in the twentieth century. Humans live in very different environments because of the material features of these processes of modernization and not only on account of altered knowledge, representations, or cultures. The materialist perspective that I embrace in this study incorporates both standard structural assessments of modernization theory and the views of post-constructivists about nature’s active participation in social change.

However, the claim of some modernization theorists that the process itself was largely inevitable and apolitical still deserves to be discarded. The insistence on historical directionality misses the role that value-laden knowledge production plays in enabling modernization. Abstract assessment about the changes in social hierarchies that occur during modernization obscures the conflicts that arise among groups with different interests and levels of political influence. As Becky Mansfield shows in the case of overfishing in modern industrial fisheries, explanations such as Garrett Hardin’s “tragedy of the commons,” which accounts for the over-exploitation of resources by evoking the rational and profit-maximizing behavior of individuals in the absence of clearly defined property rights, conceal political processes of much greater causal significance. In this

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case the large-scale economic modernization of industrial fisheries was “both envisioned and fostered” by a host of governments, international agencies, and businesses.\[17\]

In order to move from illusions of modernity to the influence of modernization, it is helpful to turn to the interdisciplinary work of political ecologists. Political ecologists seek to unearth the political dimensions of changes in land use, environmental regulation, technology, and economy. Geographer Paul Robbins defines political ecology as “empirical, research-based explorations to explain the linkages in the condition and change of social/environmental systems, with explicit consideration of relations of power.”\[18\] The eclectic methods that political ecologists use in their research assess the material features of the social/environmental linkages being investigated, but return to power dynamics when explaining them. Many political ecologists achieve this form of analysis by accepting post-modernist and post-structuralist critiques of Western science only to the point in which it is “contended rather than abandoned.”\[19\] As Richard Peet and Michael Watts put it, the “social construction of nature” should be balanced by a sense of the “natural construction of the social.”\[20\] A focus on illusions should be complimented with attention to influential material and social factors that are always being mediated by, but are not reducible to, human thought.

This dissertation treats modernization as a political project to transform relations among nature and society. Political power existed in multiple forms. On the most basic level, individuals and groups committed to maximizing the economic use of the natural world, including dominant state institutions, leaders of industry, the military, and many scientists, have held the most sway over the treatment of the environment. This top-down form of political power reflects sovereign or quasi-sovereign influence over the


environment. Elite state and industrial actors in twentieth-century capitalism and socialism shared a broad and influential, though still contested, consensus about the desirability of modernization. Manifestations of sovereign environmental power particularly affected control over access to natural resources and the physical manipulation of people and environments. 21 This political power has existed since the earliest advocacy of regional development and remains present in contemporary circumstances.

Yet, power was also dispersed through society and nature with different actors affecting the outcomes of projects of economic transformation at various points. People outside of the upper echelons of regional decision makers reacted to the natural and social conditions they encountered with an abiding capacity to alter their surroundings. Non-human agents also modified situations in unanticipated and consequential ways. The effects of this type of power emerge from what I would like to call a modernist environmentality. Foucault’s theory of governmentality stresses an assemblage of “the institutions, procedures, analyses and reflections, the calculations and tactics that allow the exercise of this very specific albeit complex form of power.” 22 Applying this concept to the natural world, Arun Agrawal evokes the term “environmentality” to capture “the knowledges, politics, institutions, and subjectivities that come to be linked together with the emergence of the environment as a domain that requires regulation and protection.” 23 A modernist environmentality instead reflects the alignment of “knowledges, politics, institutions, and subjectivities” with attempts to use the natural world to enact modernity. The material influence of nature affects the contours of modernist environmental ideologies and policies and thus contributes to this form of power as well. In order to understand these variegated expressions of power, this dissertation examines the perceptions of nature that accompanied modernization, the strategies employed by

21 I take the phrase “sovereign environmental power” from Richard Peet, Paul Robbins, and Michael J. Watts, “Global Nature,” in Peet, Robbins, and Watts, eds., Global Political Ecology, 31-34. The authors contrast this form of political power, which is exercised over societies, with environmentality, which occurs within them.


industrial planners for managing natural resources, the lived experience of individuals working in and coping with the environment, and the physical influence that humans and the environment had on each other.

**Histories of the Soviet Environment**

Environmental history aims at placing human interaction with the rest of nature at the center of investigations of the past. While the emergence of the field among historians of the United States in the 1970s and 1980s cannot be disentangled from the rise of environmentalism as a political movement, the ultimate rationale for the type of analysis offered by environmental history comes from the ways it enriches explanations of historical phenomena often taken to exist on a purely human register. As Ellen Stroud argues, the environment is not only an analytic category like race, class, and gender that allows us to observe power relationships in society. It also has a material character, “the dirt of history.” Stroud insists that by paying attention to this material side of nature environmental historians stand in the best position to transform larger historical interpretations.

This work of Soviet environmental history seeks to address large issues relevant for comparative and global scholarship and to respond to specific problems that emerge from Russian historiography. A significant portion of modern environmental history focuses on the ways that the capitalist economic system changed relationships with nature through commodification and the increased treatment of the natural world as a repository of resources to be used for accruing profit. As Donald Worster argued in an early and celebrated work of the field, a culture of capitalism in the American West crucially contributed to the social and environmental tragedy of the 1930s known as the Dust Bowl. However, much less research has been done on the main alternative economic system in the twentieth century: communism. This study reveals what some overviews of global environmental history have asserted: that the specificities of centralized command

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economies during communism mattered less than the aggregate changes that resulted from pursuing a common process of economic modernization. An investigation of the distinctions of communist environmental history still bears significance because it suggests that the reduction of nature to marketable commodities and the pervasiveness of a profit-maximizing culture do not uniquely account for common changes in human-environmental relationships throughout the world.

A lot of ink has been spilled assessing, denouncing, and proposing solutions for the environmental situation in the former Soviet Union. However, environmental history has not yet become part of mainstream historical scholarship on Russia. Current research being produced by a wide array of younger and established historians suggests that this situation is on the cusp of changing. For the time being the bulk of the literature addresses the history of conservation policy and practice, large-scale technological projects and disasters, and the cultural history of representations of nature. This dissertation advances each of these spheres of Russian environmental history. In two authoritative tomes, Douglas Weiner demonstrates the initial vibrancy and heroic persistence of scientists advocating for nature protection through the creation of a system of reserves throughout the country.

nuanced our understanding of Soviet conservation with studies of state policy toward Russia’s forests. By taking a regional approach, I unravel some of the competing agendas of conservation scientists, economic managers, and local populations that related to the entirety of the Kola ecosystem. In numerous works on Soviet science and technology, Paul Josephson highlights the hubristic utopianism and unchecked gigantism that informed much of Soviet economic development, including the cavalier treatment of the natural world. I examine massive industrialization at the enterprise-level to advance our understanding of how authorities reached distinct decisions in response to specific environmental circumstances. Scholarship that has explored the representations of nature in the Soviet Union has tended to stress the prominence of the Promethean longings to master and control it. I complicate this consensus by pointing to distinctions within this framework of dominance, the ways that desires for harmony engendered less overtly antagonistic portrayals of nature, and the influence of the material world in shaping these environmental ideologies.

**History in an Ethnographic Vein**

This dissertation is not a work of ethnography. Though I spent seven months in the region and engaged in numerous discussions with people living there, the historical

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research I undertook was mostly limited to the written record in archives, libraries, and museums. Yet, in another sense my research is deeply ethnographic. Instead of being primarily a regional history or a case study of broad phenomena in a particular place, this work aspires to address general problems of Soviet environmental history through a fine-grained analysis of the local. In doing so I follow a certain analytical logic not always present in historical scholarship.\textsuperscript{35} I eschew treating the specific history of the Kola Peninsula as directly representative of the entire Soviet Union, while interrogating local nuances in order to come to a richer understanding of issues present elsewhere in the country. I write in an ethnographic vein precisely by attempting to use deep analysis of the peripheral to complicate our picture of the general and offer insights that are often unattainable in a broad overview.

To achieve this depth I investigate a range of economic activities on the Kola Peninsula throughout the twentieth century: railroad construction, mining and chemical production, reindeer herding, non-ferrous metallurgy, and the energy economy.\textsuperscript{36} For each of these branches of industry I examine enterprise-level documentation to assess specific questions about human-nature interaction during successive bouts of economic modernization. I supplement these materials with a wide array of newspapers, journals, popular and scientific literature, document collections, regional scholarship, and other relevant archival sources. With secondary source material providing the larger picture and contemporary scientific literature facilitating historical environmental assessments, this research allows me to describe and explain social and ecological conditions in specific places throughout the century. I organize this dissertation into five chapters that treat each of these economic spheres.

The first chapter examines how distinct ideologies of the colonization and

\textsuperscript{35} A fruitful discussion of the approach I am aspiring to here appears in the volume: Michael Burawoy et al., \textit{Global Ethnography: Forces, Connections, and Imaginations in a Postmodern World} (Berkeley: University of California Press, 2000).

\textsuperscript{36} I do not cover the large fishing industry that has operated out of the port of Murmansk. My decision to focus on other economic activities comes from the fact that commercial fishing has involved less interaction with the environment of the Kola Peninsula than with the ocean. Furthermore, good research on the environmental history of the Murmansk fishing industry already exists. See Julia A. Lajus, “Razvitie rybokhозаistvennykh issledovanii barentseva moria: vzaimootnoshenia nauki i promysla, 1898-1934 gg.” (PhD diss., Rossiiskaia akademia nauk: Institut istorii estestvoznaniia i tekhniki, 2004) and Alexei Yurchenko and Jens Petter Nielsen, eds., \textit{In the North My Nest is Made: Studies in the History of the Murman Colonization, 1860-1940} (Saint Petersburg: European University at Saint Petersburg Press, 2006).
conquest of nature informed a project to construct a railroad to the new city of Murmansk during the First World War. I argue that actual interaction with the natural world influenced these environmental ideologies and shaped a militaristic pattern of modernization that would be repeated in the Stalinist era. This analysis disaggregates the common existence of technocratic and statist ideas in late imperial Russia and the Soviet Union from the influence of wartime industrialization. The second chapter explores the environmental aspects of the Stalinist construction of socialist cities with the case of the phosphate-mining town of Khibinogorsk/Kirovsk. Examining everything from the planning and ideology around the project to the lived experience of forced migrants and pollution, I argue for the centrality of the environment in Stalinist industrialization. I further posit that the project should be understood as an unsuccessful attempt to create harmony between humans and the rest of nature instead of as an intentionally hostile assault on the environment.

I then turn to the main agricultural animal in the region: reindeer. In this third chapter I discuss the way that diverse forms of knowledge about the natural world—one based on imposing legibility and another on practical experience— informs attempts to transform the reindeer economy by organizing it ethnically, promoting productivity, and protecting wild reindeer. The chapter furthermore highlights how the idea that reindeer herding was a tradition that needed to be modernized dominated until the 1970s and then the emphasis switched to promoting a discourse of traditionalism. The fourth chapter tackles the development of the mining and smelting of metals on the Kola Peninsula as a means of directly addressing the inglorious environmental record of communism. I pay particular attention to the history of the Severonikel’ and Pechenganikel’ combines, which generated pollution that destroyed large territories of vegetation in the region. I discuss several alternative explanations for the high levels of damage caused by Soviet pollution such as inherent problems in communist economies, the influence of global capitalism, and the history of authoritarianism in Russia, but end up instead stressing the significance of the culturally driven process of modernization in bringing about environmental deterioration. Finally, I look at the energy economy in the region throughout the entire time period to explore further how modernization affected the human/nature relationship. Following several theorists who have worked on this problem,
I demonstrate that a dual process of dissociation and entanglement of humans and nature occurred throughout this period of economic transformation.

These chapters build on each other to support my overall analysis of the environmental history of Soviet modernization. I begin by setting out some of the pervasive development strategies and ideologies pursued across the revolutionary divide. I then show how extreme versions of these approaches to the natural world became manifest in the Stalinist period. Shifting the focus to knowledge about a living animal, I demonstrate more thoroughly the participatory role of the natural world in a series of tsarist, communist, and capitalist ideas and techniques for modernizing it. The fourth chapter turns to the environmental influence of strategies and ideologies of modernization by assessing pollution in different political economies. Finally, I return to my theoretical discussion of modernization as possessing a transformative, but not transcendent, influence on the relationship between people and the environment.

Burdens of Historiography

Throughout these chapters, I will be making the persistent case for the relevance of environmental history to larger problems in the historiography of Russia. With this overt advocacy of a specific historical approach, I primarily aim to shed new light on a range of issues that already concern scholars of modern Russia. I also seek to challenge historians to take the natural world more seriously in their assessments of the past by demonstrating how environmental history can alter our understanding of well-researched problems. These interventions weave in and out of the dissertation—sometimes framing the main argument of a chapter and elsewhere resting just below the surface of the analysis. For this reason it is worth reviewing some of them here.

Historians of late imperial Russia and the Soviet Union have recently returned to an older argument about the continuity between the two regimes. Departing from earlier political interpretations of persistent authoritarianism extending back to the sixteenth century and social history that stressed the effects of comparative under-development, these historians, and Peter Holquist in particular, point instead to the intrusive policies of the modern state and the ways that the experience of World War I radicalized the
techniques of governance used by all sides. My look at an industrial project during the war aligns with this emphasis on continuity and the influence of military activities, but the focus on nature use causes me to return to another earlier line of analysis that explicitly tied the war experience to Stalinism. Indeed, the militarization of the Kola Peninsula often overlapped with and affected its modernization. Global geopolitics also shaped strategies of military development throughout the twentieth century.

This continuity argument in the historiography belongs to a broader school of research that aims to define the Soviet Union as part of the Enlightenment project of modernity. Scholars writing in this mode frequently evoke pan-European comparisons to demonstrate how the Soviet experience fit broadly within general trends of Western countries, albeit often extreme versions of them. Other historians such as Terry Martin have countered that to understand the unintended consequences of the policies of the modernizing state it is instead best to turn to neo-traditionalism: the argument that the pervasiveness of paternalistic and charismatic authority, informal political relationships, and primordialism in national identity constitute a divergence from the Weberian model of modernity. An environmental perspective explains unintended consequences less by the re-emergence of tradition than through the ways that the natural world prevented human control of it. The protracted debate about the treatment of non-Russian nationalities and the question of the Soviet Union’s status as an empire also relate to this issue.

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colonization ideologies suggest that imperial strategies of classifying and ordering ethnic groups vitally contributed to the Soviet project, but that such policies also led to nationality promotion.

I also intervene in the discussion about how to understand Stalinism. In particular, I expand beyond Stephen Kotkin’s approach to Stalinism as a distinct civilization with its own norms and culture rooted in an attempt to develop a non-capitalist version of Western modernity.41 I instead characterize Stalinism as an ecosystem. I insist that the multifarious environmental aspects of the efforts to build new industrial towns significantly shaped this distinct manifestation of authoritarian state-socialism. This view carries special importance for the various forms of forced labor in modern Russian history. The way that these coercive policies resulted in the increased vulnerability of forced laborers to natural hazards and the influence of harsh environments in exacerbating human misery belong at the center of our interpretations of the social history of the Gulag.

Historical scholarship on the post-Stalin era so far remains less developed, though it is rapidly proliferating. This work contributes to several discussions emerging from the social scientific literature and other fields. It highlights how the secrecy surrounding technologies such as nuclear power served to mask the unacknowledged dependencies on nature in the industrialized Soviet Union. This illusion of control over nature fed into the Cold War militarization of the country. I also suggest that comparatively high levels of pollution in the Soviet Union were historically contingent outcomes of the performance of the centralized command economy in struggling circumstances, instead of indices of the system’s overall ineffectiveness or a simple lack of environmental concern.42 Finally, this study makes the case that the entrenchment of power among actors interested primarily in accruing economic value through the industrial use of nature during the collapse of the Soviet Union comprises an important continuity between late communism and neoliberalism. In doing so, it undermines interpretations that have stressed the role of

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41 Kotkin, Magnetic Mountain.

civil society, including environmental activism, in bringing down the communist system in Russia.\footnote{Yanitsky, \textit{Russian Environmentalism} and Jane Dawson, \textit{Eco-nationalism: Anti-Nuclear Activism and National Identity in Russia, Lithuania, and Ukraine} (Durham: Duke University Press, 1996).}
Chapter 1. The Railroad and Environmental Ideologies of Russian Development

Reminiscing about his military experiences in northern Russia during the Allied Intervention in the 1918-1920 Russian Civil War, British Major-General Charles Maynard paused to recall his first trip on the recently constructed Murmansk railroad. He explicitly connected the social and environmental costs of the project, albeit in a somewhat facetious way. “Once more, however, the never-ending forest closes round you,” he wrote. “You… devote yourself to a calculation of how many million trees must have been felled to clear the way for the line, and how many men must have been employed on the work, if it was really completed within sixteen months. Personally I reached the sleepy conclusion that half Russia must have slaved at the job, and that each man, woman, and child must have felled at least one tree per minute.” This reverie, hyperbolic though it may be, reflected an insightful appraisal of the construction of the Murmansk railroad. It truly was a brutal experience for the under-provisioned prisoners of war and workers who built it, thousands of whom perished in the process. The project also hastily transformed the northern landscape, draining and filling in marshes, leveling hills, and deforesting large swaths of land.

The Russian and Soviet states in the first half of the twentieth century used railroad construction as a modernizing, militarizing, and colonizing tool to gain control over naturally harsh sections of the country. In this chapter I concentrate on the construction of railroads on the Kola Peninsula: the promotion of a line to the Murman coast in late imperial Russia; the construction of the Murmansk railroad during World War I; the efforts to use the road as a conduit for economic development in the 1920s; and the expansion of the regional railroad system during the Stalinist era. As in many places in the world, the introduction of a railroad line to the Kola Peninsula was the first major endeavor in a larger process of industrial transformation.

This chapter has two intertwined goals. It demonstrates certain commonalities in the character of development projects pursued during late tsarist state-capitalism and Soviet state-socialism. It also elaborates a distinction between the colonization and conquest of nature as modern environmental ideologies. I trace two political approaches

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to northern railroad development. One relied on a combination of technocratic and statist methods to promote the economic transformation of the region and was particularly present in the final years of the tsarist regime and the 1920s. The other involved the use of militaristic means for industrialization and connects the era of wars and revolutions (1914-1921) to Stalinism. The imperialistic policies and prerogatives of the Russian Empire shaped the overall context in which these two development models emerged, but they differed sharply in the treatment of the natural world that they promoted. Technocratic statism inspired the colonization of nature and militaristic modernization aimed at its conquest.

The colonization and conquest of nature are two related but divergent environmental ideologies of modernization. The colonization of nature is the acquisition and settlement of a natural environment formerly imagined as unused or improperly used by humans. The conquest of nature is the implementation of new technologies or economic activities on a natural system previously seen as potentially posing intractable limits on human behavior. Conquest relies on militaristic metaphors such as overcoming a natural enemy, whereas colonization invites emphasis on the environmental attractions of a place, of nature as a treasure chest. These two conceptions of nature did not contradict each other. Indeed, they were often part of a general modernist framework that promoted industrialization and approached the environment in strictly utilitarian terms. They were frequently articulated at the same time and by the same people. However, the idea of the colonization of nature found more expression in eras of exploration and overt advocacy of regional development. The notion of the conquest of nature, on the other hand, dominated in eras when actual industrial development, including railroad construction, occurred. One significant aspect of these vacillations in visions of nature is that they were intimately entangled with the physical experience of transforming the recalcitrant environment of northern Russia. The materiality of the taiga and tundra during modernization influenced that ascent of environmentally antagonistic ideas.

**Forms of Russian Imperialism and the Role of Railroads**

Imperialism played a defining role in nineteenth- and early twentieth-century history. As recent scholarship on the Russian Empire has shown, the tsarist government
participated in colonial endeavors in at least two distinct ways. It incorporated new regions on the western and southern borderlands into the empire through the employment of violence, assimilation, and settlement policies. This form of imperialism mirrors the overseas activities of many Western countries. The tsarist government also promoted policies that it defined as self-colonization: the settlement of sparsely populated regions, which nominally had been part of the country for a long time. This form of imperialism also occurred within the western United States and northern Canada. Russian “self-colonization” had more to do with the settlement of areas already seen as part of the country than the imposition of new administrative structures to rule existing populations. Furthermore, application of the term colonization (kolonizatsiia) for these contexts often carried a specific connotation of economic development of the region itself, a distinction from imperial models based predominately on resource extraction to serve the metropole. Both types of imperialistic endeavor involved government efforts to assert dominance over territories.

This chapter examines the ecological logics of this second form of imperialism. State projects to develop and settle the Kola Peninsula began in the middle of the nineteenth century. Though the Russian government had claimed the territory since the sixteenth century, it remained disputed for centuries afterwards by neighboring countries,

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3 See, for example, Andreas Kappeler, The Russian Empire: A Multi-Ethnic History, trans. Alfred Clayton (Essex: Pearson Education: 2001) and Burbank, von Hagen, and Remnev, eds., Russian Empire.

4 An older, but still important, work that discusses these policies is Donald W. Treadgold, The Great Siberian Migration: Government and Peasant in Resettlement from Emancipation to the First World War (Westport: Greenwood Press, [1957] 1976).


which periodically invaded and collected tribute from its inhabitants. As a book later produced by the Russian government dramatically put it, “it was a sad sight: the Murman coast, politically part of the Russian state, was in actuality at the disposal of Norway.” This situation resembled imperial rule in the Siberian borderland. As Andrei Znamenski argues for that location, pre-industrial imperial paternalism based on tribute-taking irrespective of religion and ethnicity defined the “ethic of empire” until the late nineteenth century. Only after this point did imperial policy turn to “modernization measures” such as resettlement. Attempts by the Russian government to use economic incentives and other benefits to entice settlers to the Kola Peninsula emerged in the 1860s. These efforts achieved only modest results; the population of the region remained under ten thousand by the beginning of the twentieth century.

The construction of railroads frequently functioned as a major tool for solidifying and strengthening state dominance during such projects of self-colonization. Railroads became a means of settling, economically developing, and asserting military control over sparsely populated peripheries in late imperial Russia. They also functioned as a key in efforts to overcome the supposed cultural backwardness of Russia. State officials like Minister of Finance Sergei Witte, for instance, believed that the introduction of railroads could play a distinct role in creating “cultural fermentation among the population,” including among the “savage people” of the empire. He further claimed that, “in Russia the influence of railroads should be even greater than in western European states” because the country had previously “lagged behind its western neighbors in cultural attitudes.” This mixture of concern about ‘cultural levels’ internally and externally reveals some of the tensions in the Russian government’s attempts to play the roles of imperial power and self-colonizer, but also highlights the believed utility of railroads.

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10 S. Iu. Vitte, Konspekt lektsii o narodnom i gosudarstvennom khoziaistve, 2nd ed. (St. Petersburg: Brokgaus’ Efron”, 1912), 344-345.
The imperative of peopling and modernizing large parts of Russia’s periphery inspired a major expansion of the country’s railroad network beginning in the 1890s.11 For instance, the construction of the Trans-Siberian railroad at the time served as an impetus for the migration of millions of people to Siberia.12

Initial ideas to transform the Kola Peninsula by building a railroad line to the Murman coast also emerged near the end of the nineteenth century. Segments of the tsarist bureaucracy promoted the military and commercial significance of the establishment of a large port and railroad connection there. Although Tsar Nicholas II decided to abandon the proposal shortly after ascending to the throne in 1894, members of the educated public in the broader Arkhangelsk province (guberniia) enthused about the possibilities that a railroad line offered for the Kola Peninsula for the next twenty years. After the Central Powers effectively closed Russia’s Baltic and Black Sea ports during World War I, state officials rashly pursued the construction of the line for strategic purposes. Within two years, hired and conscripted workers and tens of thousands of prisoners of war had built about one thousand kilometers of track connecting a new Arctic port city on the Kola Bay called Romanov-on-Murman (Murmansk after April 1917) to Russia’s main railroad network. Thousands of these prisoners and workers lost their lives because of this construction. During the Russian Civil War, British and American forces occupied northwest Russia and made moderate efforts to improve the functioning of the poorly constructed railroad. After the Bolsheviks gained control over the Kola Peninsula in the early 1920s, state efforts turned to using the Murmansk railroad as a tool for regional development. Offers of incentives to settlers and the organization of a variety of economic opportunities in the region attracted only a slightly greater number of individuals than tsarist efforts in the second half of the nineteenth century had. Only in the 1930s, when the Soviet state returned to forced migrations for the purpose of industrializing the region, did the population of the Kola Peninsula rise dramatically. The establishment of new railroad lines in the Stalinist era advanced through militaristic means akin to earlier wartime practices.

11 Inspiration for this phrase came from the collection, Breyfogle, Schrader, and Sunderland, eds., Peopling the Russian Periphery.
Technocratic Statism and the Colonization of Nature

The history of railroads on the Kola Peninsula reveals deep environmental and social similarities in the ways that the autocratic state of the late imperial era and the socialist Soviet Union approached economic modernization. One common sphere was the emergence and sustained reliance on overbearing methods of state-sponsored development. What I am calling technocratic statism involved an effort of activists in the early twentieth century to promote and manage the country’s modernization. These activists primarily consisted of representatives of the state bureaucracy who had a vested interest in economic development, but also included regional boosters, scientists, and independent businesspeople. They promoted a version of modernization that was technocratic in that it took the employment of scientific expertise and new technologies as the primary drivers of development and was statist in that they sought to use the central government apparatus to guide and regulate the process. This Russian technocratic statism belonged to part of a broader trend of the twentieth-century world. As political theorist Timothy Mitchell has noted, “the politics of national development and economic growth was a politics of techno-science, which claimed to bring the expertise of modern engineering, technology, and social science to improve the defects of nature, to transform peasant agriculture, to repair the ills of society, and to fix the economy.” The global scale of this phenomenon should be kept in mind. Modern economic development often relied on such technocratic impulses, regardless of whether or not countries embraced market mechanisms and private property.

It is important to make this distinction because of another theme in Russian historiography that advances a similar critique. A number of authors suggest that the hostility to private property among technocrats shaped Russian political culture across the revolutionary divide. In contrast to these historians, however, I do not treat the common

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14 In particular, see Peter Holquist, “‘In Accord with State Interests and the People’s Wishes’: The Technocratic Ideology of Imperial Russia’s Resettlement Administration,” Slavic Review 69, no. 1 (Spring
apprehensiveness about unregulated markets as somehow out of touch with a natural economic order. In some of this work the very fact and extent of state involvement in the economy is treated as a matter requiring significant explanation, as if the null hypothesis of a modern economic order is minimal government regulation of corporate behavior, trade, and prices. As economic sociology and anthropology have long established, even capitalistic markets are social institutions that almost always depend on state support. Additionally, I am more interested in the ways that economic modernization—whether based on private or state initiative—was taken as an imperative and what this meant for human interaction with the natural environment.

In late imperial Russia and the Soviet Union the colonization of sparsely populated realms of the country was high on the agenda for advocates of technocratic statism. These advocates included various representatives of educated society and the tsarist bureaucracy such as the Ministry of Finance, certain governorships, and the Resettlement Administration (under the Land Department of the Ministry of the Interior from 1896 to 1905, the Main Administration of Land Management and Agriculture from 1905 to 1915, and the Ministry of Agriculture after 1915). Despite conflicts over the specific methods of colonization, these technocratic statists were united in promoting plans to rationally settle and develop new territories through government guidance and the application of scientific expertise.

Historian Peter Holquist has recently examined the institutional culture of the Resettlement Administration. He argues that members of this body embraced a technocratic worldview that crossed the revolutionary divide. They subscribed to an ideology that “championed technocratic knowledge, advocated forms of scientized state intervention, and emphasized ‘productive’ labor over ‘speculation.’” Some of the most prominent officials in the Resettlement Administration such as Vladimir Voshchinin,

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15 Thomas C. Owen, *Russian Corporate Capitalism from Peter the Great to Perestroika* (Oxford: Oxford University Press, 1995) and Marks, *Road to Power*.

16 On economic sociology, see Karl Polanyi’s classic argument about capitalist institutions depending on social and political arrangements: Karl Polanyi, *The Great Transformation* (New York: Rinehart and Company, 1944).

Ivan Iamzin, and Genadii Chirkin went on to work for the Soviet government. Voshchinin and Chirkin became active in the Murmansk region specifically. These officials understood colonization as “a process of settlement and the use of productive forces of under-populated and economically underdeveloped territories by a significant mass of people emigrating from more densely populated regions.”\textsuperscript{18} That is, they saw colonization as a means of economic modernization through in-migration.

The resettlement efforts of technocratic statists entailed a conviction in the colonization of nature. This colonization ideology regarded the natural world in a quintessentially utilitarian way: it emphasized the usefulness of nature. The focus in the discussion of environments shifted from the impediments they imposed to the opportunities they offered. In the process, nature became imagined as a set of resources that simply needed productive labor to release their value and allow for regional modernization. While this vision of the colonization of nature of the Kola Peninsula appealed to adherents of top-down planning and management, there also existed limitations on the extent of environmental transformation in it. The ideology of the colonization of nature included an implicit acceptance that a given natural system only possessed a discrete array of potential uses. Advocates of it sought to maximize these uses as a means of facilitating permanent settlement and economic development. The goal was the long-term transformation and improvement of certain regions. However, in the colonization vision, utilizing nature did not necessarily imply subsuming it completely.

\textit{Murman Colonization before the Railroad}

From the beginning of official colonization efforts of the Murman coast in the 1860s, individuals promoting regional development debated strategies of nature use and the desired national composition of settlers. The initial incentive structure sought to apply a model of development that had succeeded in the northern Norwegian region of Finmark, which was adjacent to the Kola Peninsula. Government officials such as Russian General Consul in Christiania (Oslo) Leo Mechelin and Arkhangel´sk Governor Nikolai Arandarenko stressed that the Kola Peninsula’s comparable environmental

\textsuperscript{18} I. L. Iamzin and V. P. Voshchinin, \textit{Uchenie o kolonizatsii i pereseleniiakh} (Moscow: Gosudarstvenoe isdatel’sto, 1926), 4.
conditions meant that it could undergo a similar transformation. They also successfully advocated for the extension of colonization benefits to foreigners and not just the Russian Pomors, who already migrated seasonally to the Murman coast for summer fishing. These officials hoped that the Norwegian fishermen would exert a positive influence on the Pomors by helping them abandon their ‘backward’ fishing practices. This plan for permanent settlement of the Murman coast also included a proposal to develop a single concentrated port town in the Kola Bay. In these initial plans and policies we see certain features that would become essential elements of the technocratic statist approach to colonization: the interest in using foreign experiences as a model; an emphasis on the utility of science even before it had been applied; the intended role of the state in coordinating the settlement process; and a conception of northern nature as valuable.

Other individuals involved in promoting Murman colonization disagreed sharply with parts of these government efforts and instead posited a more nationalistic and entrepreneurial model. EmbODYing what economic historian Thomas Owen has called “Slavophile capitalism,” pan-Slavist philosopher Nikolai Danilevskii elaborated a unique vision of Murman development. It depended on a minimal role of the state in building infrastructure to expand markets and charging protectionist tariffs, limitations on foreign settlement and economic activities in the region, and private investment of Russians concerned for their Pomor brethren. This more nationalist and less managerial proposal for colonization included distinct ideas about the proper economic activities for the region and forms of nature use. In particular, advocates of Slavophile capitalist colonization idealized rural and decentralized communities that engaged in ‘traditional’ livelihoods, oceanic fishing in the case of the Murman coast. Moscow businessman

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20 Owen, Russian Corporate Capitalism from Peter the Great to Perestroika, 126-138.

21 N. Ia. Danilevskii, “O merakh k obezpecheniu narodnogo prodovol’stva na krainem severe Rossi,” in N. Ia. Danilevskii, Shornik politicheskikh i ekonomicheskikh statei (Saint Petersburg: Izdanie N. Strakhova, 1890), 588-601. Also see Nielsen, “The Murman Coast and Russian Northern Policies” and
Fedor Chizhov attempted to enable this form of development in the region by creating a company that offered steamship service between Arkhangel’sk and the Murman coast. Not expecting to make a profit, Chizhov was inspired by a desire to enliven the region and believed that a Russian-owned shipping company would provide an essential service to help strengthen Pomor industry. Nationalist concerns would continue to frame the debates about colonization and economic development of the Kola Peninsula until the Soviet era. Both sides of this dispute—technocratic statist and Slavophile capitalists—nevertheless shared an appreciation for the economic opportunities that the Kola environment offered.

*State Attempts at Railroad Development*

In the final decade of the nineteenth century, ambitious projects to use railroads as a colonizing tool first received serious consideration in Russia. This more transformative vision of northern development found support at the highest levels of the tsarist bureaucracy. The initial settlement campaigns had only attracted a few thousand permanent residents to the Murman coast by this time and consensus emerged in certain government circles that more intensive state activity would be necessary to further development. As Steven Marks argues in the case of the Trans-Siberian line, railroad construction in this era represented a turn toward state intervention as a means of economic transformation and the colonization of sparsely populated regions. The Ministry of Finance and the Ministry of Transportation supported extending this development strategy to the Kola Peninsula in the 1890s. Military concerns also became entwined with the economic modernization of the Kola Peninsula for the first time. Indeed, the primary source of state interest in the Murman coast came out of a search for a location for a new naval base. Such a port required natural and geographic specificities that would make it usable year-round and resistant to blockades. Minister of Finance,

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Davydov, “From Correspondence to Settlement,” in Yurchenko and Nielsen, eds., *In the North My Nest is Made*, 35-37, 48-49, and 18-20.


24 Marks, *Road to Power*. 
Sergei Witte, and the Governor of the Arkhangel’sk province, Aleksandr Engel’gardt actively endorsed the Ekaterina harbor on the Murman coast as the ideal site for this new port.

As part of the assessment of suitable options for the new port, the government arranged for several expeditions to the Kola Peninsula. This process of exploration played a significant role in shifting impressions of the territory from desolate, harsh, and inhospitable to rich, valuable, and enticing. The combination of travel, science, and economic surveying created a specific environmental experience for those on the expeditions, which reinforced a colonial mentality toward northern nature. They wanted to be impressed by the possibilities of the area and found natural features to emphasize in support of this point. A representative of the Ministry of Finance who traveled there in 1894 declared, “the importance of Murman lies in its splendid natural harbors that sit on the open ocean and do not freeze all winter.”\(^{25}\) Witte left this voyage convinced that the Ekaterina harbor was “remarkable.”\(^{26}\) Upon his return to the capital, he gave a report to Tsar Alexander III urging the construction of a naval and commercial port in the Ekaterina harbor and the establishment of a railroad line to connect it to the center.

Travel experience also informed Engel’gardt’s more elaborate promotion of regional development and emphasis on the natural treasures of the Kola Peninsula. He justified the desirability of a railroad line to the Murman coast as a needed investment to integrate the entire complex of the area’s natural environment into the economy. During a trip in 1895, he surveyed the natural and human resources of the Kola Peninsula. The book he published upon his return espoused a full vision of colonizing Kola nature: resources such as fish, forests, and mineral ore could “not only develop and strengthen the welfare of the local population, but also benefit the entire state.”\(^{27}\) Reflecting the importance of exploration for this environmental ideology, Engel’gardt used his actual observations of the region to refute claims that the natural conditions there were too harsh for development: “While studying the issue of Murman, its climatic conditions, and the

\(^{25}\text{Murmanskaia zheleznaia doroga, 15-16.}\)
\(^{26}\text{S. Iu. Vitte, } Vospominaniiia, \text{ vol. 1 (Moscow / Tallinn: Skif Aleks, 1994), 389.}\)
\(^{27}\text{Engel’gardt, } Russkii sever", 1. Engel’gardt was a notably active governor who used his annual reports to the tsar to outline plans for regional modernization. See Richard G. Robbins, } \text{The Tsar’s Viceroys: Russian Provincial Governors in the Last Years of the Empire} \text{ (Ithaca: Cornell University Press, 1987), 67-71.}\)
colonization of the Murman coast, we have quite often read and heard that one cannot live on Murman, that colonization of it is impossible, that its harsh climate prevents a healthy existence, etc. The above data testify to precisely the opposite.”

He concluded, “the time is already not far off when Murman will finally receive its proper commercial and political significance, which nature itself has specified.”

These late nineteenth-century development plans for the Kola Peninsula were unsuccessful. Shortly after he came to power, Tsar Nicholas II chose the option for the new port that was being advocated by the War Ministry and Naval Ministry: the Latvian city of Libau (Liepāja) on the Baltic Sea, which already possessed a railroad connection. Witte eventually convinced the new tsar to approve the construction of a railroad line from Saint Petersburg to Petrozavodsk, which stalled until just before World War I, and the creation of a new commercial port and city called Aleksandrovsk in the Ekaterina harbor in 1899. The inability of this new port town to function as a conduit for colonization was not only due to the fact that it lacked a railroad connection. What James Scott has outlined as a simplifying approach to natural environments in high-modernist state planning also played a role here. In their enthusiasm for colonizing nature, state officials overestimated the natural advantages of the Ekaterina harbor. The Gulf Stream current mollified the climate there like most locations on the Murman coast, preventing the waters from freezing in the winter for the most part. However, strong winds and the port’s distance from fishing grounds inhibited it from becoming a center for commercial fishing. The lands surrounding the harbor were almost exclusively steep rocky tundra without meadows or forests that could serve settlers’ livelihoods in other ways. Most remarkably, the water in the harbor at the time did occasionally freeze in the winter.

These impediments limited the growth of Aleksandrovsk for the next fifteen years and

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28 Engel’gardt, Russkii sever”, 130.
29 Engel’gardt, Russkii sever”, 133.
31 Scott, Seeing Like a State.
resulted in a later decision to place the terminal station of the Murmansk railroad elsewhere.

Technocratic Dreams in the North

The technocratic statist ideas of northern development spread in the early twentieth century. Activists in the tsarist administration and regional society became more concerned with the issue and desirous of using their scientific skills and new technologies to facilitate modernization. Numerous explorations of the region occurred in the decades before World War I for the expressed purpose of gaining economically useful scientific knowledge. Members of the imperial Resettlement Administration also became more active in trying to direct the expansion of the railroad network toward the goal of colonization. Chirkin used the journal he co-edited, Problems of Colonization, and his position in the government to advance the idea that railroad lines needed to connect to locations of desired resettlement and not only existing economic centers. The tumultuousness of early twentieth-century politics in Russia—the Russo-Japanese war, the 1905 Revolution, the establishment of a limited constitutional monarchy, and the dramatic land reforms of Prime Minister Petr Stolypin—inhibited the advance of the plans for railroad lines to northwest Russia. However, these same transformations also inspired ambitious state thinking and by 1912 plans for a railroad line to the Murman coast were again being pursued.

Regional boosters of this era also articulated a heightened sense of the value of northern nature, referring to it frequently as diverse, inexhaustible, and a treasure chest. Nature’s deficiencies resulted, many of them asserted, from an insufficient number of humans to use it economically. As the editors of a new journal and regional organization


centered in Arkhangel’sk put it: “The enlivening of the North can only stand on solid ground after a period of exploiting its resources.” They continued that “the colonization system should be focused directly on the exploitation of natural resources of the North” and not “one-sided goals.” Specifically addressing the Kola Peninsula, another article highlighted the need for colonization to enable total nature use: “the size of the current population of Murman does not correspond to its natural resources. A continual and significant influx of new forces and working hands is urgently required for the successful expansion” of their use. Many of these local advocates agreed with individuals in the Resettlement Administration that the construction of the delayed railroad line could solve these labor shortages. “The rich forests along the railroad would be objects of industrial extraction,” wrote another journalist, “Life on the Murman and other coasts then would be turned toward vigorous labor and trading; mineral resources would not be left without exploitation.” Similar to Witte and Engel’gardt, these boosters believed that regional settlement depended on the colonization of nature.

Even some nationalists who were hostile to foreign science and remained attached to a romanticized traditionalism supported plans for using a railroad to settle the Kola Peninsula. Widespread ambivalence about the desirability of economic modernization existed among sections of state and society in late imperial Russia. Many of the critics of modernization came from an avowedly conservative stance. They often rejected technocratic solutions but not necessarily statist ones. Representatives of this mentality, who were concerned with issues of the north, criticized the activities of foreign trawling ships for depressing the economy of the Pomors, and they viewed the influence of foreign colonists on the Murman coast as tragic. They tended to reject calls for the adoption of new fishing technologies as a solution. However, they also praised northern nature as

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37 “Ot redaksii,” Izvestiia Arkhangel’skogo obshchestva izucheniia Russkogo Severa 1, no. 2 (June 1, 1909): 5-6.
38 “Chto nuzhno dlia kolonizatsii Murmana?,” Izvestiia Arkhangel’skogo obshchestva izucheniia Russkogo Severa 1, no. 2 (June 1, 1909): 8.
rich and believed that proper railroad development could help Russify the territory. This consensus assured broad support among regional advocates during the wartime construction of the line.

During the wars, revolutions, and construction of the Murmansk railroad, the ideas of technocratic statists were put into action. The Resettlement Administration turned its efforts to regulating the food supply during the wars; Chirkin, who now headed it, also became interested in long term plans for the colonization of northern Russia. The actual militaristic modernization of the Kola Peninsula involved a shift to an environmental ideology that stressed the conquest of nature (which I will address later in the chapter). However, the desire to colonize nature abided and found expression as a future possibility. A propaganda publication commemorating the completion of the line in 1916 noted that “the introduction of a railroad here opens up the brightest possibilities,” including “for the development of productive forces.” “In terms of the colonization of the vast Murman region—the current population of which does not correspond to its enormous natural resources—the railroad is destined to have a prominent role.” Although this book took the construction of the line as a wartime necessity, it posited that the natural richness of the region justified the investment in the long run.

**The Railroad as a Colonizer**

After the Bolsheviks re-captured the Kola Peninsula in early 1920, fertile ground existed for the implementation of colonization schemes innovated in late imperial Russia. The devastated economy of the country and the largely destroyed condition of the

42 World War I also intensified state attempts to promote Russian nationality within the empire, see Eric Lohr, Nationalizing the Russian Empire: The Campaign against Enemy Aliens during World War I (Cambridge, MA: Harvard University Press, 2003).
44 Murmanskia zheleznaia doroga, 117. For other sources that emphasized the colonization potential of the Murmansk railroad as it was being completed, see A. F. Zaitsev and N. R. Rodionov, “Murmanskaia zheleznaia doroga i zadazhi ekonomicheskoi politiki na Severe,” Voyna i ekonomicheskaia zhizn’, no. 3 (1916): 1-45 and A. F. Zaitsev, “Murmanskaia zheleznaia doroga i zadazhi ekonomicheskoi politiki na Severe,” Russkaia mys’ 37, no. 8 (1916): 1-16.
Murmansk railroad, however, impeded an immediate renewal of colonization efforts. In fact, several central government agencies in the early 1920s proposed closing the railroad for the time being and only restoring it to a functioning condition at some point in the future. The leaders of the new Karelian Labor Commune—Finnish communists hoping for an eventual re-unification of the newly independent Finland after the anticipated proletarian revolution there—supported renovating the railroad, but resisted the imposition of any development schemes that challenged their regional autonomy or de-nationalized the population of Karelia.\(^45\) Officials in charge of the Murmansk railroad, members of the new State Colonization Institute, and the central People’s Commissariats of the Navy, the Military, and Transportation pushed through a plan to transform the railroad into a self-sustaining “industrial-colonization-transportation” combine. With support from Vladimir Lenin and Felix Dzerzhinskii, the Council of Labor and Defense (STO) passed a resolution officially re-organizing the Murmansk railroad in this direction on May 25, 1923 and allocating huge sections of land to its administration. Most of the 241,000 square kilometers under the purview of the Murmansk railroad were located on the Kola Peninsula.\(^46\)

The technocrats from the tsarist era who proposed this development scheme believed that the transformation of nature would allow it to be self-financing. Supporters claimed that land allocation could substitute for state subsidies from the central government. Timber from the region would fuel the railroad, provide local building materials, and generate profits from exports. The fishing industry and the efforts to develop agriculture in the far north would feed the new settlers. What Chirkin called “a whole treasure chest of untouched nature” could help fund initial colonization; the economic activity of human settlers with this nature would then unleash “productive forces” and “enliven” the region.\(^47\) Chirkin extolled the role of the railroad here,
comparing it to the example of Canadian development, and its potential to benefit the country as a whole. “On the basis of ‘Canada-ization’,” he wrote, the “pioneering role of the Murmansk railroad brings about the urgent necessity of using the natural resources that lie in this region for the economic revival of the ruined Russian interior. Because of the barrenness of the region it is impossible to bring to life the industrial colonization of the territory without the assistance of the road.”48 This vision of making the entire territory industrially productive through the colonization of nature expanded throughout the 1920s, in no small part aided by the expeditions of tsarist-era geochemist Aleksandr Fersman that began to reveal the mineral wealth of the region.49

To a notable degree this model for the Murmansk railroad shaped the strategy for exploiting natural resources locally through the end of the 1920s. The railroad administration managed subsidiary enterprises—Zhelles, Zhelryba, Zhelstroy, Zhelsilikat, and others—that organized timber collection and processing, fishing, construction, and brick-making respectively.50 Income from deforestation and investments from private and regional groups allowed for the quick restoration of the railroad line to working condition.51 Throughout the era of the New Economic Policy (1921-1928), the timber harvest of the railroad grew. Zhelles went from gathering 720,000 cubic meters of forest materials in 1924 to 1,460,000 cubic meters for the 1928-1929 accounting year, and felled a total of 5,857,000 cubic meters of forest in these years.52 Most of the higher quality forest material came from Karelia; Kola wood almost exclusively served as railroad fuel. The railroad administration also took over the Murmansk port in 1924 and

48 Chirkin, “‘Kanadizatsiia’ Murmanskoii zheleznoi dorogi,” in Proizvoditel’nye sily raiona Murmanskoii zheleznoi dorogi, 231.  
50 Each of these subsidiary names combines the term for railroad in Russian, zheleznaia doroga, which literally translates as “iron road,” with the economic sphere it covered. Thus, Zhelles meant “iron-forest,” Zhelryba meant “iron-fish,” and so on. Clearly, these monikers associated these economic activities with industrial development as well. Khabarov, Magistral’, 41-62.  
51 Baron, Soviet Karelia, 77-78.  
52 ARAN, f. 544, op. 1, d. 115, l. 3.
expanded commercial trawl fishing out of it.\textsuperscript{53} Zhelryba took in 16,483 tons of fish from 1923 to 1929.\textsuperscript{54} Finally, with a large amount of territory on the Kola Peninsula under its control the Murmansk railroad looked for new ways to use the marshy and tundra lands.\textsuperscript{55} In part this endeavor included examining the potential of expanding productive forces by creating a network of hydroelectric power stations, modernizing reindeer herding, and surveying mineral deposits.\textsuperscript{56} It also entailed work by the colonization department of the railroad on land reclamation, planting trees in certain areas, and preparing parcels into potential homesteads.\textsuperscript{57}

If the Murmansk railroad administration succeeded to a significant extent in colonizing nature in the 1920s, it had a much more spotty record with human colonization. It offered land and employment options to settlers, but had a hard time convincing people to come and to stay. In the first few years, only several hundred moved to homesteads near railroad stations on the Kola Peninsula and many of these settlers left after a short period of time. Great numbers of the colonists re-located to Karelia. But even here the new labor force was insufficient for the timber operations of the railroad, which continued to employ thousands of seasonal workers throughout the decade and began again relying on prisoners by the late 1920s.\textsuperscript{58} Embarrassed by the lack of progress of the colonization department, the head of the Murmansk railroad administration, A. M. Arnol’dov, defensively wrote in 1925: “Such resettlement does not have a dominant significance but a functional (sluzhebnoe) one; it is a means, not a goal, and it is only one of the elements of the colonization process. … The task of colonization work is the organization of an entire range of enterprises for the industrial use of the natural resources of the colonized region.”\textsuperscript{59} This rationale re-affirmed that the colonization of the Kola Peninsula for the technocrats in the railroad administration

\begin{itemize}
\item \textsuperscript{53} Khabarov, \textit{Magistral’}, 55-56.
\item \textsuperscript{54} ARAN, f. 544, op. 1, d. 115, l. 3.
\item \textsuperscript{55} Baron, \textit{Soviet Karelia}, 72-78.
\item \textsuperscript{56} See the essays in \textit{Proizvoditel’ nye sily raiona Murmanskoi zheleznoi dorogi}.
\item \textsuperscript{57} Murmanskaiia zheleznaia doroga kak promyshlennoo-kolonizatsionno-transportnyi kombinat (Leningrad: Pravlennie Murmanskoi zheleznoi dorogi, 1926), 16-17 and GAMO, f. R-397, op. 1, d. 34, ll. 25-28.
\item \textsuperscript{58} Murmanskaiia zheleznaia doroga kak promyshlennoo-kolonizatsionno-transportnyi kombinat, 9.
\item \textsuperscript{59} A. Arnol’dov, \textit{Zheleznodorozhnaiia kolonizatsiia v Karel’sko-Murmanskom krae: Po materialam razrabotannykh kolonizatsionnykh otdelov pravlenii dorogi} (Leningrad: Pravlennie Murmanskoi zheleznoi dorogi, 1925), 12-14.
\end{itemize}
meant above all the colonization of its nature. Reflections of an expanded desire to highlight the natural attractiveness of the place appeared in publications around this time, including articles that now stressed the potential of the Kola forest industry.\(^{60}\)

The overall economic development facilitated by the Murmansk railroad combined with its deliberate colonization efforts made more headway by the end of the decade. In 1929 Chirkin boasted that the Murmansk region had grown in population from 14,500 to 23,000 since 1923.\(^{61}\) But these positive results in no way altered the transition in Soviet development models from ones based on colonization to ones emphasizing conquest. Throughout 1930, the Murmansk railroad relinquished its role in regional settlement and by September it lost its status as an “industrial-colonization-transportation” combine.\(^{62}\) The word colonization (kolonizatsiia) itself, disputed but accepted in the 1920s, became increasingly marginalized in Soviet discourse with the rapid industrialization of the first five-year plan.\(^{63}\) Techniques of industrialization and regional settlement more closely resembling wartime modernization replaced tsarist-era technocrats’ efforts to colonize the Kola Peninsula.

Commonalities in the articulation and implementation of technocratic ideas of using the railroad as a tool of colonization in the late imperial and early Soviet eras should not obscure the fact that alternatives to development practices were possible in both periods. Unlike some other scholars who emphasize the continuum of war and revolution, I do not believe that the existence of heavy-handed state development models curtailed any possibility of more humane and environmentally sound versions of socialism.\(^{64}\) Proponents of using Murmansk railroad to colonize the Kola Peninsula were


\(^{61}\) Baron, Soviet Karelia, 77.


\(^{63}\) At an early planning meeting of the Apatite trust, Mikhail Tomskii scolded the new head of the enterprise Vasilii Kondrikov that “the term ‘colonization’ needs to be thrown out.” GAMO, f. 773, op. 1, d. 1, l. 103. Also see Hirsch, Empire of Nations, 87-98.

acutely aware of the history of forced labor in the construction of the line and wanted to attract settlers with incentives instead of coercion.\textsuperscript{65} They turned away from this hesitation in the latter part of the 1920s when their colonization ideology became overshadowed by other notions of regional development.\textsuperscript{66} Furthermore, the environmental costs of the colonization activities of the Murmansk railroad were dwarfed by the next phase of Soviet industrialization. The vision of the colonization of nature included limitations on nature use—a resistance to some activities seen as plundering and predatory—that desires of conquest did not. My point here is not to defend technocratic statism, but simply to distinguish it from a more nefarious form of development: militaristic modernization.

\textbf{Militaristic Modernization and the Conquest of Nature}

Russian wartime modernization in the far north was catastrophic. It involved the careless treatment of humans and nature, which created vulnerable conditions and led to the loss of many lives. The pattern of urgent and rushed industrialization undertaken with the building of the Murmansk railroad resembled essential characteristics of railroad construction in the Stalinist era. Impossible time schedules, chaotic planning, major constraints in acquiring adequate supplies and finances, the use of prison labor for construction, and shortsighted methods of nature use that undermine land health and subsequent economic growth all characterized a form of development that I call militaristic modernization. Despite distinct sets of political and ideological justifications, the militarized practices of railroad construction on the Kola Peninsula during World War I and from 1928 to 1953 comprised overarching connections between these two areas.\textsuperscript{67} By emphasizing common approaches to economic development that emerged out of World War I, I complement, yet slightly diverge from, Holquist’s arguments about the

\footnotesize\textsuperscript{65} Arnol’dov, \textit{Zheleznodorozhnaia kolonizatsiia v Karel’sko-Murmanskom krae}, 33-35.  
\footnotesize\textsuperscript{66} Baron, \textit{Soviet Karelia}, 100-104.  
appearance of modern political practices in this era. The actual establishment of railroad lines, unlike political practices such as surveillance and colonization programs, became brutal more because of a martial approach to the natural world than the pursuit of technocratic impulses.

The construction of the Murmansk railroad also reveals how geopolitics helped first intertwine the processes of modernization and militarization on the Kola Peninsula. An international context of urgency, mass mobilization, and sweeping social and economic transformations shaped the actions of the warring powers in Europe at the time. The need for an accessible port that had not been closed by the activities of foreign navies impelled Russia to embark on this project of rapid industrialization. Additionally, the involvement of a plurality of governments and countries helped forge the heavy-handed practices of militaristic modernization. The United States, Britain, and France all participated in the construction of the Murmansk railroad from the beginning and later oversaw sections of the line during the Russian Civil War. Austro-Hungarian soldiers and Chinese workers helped actually build the road. The international context of the history of its construction suggests that militaristic industrialization practices extended beyond a particular political regime or ideology. As one of the worst wartime projects in terms of human suffering and mortality, the building of the Murmansk railroad puts some of these connections into sharper view.

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68 Holquist, Making War, Forging Revolution; Peter Holquist, “‘Information is the Alpha and Omega of Our Work’: Bolshevik Surveillance in its Pan-European Context,” The Journal of Modern History 69, no. 3 (September, 1997): 415-450; and Holquist, “‘In Accord with State Interests and the People’s Wishes’,“ Slavic Review 69, no. 1 (Spring 2010): 151-179.


Militaristic modernization relied rhetorically on the language of conquering nature and materially on antagonistic and shortsighted environmental practices. The conquest of nature entailed viewing the environment as a set of obstacles to be overcome through industrial transformation. As such the natural environment was narrated with a set of militaristic metaphors, including portrayals of it as an enemy, incorporation of it into heroic tales of successful industrial action, and propagandistic posturing of it as an ally. The wartime context obviously influenced the ideology of conquering nature by positing the environment as another front. In contrast to the colonization of nature, the conquest of it focused on economic activities themselves—the means of modernization—instead of the attractiveness of a new industrialized world—the end of modernity. Related to this distinction, conquest rhetoric tended to become more frequent in descriptions of actual transformation while colonization discourse imbued surveys of economic potential. Thus, beyond the wartime context, tangible interaction with the natural world influenced the articulation of modern environmental ideologies. A more radical way to put this idea is that the recalcitrance of environments to anthropogenic manipulation helped lead to more frequent evocations of the conquest of nature.

A pre-war example of this phenomenon in the history of Kola railroad construction supports this point. During the opening of the port city of Aleksandrovsk in 1899, the newspaper *The Light* (*Svet*) cheered: “Russia celebrated a big victory over the stepmother of geography. …The newest Russian victory over northern nature is called the new city of Aleksandrovsk in the Ekaterina harbor.” The celebration of a “victory” over nature incorporated it into a heroic conception of conquest. This rhetoric appeared only in response to an economic transformation of an environment seen as an obstacle. Therefore, not only did ideas of conquest influence environmental practice, but nature’s intractability also helped engender those very ideas.

**Wartime Urgency and the Beginning of Construction**

From the outset the construction of a railroad line to the Murman coast possessed strategic military significance. These concerns had been high on the agenda during Witte’s abortive effort in the 1890s and remained important as government officials and

private entrepreneurs renewed preliminary planning for a railroad connection several times in the decade before the outbreak of the First World War.\textsuperscript{72} In 1912 the regional government of the Olonets province cooperated with central state agencies to form a private company to build a connection from Saint Petersburg to Petrozavodsk. The Olonets railroad sought investments from Russian and foreign sources and began construction on the line by the summer of 1914.\textsuperscript{73} At the time, members of the government and the educated public floated various ideas for a further expansion to the north, including several options for a railroad to Murman and the possibility of bypassing the Kola Peninsula and running the line through the Grand Duchy of Finland.\textsuperscript{74}

Strategic calculations changed dramatically with the commencement of the war. During the first few months of the conflict, the navies of the Central Powers effectively closed Russia’s Baltic and Black Sea ports, thereby cutting off the most accessible trade hubs for the Allies. These developments left Russia with the distant Pacific port of Vladivostok and one in Arkhangel’sk, which closed for five months in the winter.\textsuperscript{75} The urgent need for greater access to foreign supplies inspired the government to go forth with a plan to build a railroad line to the Murman coast rapidly.\textsuperscript{76} Accepting that Aleksandrovsk had been an inappropriate location for a major port, officials initially designated the town of Kola as the terminus of the railroad and then moved it north about eleven kilometers to the Semenov bight—the future site of Murmansk—where the bay water remained unfrozen in the winter.\textsuperscript{77}

\textsuperscript{72} Murmanskaia zheleznaia doroga, 18-19.
\textsuperscript{75} Ushakov, Izbrannye proizvedeniia. Tom 1, 549-551.
\textsuperscript{76} Murmanskaia zheleznaia doroga, 20-22.
\textsuperscript{77} Khabarov, Magistral’, 15.
With the help of foreign supplies, capital, and laborers, over one thousand kilometers of railroad track connecting Petrozavodsk and the Semenov bight were laid during 1915 and 1916. Such a bout of break-neck industrialization exemplified a key element of militaristic modernization: hastiness in construction that results in chaos. To expedite the process, Russian officials arranged, through Ambassador George Buchanan, for British financiers and construction companies to build part of the line. The *Pauling Company* hired several hundred Canadian railroad workers to lay part of the line on the Kola Peninsula. The protests of these workers over the conditions that greeted them exacerbated the souring relationship between the *Pauling Company* and the administration of the Murmansk railroad. Foreign firms withdrew from the construction altogether in February 1916, leaving it to Russian management. However, the railroad administration continued as previously to rely heavily on imported equipment, including rails, locomotives, and wagons.

The single line track of the Murmansk railroad traversed north from Petrozavodsk along Lake Onega and then up to Soroka on the southern shore of the White Sea. The line then went through an extremely marshy area in northern Karelia up to Kandalaksha in the southeast corner of the Kola Peninsula. On the Kola Peninsula the railroad line followed a valley that paralleled Lake Imandra and eventually extended up to the Kola Bay.

Pomors had historically used this route for making the trek to summer fishing grounds, as did Sami coachmen for carrying mail, goods, and travelers through the region. These three segments of the railroad—Petrozavodsk to Soroka, Soroka to Kandalaksha, and Kandalaksha to Kola—were the main sections around which building activities were arranged. The actual construction of the line began in the spring of 1915 and was completed for the Petrozavodsk-Soroka and Kandalaksha-Kola segments a year later. In June 1916 the new port city of Romanov-on-Murman opened with a martial celebration. With a massive influx of POW labor during that summer, construction of the final

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80 *Murmanskaia zheleznaia doroga*, 28.
section—the difficult Soroka-Kandalaksha segment—was finished by the end of the year.  

Conquering Natural Obstacles  

During the construction of the Murmansk railroad the people involved in the project approached the natural environment belligerently and heedlessly. The martial character of the project contributed to these actions and ideas. However, the environment also resisted these modes of manipulation. Certain stable environmental features created difficulties for the project from the outset. On the Kola Peninsula, for instance, the long, dark, and snowy winter severely limited the times of the year that work could be done there. The abundance of marshes and rocky ground in the region as a whole forced considerable extra work: a total of 250 verst (a verst is roughly equivalent to a kilometer) went through marsh, including a continuous fifty-two verst section from Soroka to the town of Kem, requiring numerous bridges and curves in the track and the dredging of many swamps. The inability to grow many crops required a greater dependence on the imported food supply system than in agriculturally fertile regions. Finally, the materials available for construction and fuel along the line were limited. Forests in the north became sparser and only usable for fuel and not as sleepers or for buildings. There was also a general lack of sandy land along parts of the line to use as ballast for the embankments.

Impediments also arose in response to destructive efforts to transform the landscape. Supporters of the project classified many of these difficulties as technical, but the complete anthropogenic control implied by this term was largely illusionary. Nature repeatedly “bit back” in ways unpredictable at the time. For instance, in many places builders used rocks and logs to lay the roadbed of the track through marshy areas.

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85 Murmanskaia zheleznaiia doroga, 46-65.
88 Murmanskaia zheleznaiia doroga, 43.
Elsewhere workers attempted to drill into frozen rock that splintered in the process. The roadbeds required approximately 15,000 cubic meters of land per *versta* and ended up using 10 million cubic meters of excavated earth, including over one million that had been blown up with dynamite. Nevertheless, these roadbeds often sank under the newly placed track. In locations near the White Sea at Soroka and the Kandalaksha Bay, the tide would outright flood the high embankments until engineers invented a means to let the water drain out. Additionally, shipments of supplies from abroad often had trouble reaching the worksites in part because the frozen White Sea closed the Arkhangelsk port and because of the inaccessibility of northern areas of the line. Imported animals intended to assist in transportation and provisioning the labor forces suffered from the cold and malnourishment and died in large numbers in several instances.

Finally, de-forestation from felling huge areas for laying the track and acquiring fuel and by fires from industrial activity exacerbated the lack of energy resources in the region. The administration of the railroad desperately attempted to ration wood and arrange for fire prevention services. These measures achieved little in terms of increasing the pace of construction, limiting forest destruction, or preventing human suffering. By 1918 no dried wood usable for locomotive fuel remained in the region of the railroad and the trains relied entirely on imported coal from England. In a July 4, 1916 report, British Major-General Alfred Knox grouped these various obstacles as “natural difficulties of construction” and correctly predicted that combined with a prioritization of the rapid completion of the project these difficulties would result in the line operating at less than half of its intended capacity.
The experience with these material features that inhibited railroad construction played into a fully militarized expression of the conquest of nature. Typical mentions in the press in the immediate aftermath of the construction of the Murmansk railroad described it as “a struggle with harsh and primordial northern nature” and “an uninterrupted struggle with elemental obstacles.” Such militaristic language often was elaborated with explanations of the multiple ways that the environment challenged modernization work. For instance, the 1916 book published by the Russian government celebrating the line’s completion categorized the work on the Murmansk railroad:

This is a grandiose war with elemental forces and economic obstacles. The elemental obstacles were the local conditions. The conditions of the worksite included a harsh climate, the continuous polar night for a month and a half, the short summer construction period, a negligible population, the absence of housing, the absence of transportation and a local means of transit, the distance and isolation of the road construction from the railroad network, and the lack of local medical help and hospitals because of the severe climate, etc. Most of these spontaneous obstacles clearly related to the natural conditions of the region. Echoes of this theme of construction work as a war appeared in many places, including the standard letters of congratulations sent by Tsar Nicholas II to the administration of the Murmansk railroad after completion of different segments of the line and the entire road. The tsar made a point to mention “the technical difficulties and harsh local conditions” of the project. After the completion of the line the conquest of nature rhetoric could take a heroic tone, though the ongoing conflict seemed to mitigate such revelry. On the eve of the collapse of the monarchy in early 1917, a journalist referenced a litany of aggravating natural conditions—the darkness and cold in the winter

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100 Murmanskaia zheleznaia doroga, 31.

101 GAMO, f. I-72, op. 1, d. 13, ll. 136, 202 and Murmanskaia zheleznaia doroga, 6.
and the rapacious insects in the summer—before triumphantly praising the workers on the Murmansk railroad, “you defeated the harsh north.”

Militaristic Modernization and Brutal Work Conditions

This treatment of the natural environment contributed significantly to the miserable experience of the thousands of individuals forced to build the Murmansk railroad. The efforts of the leadership of the railroad to recruit a workforce failed to produce sufficient workers; few people lived in the region and the demands of the Russian army severely diminished the potential labor pool. Data are elusive, but according to its Chief Engineer, Vladimir Goriachkovskii, in January 1917, the administration of the Murmansk Railroad employed approximately 32,000 Russian citizens, which included ethnic Russians, Pomors, Sami, Buryats, and Caucasians, and 8,000 Chinese workers on the project. Many hired workers refused to renew their initial six and a half month contracts. Faced with these limitations, the Russian government decided to rely primarily on the punitive labor of prisoners of war with disastrous results. German historian Reinhard Nachtigal, who has extensively researched the Murmansk railroad, declares that it was “one of the worst horrors of captivity in Russia during World War I.” Peter Gatrell and Alon Rachamimov agree. According to the (likely inflated) estimates of Red Cross nurse Elsa Brändström, who lived with POWs in Russia during the war, 25,000 of 70,000 POWs sent to work on the Murmansk railroad died as a result. “Of the remaining 45,000 there were, in the autumn of 1916,” wrote Brändström, “32,000 sick of scurvy, tuberculosis, rheumatism, and diarrhea.”

This horrific outcome for the people subjected to the work conditions on the Murmansk

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102 M. Bubnovskii, “Po novomu puti (Iz dnevnika narodnogo uchitelia),” Izvestiia Arkhangelskogo obshchestva izucheniiia Russkogo Severa 9, no. 1 (January 1917): 7.
103 Khabarov, Magistral’, 18-20 and Gatrell, Russia’s First World War, 113-117.
105 Nachtigal, Die Murmanbahn 1915 bis 1919, 198.
107 Rachaminov, POWs and the Great War, 111-112 and Gatrell, Russia’s First World War, 184.
railroad, like the technical difficulties of the project, need to be understood in relation to the natural context.

The weather conditions, the lack of food and shelter, and diseases aggravated the experience of the workers on the Murmansk railroad. All of these elements were environmental at a significant level: the frozen dark winter and constantly light summers with ravenous mosquitoes led to several tragedies and increased workers’ exhaustion; nutritional deficiencies related to foods that could not grow in the region caused avitaminosis; and crowded and unhygienic sanitary conditions allowed for viral and bacterial pathogens to thrive epidemically. Overall, the barren polar Kola Peninsula experienced some of the worst work conditions. The vulnerability of the labor force to these natural elements, however, obviously arose from deliberate decisions to build the railroad in this way and the militaristic character of the industrialization project. Political and social processes made POWs and hired workers vulnerable to natural hazards.109 Political ecologist Piers Blaikie and several of his colleagues have elaborated a set of general vulnerability-creating processes for biological hazards related to human action: conditions of the micro-environment such as diet, shelter, sanitation, and the water supply; migration and especially forced displacements; and the degradation and limited capacities of a physical environment.110 All of these processes played a role in the construction of the Murmansk railroad. In this specific case political and economic activities comprised what we have been calling militaristic modernization: the pursuit of recklessly urgent industrialization at a moment of limited capacities to obtain necessary materials and supplies. The conquest of nature ideology supported this vulnerability-creating process of militaristic modernization by justifying a struggle with the environment as part of the war.

The POWs building the railroad line suffered from an array of harsh conditions and deprivations. In late 1915 the Governor of the Arkhangel’sk province, Sergei Bibikov, wrote to the Minister of Transportation, Aleksei Trepov, about the dire

110 Blaikie, et. al., At Risk, 106-108.
conditions on the line and advocated for the government to arrange an evacuation through Finland. After an inspection in the summer of 1916, Bibikov filed an impassioned report surveying the desperate situation. “The majority of the barracks,” he wrote, “do not account for the hygienic conditions of the harsh northern climate.” Lacking walls, adequate floors, windows, and sufficient kitchens, they were “completely unfit for the winter.” The dense marshes, where the barracks were located, also now kept them filthy: full of dirty water, waste, and insects. Without adequate drinking water, bathing facilities, and medical help, diseases among the workers proliferated. Bibikov also highlighted the sanitary problems and cold that resulted from a lack of clothing and noted that the pitiful food provisions, which mostly consisted of rye flour, led to scurvy outbreaks.

By this time, scurvy and other diseases like typhus gripped the population of POWs and hired workers. While certainly a low priority for the tsarist state, government officials and railroad administrators tried to ameliorate the situation by arranging for shipments of foodstuffs believed to prevent and cure scurvy and for evacuations of the ill. The head of the Russian Sanitation and Evacuation Section, Prince Aleksandr Oldenburg, considered the conditions illegal and informed the administration of the railroad that it was responsible for the “sanitary well-being” of the POWs and hired workers. The wartime conditions also elicited a more callous response. Since the beginning of construction, the railroad administration set prices for wood, kerosene, and food and prioritized supplying hired laborers, especially Russian ones, over POWs. The outbreaks of diseases forced a revision in these policies, but it maintained heavy-handed restrictions on trade and acceptable provisions. Furthermore, the administration of the Murmansk railroad initially responded to the spread of diseases in March 1916 by attempting to reinforce labor discipline and restrictions on leaving the construction site to

111 Nachtigal, *Die Murmanbahn 1915 bis 1919*, 50, 84-86.
114 GAMO, f. I-72, op. 1, d. 33, l. 65 and Nachtigal, *Die Murmanbahn 1915 bis 1919*, 87.
seek medical help. Considerable numbers did flee; some preferred to take their chances
with the eastern front instead of with the northern environment. Finally, during the first
evacuations from the area in the summer of 1916, a large influx of laborers also arrived to
complete the line. At this point the condition of the POWs grew into a diplomatic
dispute and the Central Powers used threats and limited acts of reprisal to secure the
evacuation of many POWs from the Murmansk railroad by the autumn of 1916.

A particularly illustrative episode of militaristic modernization occurred on the
Kola Peninsula at a subsidiary project of the Murmansk railroad. Here we see how
natural obstacles stymied construction and negatively affected human well-being. In
March 1916, the Naval Ministry contracted the Murmansk railroad administration to
build a military port at Iokanga on the eastern end of the Murman coast. A lack of
adequate supplies and food greeted the workers sent to build the facility. The on-site
engineer responsible for the Iokanga port wrote desperate telegrams outlining the
conditions in the summer of 1916: the workers slept in wet clothes in the cold; they had
no accessible wood to use for fuel; they were falling ill from parasites; and they lacked
sufficient food. The engineer purchased reindeer hides and venison to attempt to
ameliorate the situation. However, a strike broke out in the middle of October and the
leaders of the project made arrangements to evacuate the port for the winter. When
explaining the halt in construction, officials repeatedly referred to the “climatic
conditions” of the winter, in particular the “frosts, fogs, and short days.” The efforts of
the Provisional Government the next year to operate the construction of the Iokanga base
more humanely failed to prevent a scurvy outbreak and the need to abandon the port
during the winter.

The diplomatic conflict between the Central Powers and the Russian Empire over
the POWs on the Murmansk railroad opened way for expression of different sides of the

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116 GAMO, f. I-72, op. 1, d. 33, l. 50.
118 Nachtigal, Die Murmanbahn 1915 bis 1919, 97-123.
119 GAMO, f. I-72, op. 1, d. 2, ll. 12-14, 16-17.
120 GAMO, f. I-72, op. 1, d. 3, ll. 15-19, 29, 37, 112, 137-138.
121 GAMO, f. I-72, op. 1, d. 3, ll. 119, 158.
122 GAMO, f. I-72, op. 1, d. 3, ll. 153, 166.
123 GAMO, f. I-72, op. 1, d. 4, ll. 62, 99.
124 GAMO, f. I-72, op. 1, d. 3, ll. 394, 417-423 and GAMO, f. I-72, op. 1, d. 4, l. 161.
conquest of nature ideology. In large part the tsarist government attempted to respond to the grievous conditions on the line out of fear of reprisals against their own POWs. In addition to their chaotic attempts to evacuate some of the sick, part of this effort included wartime propaganda to portray more benevolent construction practices that accommodated natural limitations. For instance, an official government publication discusses how the polar day posed a perilous threat to Muslim workers who were observing a summer Ramadan fast, when they could only eat after the sun set. In response personnel on the railroad had these individuals transferred to a section further south so they would have a brief window for eating. Whether or not it was true, evocation of this story aimed to emphasize rational and flexible human control over nature. The most positive theme of the conquest of nature that emerged in the aftermath of public knowledge about the POWs on the line was the representation of both the prisoners and nature as transformed allies. Leading up to a sympathetic account of an Austrian POW who now cursed the Germans for starting the war, one journalist also flipped the logic of northern nature as an enemy. “But here in the North the winter helps the summer and the summer helps the winter,” wrote the author, explaining that the summer allowed for access to materials for erecting embankments and bridges and the winter provided strong ground to reach less accessible sections.

_The Murmansk Railroad as a War Zone_

Months after the announced completion of the Murmansk railroad, the tsarist regime ceased to exist. The socialist revolution of October 1917 followed the liberal one in February. The Civil War that came the next year turned the Kola Peninsula into part of the northern front of this conflict. The efforts of various powers—the Provisional Government, the Bolsheviks, the White Army, and British, American, and French forces—to exert authority over this area included repeated attempts to bring the line up to operating condition. The status of the Kola Peninsula as a war zone inhibited the replacement of temporary structures with permanent ones and made the line largely

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125 Nachtigal, _Die Murmanbahn 1915 bis 1919_, 90-106.
126 _Murmanskaiia zheleznaia doroga_, 72.
nonfunctional by the end of the conflict. The wartime economic practices of these international and ideologically diverse actors shared certain common features: continued use of POW labor; hasty and chaotic approaches to immediate difficulties; a pattern of shortsighted and destructive nature use; and an antagonistic view toward the northern environment. These common practices among revolutionary Russian liberals and socialists, internal opponents of the Bolsheviks, and the ambivalent Allied Powers reveal the overarching impact of the military imperatives of this economic modernization over specific political ideologies.

The decision of the Provisional Government to prolong the First World War influenced the continuation of practices on the Murmansk railroad that had been disavowed. Journalists writing exposés on the brutal construction of the railroad and government ministers now overseeing the line evoked the February Revolution as a transformative break with the disgraced tsarist regime. The new port city of Romanov-Murman was renamed Murmansk in April 1917. However, throughout the year and into the era of Bolshevik rule, the government continued to employ large numbers of POWs to work on the Murmansk railroad. The deprivations these prisoners faced again led to scurvy outbreaks. The railroad administration attempted to manage the situation and keep the road operating by using familiar tactics such as regulating food prices, imposing sanitation rules, soliciting limited medical help, and trying to enforce discipline and surveillance over workers and prisoners. The intensified efforts to clean and disinfect the train wagons, stations, and material storehouses speak to the effects of the human pollution in making these places filthy and, in turn, keeping people vulnerable to bacterial diseases. The “difficult climatic conditions” once more convinced authorities

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129 Surozhskii, “Kak stroilas’ Murmanskaia zheleznaia doroga,” Letopis’ 11, no. 7-8 (July-August 1917): 232-244 and GAMO, f. I-72, op. 1, d. 1, l. 165.
130 GAMO, f. I-72, op. 1, d. 1a, l. 232 and Khabarov, Magistral’, 32.
131 Nachtigal, Die Murmanskern 1915 bis 1919, 139-173; Grazhdanskaia voina na Murmane glazami uchastnikov i ochevidtsev: sbornik vospominanii i dokumentov (Murmansk: Murmanskoe knizhnoe izdatel’stvo, 2006), 24-26; GAMO, f. I-72, op. 1, d. 4, l. 161; and GAMO, f. I-72, op. 1, d. 13, ll. 5-6, 55.
132 GAMO, f. I-72, op. 1, d. 1, ll. 165, 181-183, 191; GAMO, f. I-72, op. 1, d. 1a, ll. 86, 120; GAMO, f. I-72, op. 1, d. 16, l. 86; GAMO, f. I-72, op. 1, d. 1b, l. 186; GAMO, f. I-72, op. 1, d. 17, ll. 96, 98, 174-177; GAMO, f. I-72, op. 1, d. 14, ll. 3, 31, 152; GAMO, f. I-72, op. 1, d. 4, ll. 67-68, 161, 180; GAMO, f. I-72, op. 1, d. 33, ll. 128-131; and GAMO, f. I-72, op. 1, d. 13, ll. 5-6.
133 GAMO, f. I-72, op. 1, d. 1a, l. 86; GAMO, f. I-72, op. 1, d. 1b, l. 186; and GAMO, f. I-72, op. 1, d. 17, ll. 96, 98, 174-177.
to abandon work on the Iokanga base for the winter.\textsuperscript{134} Rampant de-forestation persisted and again under-fed and unsheltered livestock perished.\textsuperscript{135} From the time the Bolsheviks gained control of the government in November 1917 to the Treaty of Brest-Litovsk, which ended the country’s involvement in World War I in March 1918, they managed the railroad similarly.\textsuperscript{136} Some POWs remained on the Murmansk railroad through the spring of 1918.\textsuperscript{137}

The road then turned into a war zone during the Russian Civil War. British marines first landed in Murmansk with the initial acceptance of Bolshevik leaders immediately after the signing of the peace treaty of Brest-Litovsk. The Allied forces officially sought to protect large stores of munitions and the railroad line there from a potential Central Power invasion, but had tentative plans to confront the Bolsheviks if the conflict unraveled in particular ways. With the support of the Murmansk Regional Soviet, which disobeyed orders from the Bolsheviks in the center to terminate cooperation in the spring of 1918, large forces of foreign troops intervened the following summer. Increasingly ambivalent about being involved in the Civil War after the November 1918 armistice ended World War I, the foreign interventionists, including specific American military companies focused on maintaining the Murmansk railroad, remained in the area until the fall of 1919. The Bolsheviks then captured the Kola Peninsula in February and March 1920 after the remaining anti-Bolshevik forces retreated.\textsuperscript{138} A prominent part of the military confrontation in the region during the Russian Civil War was the repeated bombings of railroad bridges by the Red Army and the repair of them by the Allies.\textsuperscript{139}

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\textsuperscript{134} GAMO, f. I-72, op. 1, d. 3, l. 394.
\textsuperscript{135} GAMO, f. I-72, op. 1, d. 4, l. 180 and Kiselev, Kol’skoi atomnoi – 30, 10.
\textsuperscript{136} GAMO, f. I-72, op. 1, d. 1a, ll. 120, 139, 163 and GAMO, f. R-488, op. 1, d. 15, ll. 8, 31-32, 42, 53, 97, 101-102.
\textsuperscript{137} Nachtigal, Die Murmanbahn 1915 bis 1919, 123 and GAMO, f. R-488, op. 1, d. 13, l. 58.
\textsuperscript{138} Several works of military history review these developments. See George F. Kennan, The Decision to Intervene, 2 vols. (Princeton: Princeton University Press, 1958); David S. Fogelson, America’s Secret War against Bolshevism (Chapel Hill: University of North Carolina Press, 1995); Ilya Somin, Stilborn Crusade: The Tragic Failure of Western Intervention in the Russian Civil War 1918-1920 (New Brunswick: Transaction Publishers, 1996); and Robert L. Willett, Russian Sideshow: America’s Undeclared War (Washington, DC: Brassey’s, 2003). Also see Grazhdanskaia voïna na Murmane glazami uchastnikov i ochevidcev; Maynard, The Murmansk Venture; RGASPI, f. 67, op. 1, d. 27, ll. 1-33; NARA, RG 120, Boxes 1-3; and NARA, RG 182, Boxes 1594-1597.
\textsuperscript{139} Willett, Russian Sideshow, 131-138; GAMO, f. R-621, op. 1, d. 22, ll. 49-50; GAMO, f. R-397, op. 1, d. 2, l. 2; GAMO, f. R-397, op. 1, d. 8, ll. 9, 33; and GAMO, f. R-397, op. 1, d. 30, l. 18.
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All sides involved in the Russian Civil War treated the natural environment as a wartime obstacle and expressed elements of the conquest of nature ideology. Coordinating first with the socialist government under the renowned former revolutionary, Nikolai Chaikovskii, in Arkhangel’sk and then with the White leader in the north, General Evgenyi Miller, the Allied Powers effectively ruled the Kola Peninsula during the first years of the Civil War. They imposed their own food rationing system on Murmansk, not just for their troops but also as a means of gaining and maintaining the loyalty of the local population. Due to greater available provisions in these countries, the Allies succeeded in obtaining enough to feed the population in spite of delays and conflicts between the British and American governments about the issue. Delivery of food beyond Murmansk remained difficult because of natural factors. The frozen waters made Arkhangel’sk inaccessible and caused much alarm within the U.S. government, particularly about the women who had to deal with the harsh climate. The military sought to use the Murmansk railroad to bring supplies down to the White Sea coast, but the spring thaws flooded and destroyed much of the track and made it unreliable. Such impediments fostered deprecating discussion of the environment. One American soldier, who worked on repairing the Murmansk railroad and in general described the region as “bleak and dreary,” joked in a letter home: “The only excitement to-day was a train leaving for Murmanska. We call it the North Pole Limited or the Tri-weekly. It goes up one week and trys (sic) to get back the next.” At the same time the ideas of the Allies about the harsh Kola environment could reflect the “conquest of nature” in a way that emphasized the defensive security it provided. A pamphlet of the American War Department given to soldiers noted that the “topographical conditions of the Murman region are such that in the north an enemy would have little chance of seizing the railroad.”

The Bolshevik forces on the southern part of the Murmansk railroad faced more miserable conditions during the Civil War. Desperate to supply other areas of the country

141 NARA, RG 182, Box 1594.
142 NARA, RG 120, Boxes 1-3, [Letter from W. Delano Osborne, February 21, 1919].
143 NARA, RG 120, Boxes 1-3, [Situation in North Russia Theater, February 26, 1919], 9.
144 Bentley Historical Library, Polar Bear Collection, Harry Dunck Papers, 40-41.
145 Bentley Historical Library, Russia Route Zone A, 22.
with fuel but lacking skilled cadres of loggers and necessary equipment, the “Office of Forest and Peat Development” of the Murmansk railroad carelessly ravaged the Karelian forests in an attempt to meet immediate needs. Despite continued difficulties transporting the wood, felling went well beyond what had been intended.\textsuperscript{146} Agents at the railroad referred to the trees as “inexhaustible forest resources” and the People’s Commissariat of Transport re-defined “rational” forestry as using “heroic measures” to obtain the most wood possible.\textsuperscript{147} After capturing the Kola Peninsula in early 1920, officials now sought to use all wood available just to operate the trains and bring food provisions to the famine-stricken area. This wartime pillaging responded, of course, to military needs and produced a level of chaos that undermined the prerogatives of economic modernization in the immediate term and created vulnerability to famine and disease among the population. Complaining about the rationed norms days before the Civil War ended in the north, one engineer on the Murmansk railroad wrote: “This is a real famine emerging among the population and the railroad workers (more than 60% of their families live in horror).” He also predicted yet another scurvy outbreak.\textsuperscript{148}

In the midst of the conflict, the Reds and the Whites and their allies responded to difficult circumstances in comparable ways. They both treated captured prisoners brutally: the Bolsheviks renewed the use of POWs on the railroad and the White Guard sent individuals to a prison at Iokanga in the fall of 1919, where 100 people died.\textsuperscript{149} While the Allies worried about spring thaws, the Bolsheviks encountered snowdrifts and avalanches in their attempt to keep their portion of the railroad operating.\textsuperscript{150} Here it is clear that the actual difficulties caused by snow during these desperate times inspired more aggressive descriptions of northern nature. The appropriate response to the “distressing situation” created by the inability to manage snow was “to combat snow drifts.”\textsuperscript{151} Such economic actions and the responses to a recalcitrant environment expose

\textsuperscript{146} GAMO, f. R-483, op. 1, d. 2, ll. 2-6, 21-25, 29-32, 42, 169-171; GAMO, f. R-483, op. 1, d. 3, ll. 6, 16-20, 31-38, 53-54, 61-62; GAMO, f. R-483, op. 1, d. 36, ll. 3-5, 13-16; GAMO, f. R-483, op. 1, d. 94, ll. 11-12; and GAMO, f. R-483, op. 1, d. 100, ll. 1-4, 26, 30, 36-38, 94, 115-120, 138, 141-142.

\textsuperscript{147} GAMO, f. R-483, op. 1, d. 2, l. 21; GAMO, f. R-483, op. 1, d. 3, l. 61; and GAMO, f. R-483, op. 1, d. 100, l. 138.

\textsuperscript{148} GAMO, f. R-621, op. 1, d. 22, l. 32.

\textsuperscript{149} GAMO, f. I-72, op. 1, d. 1a, l. 271 and A. A. Kiselev, “GULAG na Murmane: Istorii tiurem, lagerei, kolonii,” Sovetskii Murman (October 7, 1992), 3.

\textsuperscript{150} GAMO, f. R-621, op. 1, d. 22, l. 32.

\textsuperscript{151} GAMO, f. R-621, op. 1, d. 22, ll. 18ob, 67ob.
the common pattern of militaristic modernization practiced by the different governments involved in the construction and early operation of the Murmansk railroad.

The Stalinist Embrace of Militaristic Modernization and the Conquest of Nature

The Soviet government in the 1930s embarked on one of the most rapid and disruptive episodes of industrialization ever undertaken. While officially justified as a step toward socialism, the practices of Stalinist industrialization closely resembled the militaristic modernization of the construction of the Murmansk railroad. Though the threat of war lingered over the 1930s, no immediate conflict accounted for the embrace of chaotic economic development masked by a veneer of state planning. The rationale of the Stalinist state for pursuing these modernization practices will be addressed in the following chapters.

The resemblances between the impact of railroad construction in the far north on people and nature during World War I and the Russian Civil War and during Stalinist industrialization are striking. Determined to meet breakneck goals of rapid construction, projects went forward with inadequate supplies, provisions, and labor. In part as a means of overcoming a dearth of construction materials, industrialization relied on improvident and environmentally destructive uses of local natural resources, which made little economic sense outside of a context of wartime necessity. Continuing a tradition of using prisoner labor to build railroads that extended at least back to the Trans-Siberian railroad of the early twentieth century and became entrenched during World War I, almost every new railroad branch on the Kola Peninsula until the death of Stalin in 1953 relied on some form of coerced labor: Gulag prisoners, forced peasant migrants known as special settlers, and POWs. The decisions to rely on marginalized and coerced labor in the


pursuit of hasty modernization led to the acute vulnerability of these under-provisioned and barely sheltered workers to natural elements.

The era of Stalinist industrialization also saw a renewal of the aggressive articulation of the conquest of nature ideology. Expressions such as the “struggle with nature” and “the conquest of nature,” which attempted to narrate industrial activity as a military campaign, pervaded popular sources in the 1930s. One Soviet propagandist echoed the forceful descriptions of the tsarist government during the construction of the Murmansk railroad when he wrote about socialist industrialization in the Khibiny Mountains: “the railroad and the automobile, electricity and radio, scientific thought, and Bolshevik perseverance regenerated this ‘land of fearless birds.’” Fersman depicted these early road construction efforts in the Khibiny Mountains in similar language.

The initial return to militaristic modernization occurred with the establishment of an enterprise, the Apatit trust, focused on the mining and processing of the phosphorous-rich material apatite for chemical fertilizers and the accompanying socialist city of Khibinogorsk (later Kirovsk). Upon the final decision to begin the project in September 1929, Soviet planners ordered the construction of a railroad branch connecting the mainline of the Murmansk railroad to the new worksite in the Khibiny Mountains. At the outset, they scheduled the new branch for completion by August 1930 and specified that the labor could come from inmates of the Solovki prison camp. By the end of 1930 about 2,000 prisoners worked on the railroad as the harsh winter approached and the project, like most of the construction in the Khibiny Mountains in these years, languished behind schedule. Similar diseases broke out among the workers as during the construction of the Murmansk railroad—typhus, tuberculosis, and scurvy—because of

\[restukturizatsiia gornodobyvaiushchei promyshlennosti Pechengskogo raiona Murmanskoi oblasti\]
(Murmansk: Murmanskii gumanitarnyi institut / Barents tsentr issledovanii, 2004), 12-15.

154 For example, Khibinogorskii rabochii (October 18, 1932), 1; Fersman, Tri goda za poliarnym krugom, 3; Fersman, Novyi promyshlennyi tsentr SSSR za poliarnym krugom, 5-7, 47-48; B. Vishnevskii, Kamen’ plodorodia (Moscow/Leningrad: Partiinoe izdatel’stvo, 1932). M. M. Kossov and B. I. Kagan, “Severnii gorno-khimicheskii trest Apatit vo 2-m piatiletii,” Karelo-Murmanskii krai, no. 3-4 (1932), 14; and G. Geber, M. Maizel’, and V. Sedlis, eds., Bol’shevikey pokedyi tundru (Leningrad: Izdatel’stvo pisatelei v Leningrade, 1932).


158 GAMO, f. 773, op. 1, d. 1, ll. 318-319.
the unhygienic environment and natural deprivations.\textsuperscript{159} Furthermore, when approximately five thousand Gulag prisoners—a number of whom built a road to Ena—arrived at the site of the future mining city of Kovdor, they quickly chopped down all the trees in the area to set up camp and shelter.\textsuperscript{160} Throughout the early 1930s, the Murmansk railroad itself also remained tangentially dependent on a different group of forced laborers for its most significant upgrade of the era. Forced peasant migrants, who had been subject to de-kulakization (“special settlers” in Soviet terminology) and faced conditions comparable to the Solovki prisoners, built the Niva Hydroelectric Station that enabled electrification of the sections of the railroad.\textsuperscript{161}

The construction of an extension line from the Murmansk railroad to an emerging center for nickel mining and smelting, Monchegorsk, also reveals how this development model and the ideology of conquering nature affected Stalinist industrialization. In August 1935, the newly established Severonikel’ combine contracted with the fourteenth department of the White Sea-Baltic Combine (BBK), a Gulag organ, to build a line from the new nickel works to the Olen’ia railroad station north of Lake Imandra.\textsuperscript{162} Economic planners initially hoped to have the line operational by November 1935, but work dragged on into the summer of 1936. The prison camp leaders declared the project finished in April 1936, but the road was still unusable and workers from the Severonikel’ combine needed to repair it over the next several months.\textsuperscript{163} The several thousand prisoners who labored on the railroad during 1935-1936 faced horrendously insufficient supplies of equipment, food, and housing. The administration of the fourteenth department of the BBK primarily provided military tents as housing, which required

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\textsuperscript{160} Kiselev, “GULAG na Murmane,” \textit{Sovetskii Murman} (October 13, 1992), 3.


\textsuperscript{163} GAMO, f. 773, op. 1, d. 53, ll. 15-16; GAMO, f. 773, op. 1, d. 63, ll. 110, 248-252; GAMO, f. 773, op. 1, d. 62, ll. 160, 385-389; and GAMO, f. 773, op. 1, d. 64, ll. 191-194, 236-237.
\end{footnotesize}
prisoners to sit and lie directly on the snow. One prisoner bitterly described these accommodations: “it was as filthy in them as a barnyard and often there was no hot water.”\textsuperscript{164} Food rations for them were unreliably shipped to the camps from Kola. The cold, filth, and lack of nutrition took its toll as apparently almost a tenth of the prisoners working on the railroad line perished.\textsuperscript{165}

Interaction with the surrounding environment during the founding of this railroad mirrored wartime construction as well. Workers quickly chopped down any trees nearby to clear space for the track, supply firewood, and use as sleepers for the road. They also gathered sand along the road to erect embankments for the roadbed.\textsuperscript{166} This nature use hastily transformed the environment, but failed to adequately construct the road. The lack of material used for the roadbed and insufficient number of sleepers resulted in such sloppy construction that the spring thaws quickly destroyed the railroad.\textsuperscript{167} The irate head of \textit{Severonikel’}, Vasilii Kondrikov, described how nature retaliated in this instance: “The situation with the railroad branch is very distressing: the snow came off and clearly revealed the disgraceful work of the fourteenth department on the line. In essence there is no branch since along almost the entire length it proceeds at ground level and through swamps.”\textsuperscript{168} Approached as an object of urgent conquest, the natural world demonstrated its resistance to manipulation when haphazardly treated.

Finally, the militarization of the regional economy in the years approaching World War II and the rebuilding of it after wartime devastation continued this pattern. The application of Gulag labor for assorted railroad repair and construction projects increased with the outbreak of the Winter War between Finland and the Soviet Union in late 1939 and remained the norm in the 1940s and early 1950s.\textsuperscript{169} Additionally, prisoners of war during and after World War II helped with a variety of construction projects, including work on railroads and the redevelopment of the Pechenga region.\textsuperscript{170} Efforts to

\textsuperscript{164} Quoted in Kiselev, “GULAG na Murmane,” \textit{Sovetskii Murman} (October 22, 1992), 3.
\textsuperscript{165} Kiselev, “GULAG na Murmane,” \textit{Sovetskii Murman} (October 22, 1992), 3.
\textsuperscript{166} Eremeeva, “Stroitel’stvo kombinata ‘Severonikel’,” in V. P. Petrov and I. A. Razumova, eds., \textit{Etnokul’turnye protsessy na Kol’skom Severe}, 91.
\textsuperscript{167} GAMO, f. 773, op. 1, d. 63, ll. 250-252 and GAMO, f. 773, op. 1, d. 62, l. 387.
\textsuperscript{168} GAMO, f. 773, op. 1, d. 62, l. 160.
\textsuperscript{170} Rautio and Andreev, \textit{Sotsial’naiia restrukturizatsiia gornodobyvaushchei promyshlennosti Pechengskogo raiona Murmanskoi oblasti}, 12-15; Eremeeva, “Stroitel’stvo kombinata “Severonikel’,” in
lay down a railroad line to link the nickel deposits of the Pechenga territory to the mainline of the Murmansk railroad commenced in the early 1950s, but yet again the natural conditions of the region—the rocky and swampy landscape and seasonal fluctuations in weather, which undid previous work—caused significant delays. In this case the lines connecting the Pechenga region to Kola only opened at the end of 1960.\textsuperscript{171} The end of the Stalinist era, nevertheless, brought reprieve from this arduous modernization strategy that had been innovated during World War I and revamped in the 1930s.

Modernization based on conquering natural environments and transforming them with militaristic practices led to atrocious results for humans and nature in projects ostensibly aimed in part at development and improvement. In partial contrast to colonization efforts, militaristic modernization entailed a vicious cycle of reckless nature use, environmental impediments thwarting human economic activity, and the increased articulation of antagonistic environmental ideologies. The conquest of nature as an idea predated the First World War, but as inspiration for militaristic modernization it grew out of the context of total war. Numerous sides participated in the creation of these policies during the war, but the Soviet Union under Stalin adapted them to peacetime modernization. However, it was militarism, and not technocratic statism exacerbated during wartime, that exerted a deeper influence on the environmental and economic practices of Stalinism.

\textbf{Conclusion}

Commonalities in economic development strategies and practices united late imperial Russia and the Soviet Union, as seen in the case of railroads on the Kola Peninsula. These similarities did not emerge out of deep-seated authoritarian politics or out of inherent inclinations of socialism, but instead out of a combined conviction in the necessity of rendering the economy modern and in military prerogatives. Imperialistic urges for colonization and development fed into hasty industrialization justified by war or

the fear of war. However, disaggregating technocratic statism and militaristic modernization helps explain the varied outcomes shared by the early twentieth century and the 1920s and common to the World War I era and Stalinism.

A focus on the environmental ideologies that accompanied these modernization projects demonstrates diversity within utilitarian approaches to nature that took the natural environment purely as an economic asset. It also shows how the environment did not simply play a passive role in human culture; the physical difficulties it posed intensified the hostility towards nature present in modernist ideas. The results of pursuing the conquest of nature were clearly worse for people and the environment in the short term, but, as we will see, the totalistic view of natural resources in the colonization of nature ideology may have had a more profound effect on the economic use of the environment in the long run.
Chapter 2. Stalinism as an Ecosystem

The Stalinist construction of socialist cities organized the relationship between human beings and the natural environment in specific ways. As part of the project of building socialism in one country and as a key feature of the social, political, and economic system known as “Stalinism,” industrial towns have served as sites of micro-historical analysis for scholars interested in examining the social history of the Soviet Union. Beyond excavating socialist cities for insights into how the Stalinist system functioned as a civilization, this chapter examines the multifarious relations among people and other elements of nature during the forced modernization of the 1930s. I insist that the Stalinist system possessed a deep and intricate relationship with the environment. I also argue that Stalinism was an extreme method of creating a modern economic relationship with the environment that simultaneously strove for a new level of ascendance of humans over nature and for socialist harmony among humans and their environment.

In the previous chapter we saw that the Russian Empire was already apt to use coerced labor and exploit natural resources carelessly in order to complete pressing industrial projects in peripheral places. An environmental ideology that stressed the conquest of nature accompanied both the wartime construction of the Murmansk railroad and the building of railroad branches in the 1930s and 1940s. Beyond the commonalities, what, then, distinguished this Stalinist variant of militaristic modernization? As many scholars have noted, this important period in Soviet history combined a renewed revolutionary zeal, chaotic attempts at centralized planning, and coercive solutions to supplying labor for industrialization. The infusion of revolutionary enthusiasm into

militaristic economic practices led to an approach to the environment that eclipsed technocratic statism and militaristic modernization. Instead of just colonizing and conquering nature, the Stalinist state also aspired to transform environments to fit a vision of holistic socialism. Accordingly, Stalinism cannot be characterized by pure hostility toward nature. State planners grappled with trying to make the natural world more economically useful and suitable for human settlement, while also hoping to prevent excessive destruction of nature. Nevertheless, this militant attempt to turn inhospitable natural environments into realms where humans and nature can abide in harmony precipitated new social and environmental tragedies.

This examination of the creation of an enterprise to mine and process apatite-nepheline ore and the accompanying socialist city of Khibinogorsk (Kirovsk after December 1934) on the Kola Peninsula endeavors to treat Stalinism as an ecosystem instead of just as a civilization. The civilization approach to understanding the Stalinist Soviet Union began to be elaborated in the 1990s by historians who benefited from greater access to the primary sources of social history. Stephen Kotkin’s study of the socialist city of Magnitogorsk argues against interpretations that claimed that Stalinism was simply a form of despotism or the result of counter-revolution. Instead, he defines it as “a specifically socialist civilization based on the rejection of capitalism.” In order to understand the system’s social history, Kotkin positions the Soviet project as a radical new embodiment of the European Enlightenment and insists on the relevance of Foucauldian power dynamics. His concentration on the minutiae of daily life and use of micro-history unite his approach with other historians of Stalinism, who sometimes diverge on interpretative issues but share Kotkin’s concern with understanding Stalinism


as a specific type of society. For the most part, this scholarship either eschews environmental issues or treats them as evidentiary support for social, political, or cultural analysis instead of as a primary realm of investigation.

I use the concept of an ecosystem to capture the web of interaction among the actors: people, other living organisms, climate, geological processes, and inanimate matter. Though this borrowed term from ecology might seem imprecise in this work of environmental history, it serves my analysis here in two important ways. First, it shifts the discussion toward the totality of a natural system in a given area, pointing to issues beyond pollution, environmental management, and conservation efforts in the history of this enterprise and city. I will highlight human health and habitat, population dynamics, seasonal variation in climate, the properties of mined material, and local flora and fauna as inherently environmental features of this history. This inclusive focus encompasses all aspects of a “civilization” approach and adds unaddressed factors especially pertinent for understanding the creation of a new industrial world. The term ecosystem also allows me to stress the potency of nature as a set of actors without digressing into debates about nature’s agency. Instead, I assume that in a natural system all beings and forces act on, influence, and modify each other.

This discussion of the political ecology of Stalinism focuses on the era of the first and second five-year plans (1928-1937). I trace the emergence of a Stalinist form of modernization in the Khibiny project and analyze the place of the environment in urban and industrial planning and in the culture of socialist construction. I also probe how the natural world shaped the social experience of participants in this industrial project. The

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later sections of the chapter address the strategies of enterprise planners to confront environmental impediments and curb pollution. Finally, I show how these Stalinist efforts to create environmental harmony often failed to come to fruition.

The Discovery of Apatite

Geological processes created the Khibiny Mountains and supplied them with the phosphorous-rich material apatite, but humans sought to convert this rock formation into a source for realizing economic modernity. This process began with the scientific exploration of the area that eventually led to the opening up of large veins of apatite-nepheline ore in several of the mountains of the massif. This form of learning about the natural world and promoting the potential wealth of resources fit squarely within the colonization approach to the environment that had been innovated by late imperial technocrats. The activities of geologists in the 1920s also later functioned as foundation myths of the heroic feats of regional pioneers.

Foreign scientists began exploring the Khibiny Mountains in the nineteenth century, but focused more on geological questions than the potential uses of minerals like apatite. Apatite is a form of calcium phosphate (\(\text{Ca}_5(\text{PO}_4)_3\)) with an extra ion of fluorine, hydroxyl (OH), or chlorine. Along with other types of mineral ore and bat guano, apatite could be processed into a material called superphosphate and used as a chemical fertilizer. Until the proliferation of nitrogen-fixating technologies after World War II, superphosphate was the dominant product of the chemical fertilizer industry worldwide.\(^5\) In the late nineteenth century researchers from abroad proposed a rough date for the origin of the Khibiny Mountains and described the crystallization process of the pervasive nepheline-syenite rock. After these initial endeavors, geological research on the Khibiny halted in the first couple of decades of the twentieth century.\(^6\)

After the Bolshevik victory over White Army forces and their foreign allies in northwest Russia in the first months of 1920, scientists with a longstanding interest in putting their sophisticated knowledge to practical economic use for the state renewed

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geological surveying on the Kola Peninsula. In May of that year the Petrograd Soviet Executive Committee formed a commission of the Academy of Sciences to inspect the postwar condition of the Murmansk railroad. During a brief trip with the commission up to the Kola Peninsula, Aleksandr Fersman became excited at the presence of unknown minerals in the Khibiny Mountains. Soon after returning he arranged a full geological expedition of the massif.\(^7\) This surveying of the Khibiny region in the fall of 1920 commenced a period of intensive study of the range's mineral resources and would eventually lay the groundwork for the industrialization of the Kola Peninsula.

Fersman was a moderately progressive intellectual from the liberal tradition of imperial Russia. His academic advisor, collaborator in geochemical research and public service, and lifelong interlocutor, Vladimir Vernadskii had helped form the Constitutional Democrat Party (Kadets) during the 1905 Revolution and remained an active member through the November 1917 Bolshevik takeover.\(^8\) Despite their occasionally fierce opposition to the autocracy of tsarist Russia and the socialism of the Soviet era and their preference for capitalist democracy, scientists with such liberal proclivities tended to be technocratic statist. They supported modernization guided by a beneficent government and believed in their personal obligation to use their expertise to assist national interests. Accordingly, starting in 1915 Fersman helped organize expeditions to locate militarily strategic mineral deposits during the First World War. He continued his willingness to find practical applications for his mineralogical knowledge, especially when it could help fund fieldwork, almost without interruption into the Soviet era.

During the early 1920s, the Fersman expeditions discovered large sections of green apatite ore on Mount Kukisvumchorr and Mount Iuksporr of the Khibiny Mountains. The quantity of the material remained a mystery, but its potential utility as a

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\(^8\) Kendall E. Bailes, *Science and Russian Culture in an Age of Revolutions: V. I. Vernadsky and His Scientific School, 1863-1945* (Bloomington: Indiana University Press, 1990), 81. While the precise contours of Fersman’s pre-revolutionary political views and their exact similarities with Vernadskii’s are difficult to trace, it is worth at least noting that Vernadskii felt comfortable expressing his disillusionment with the course of events in 1917 and 1918 in his letters to Fersman. M. I. Novgorodova, ed., *Neizvestnyi Fersman: 120-letiiu so dnia rozhdeniia A. E. Fersmana posviashchaetsia* (Moscow: EKOST, 2003), 89-93.
source for phosphoric acid was immediately apparent to the researchers. Soon afterward, a new stage of research began that was more focused on assessing the capacity of these apatite deposits. The results of this surveying rapidly increased the estimates of the apatite reserves in the Khibiny and opened new deposits. After an expedition in 1928, the agencies involved in the project unanimously agreed about the industrial significance of the apatite deposits. Simultaneously, experiments with apatite samples from the Khibiny established the ability to enrich the ore to above a 36% concentration of phosphorous pentoxide (P$_2$O$_5$), the active substance in superphosphate fertilizers.

The reflections of geological surveyors in the Khibiny Mountains at the time contributed to what would become a local cult of scientific explorers in later periods. Boris Kupletskii characterized the region during a 1922 trip with the following stanza: “The landscape is dejected. Severe nature / Only provided the north with dull tones: / Scorched forest, a boulder, sad marshes, / Melancholic rain and a dim moon.” Another researcher, A. N. Labunstov, evoked the natural calamities of the area when describing how his team overcame “Khibiny weather” in August 1925 by huddling in their cold tent during a frigid summer downpour. In addition to highlighting the struggle of these scientists with hardship, he also publicly insisted that “Khibiny apatite” and other minerals of the range would serve “as a new factor in the colonization and revival of the Murmansk Region.”

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The Creation of a Stalinist Enterprise

The turn from studying the Khibiny to mining and processing phosphates for fertilizer there occurred as part of the Soviet Union’s massive campaign to create a modern economy and propel the country closer to socialism and communism. In 1928-1929 a political-economic system called Stalinism emerged in the Soviet Union. Billed as the “great break,” the Stalinist revolution ushered in the first five-year plan and the collectivization of agriculture. Initial plans for the industrial and urban development of the Khibiny region were modest, but expanded, in Fersman’s words, to “an unprecedented scale for work undertaken in a polar realm.”16 The evolution of Soviet designs for the area involved decisions to build an entire socialist city in the region, a willingness to use forced laborers, bureaucratic disputes connected to national politics, and an expansive vision of natural resource use.

Several of the economic and regional factors surrounding the advent of Stalinism carried special relevance for the creation of a chemical industry in the Murmansk region. The New Economic Policy of the 1920s in many ways helped the country’s economy recover, but agricultural production remained depressed. The lack of grain surpluses hindered the growth of foreign trade and the ability of the state to fund industrial development.17 This situation influenced the decision to mine Khibiny apatite by creating strong incentives to reduce imports (the Soviet Union had been importing superphosphate from Morocco) and increase fertilizer consumption as a means of improving agricultural yields.18 In terms of spatial organization, the Khibiny region enjoyed several features that appealed to industrial planners, despite its location in the sparsely populated polar tundra. Above all, its proximity to a functioning railroad line that connected it to Leningrad and the Murmansk port rendered it a cheaper source of phosphorous material than other deposits. The administrative organization of the territory also made it an ideal place to treat as an extraction colony. After the Civil War the Kola Peninsula became its own independent regional unit, the Murmansk province (guberniia), but in 1927 it was

18 Acknowledgement of these factors appears in RGAE, f. 3106, op. 1/2, d. 367, ll. 62-81.
downgraded to a county (okrug) of the Leningrad region (oblast'). Under this jurisdiction, the Khibiny Mountains could be subjected to the plans of one of the most powerful regional administrations in the country.

Government and scientific planning organs in 1928 and 1929 initially envisioned using the Khibiny exclusively for mining and extracting apatite-nepheline ore with minimal construction of accompanying settlements. With this option on the horizon more geological expeditions raised the confirmed apatite reserves to 90 million tons and research agencies—the Scientific Institute for Fertilizer (NIU) and the Institute of Mechanical Processing of Mineral Resources (Mekhanobr)—devised methods for producing superphosphate from Khibiny apatite. In December 1928, the Supreme Council of the National Economy (VSNKh) outlined a possible first five-year plan for the chemical industry in the Leningrad Region. This document highlighted the expediency of building the superphosphate factory in Leningrad and not “directly at the Khibiny deposits of apatite.” Planners also proposed research on the potential to use the small White River for hydroelectric energy and on the best path for connecting the deposits to the mainline of the railroad. They presumably believed that labor would be supplied by a combination of invigorated colonization efforts of the Murmansk Railroad and continued seasonal hires.

This limited development model was soon replaced with another strategy of modernization that is properly called Stalinist. This shift from simple extraction to the construction of an enrichment factory to produce apatite concentrate and a large accompanying city entailed a different vision of nature use. Instead of peripheral resource extraction predominately for the sake of bolstering the economy of the country overall, this emergent model of modernization sought also to use the minerals of the north as a means of creating a new, ostensibly socialist, urban environment. This type of socialism in theory would feature prosperous workers, who had a thriving modern collectivist culture and lived in accord with their subjugated natural surroundings.

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21. RGAE, f. 3106, op. 1/2, d. 367, ll. 62-79.
The turn to Stalinist modernization began in the fall of 1929 with discussions about moving the proposed enrichment factory to the Khibiny region from Leningrad. It also coincided with a request that the Unified State Political Organization (OGPU, the secret police) arrange a labor force partially based on the Solovki prison camp (USLON). VSNKh rejected the OGPU’s bid for the project; its representatives claimed that the great potential for the chemical industry in the north necessitated oversight by an economic organization and agreed to contract out some labor from USLON. On November 13, 1929, VSNKh, following earlier resolutions by the State Planning Committee (Gosplan) of the USSR and the Economic Council of the Russian Republic (RSFSR), officially created the Apatit trust and appointed Vasilii Kondrikov as its temporary manager. An under-educated but hard-working enthusiast for socialist industrialization, Kondrikov would lead many of the enterprises involved in the economic transformation of the Kola Peninsula until 1937. Conflicts over the basic methods of how to organize the project, how much to fund it, how to supply labor, and how to meet production quotas defined the first year of existence of the Apatit trust. The main sides of these disputes revolved around Kondrikov, who was being supported and tutored by First Party Secretary Sergei Kirov of the Leningrad region and Fersman, and the members of the reputed “right” deviation at the All-Union Association of the Chemical Industry (Vsekhimprom) of the VSNKh, who were in charge of the trust. Vsekhimprom’s leader, Mikhail Tomskii—a Politburo member and the former head of the All-Union Central Council of Trade Unions—opposed Stalin’s plans for forced collectivization and rapid industrialization. Along with Nikolai Bukharin and Aleksei Rykov, Tomskii promoted a more gradual method of

25 GAMO, f. 773, op. 1, d. 1, ll. 18, 22.
26 GAMO, f. 773, op. 1, d. 1, l. 18; Petrova, Salimova, and Podgorniskaia, eds., Kirovsk v dokumentakh i faktakh, 38-39; and “Chast’ ofitsial’naia,” in Fersman, ed., Khibinskie Apatity, vol. 1, 286-291.
28 I. O. Gorelov, Tsugtsvang Mikhaila Tomskogo (Moscow: ROSSPEN, 2000).
economic development that would not have required a total rejection of NEP nor funded industrial buildup by forcefully increasing taxation of the peasantry and reducing real wages for workers.\textsuperscript{29} Kondrikov and his patrons, in contrast, represented the enthusiastic embrace of Stalinist industrialization.

At a meeting of the commission on apatite of \textit{Vsekhimprom} on December 23, 1929, the different factions quarreled about the Khibiny project. At the time the \textit{Apatit} trust had drawn up a plan to mine 400,000 tons of ore and requested a budget of approximately 13 million rubles. Kondrikov annoyed Tomskii by raising the question of the economic viability of processing nepheline tailings when the intended agenda of the meeting was the use of USLON labor. Fersman’s influence here was clear. He had already encouraged Kondrikov to believe that the optimal way to process mineral ore included the maximal conversion of the nepheline-rich wastes into economically valuable substances.\textsuperscript{30} Kondrikov also proposed that by mining on three different mountains at once, they would be able to extract 3.5 million tons by the end of the first five-year plan. The enterprise would construct a hydroelectric dam on the Niva River and an enrichment factory. At this scale the project would require “colonization” of the region and necessitate housing construction and a permanent work force. Kondrikov believed that they could rely on a combination of temporary prison labor from USLON and hired laborers. Tomskii responded to this model of development by rejecting the idea of “colonization” as too expensive and questioning the arrangement of a combined labor force.\textsuperscript{31}

Tomskii’s criticism of Kondrikov’s plan reflected an ideological rift in the Soviet leadership about the correct method of industrialization. Justifying the Stalinist position, Kondrikov argued, “I am a maximalist: either nothing or a very large management. You

\textsuperscript{29} Summaries of the economic debates about how to industrialize that occurred in the late 1920s appear in: Alec Nove, \textit{An Economic History of the U.S.S.R.} (Middlesex: Penguin Books, 1969), 119-135 and Robert C. Allen, \textit{Farm to Factory: A Reinterpretation of the Soviet Industrial Revolution} (Princeton: Princeton University Press, 2003), 47-64. The argument that Stalin-era industrialization was partially funded by reducing real wages appears in much of the economic literature and social history on this era: Abram Bergson, \textit{The Real National Income of Soviet Russia since 1928} (Cambridge, MA: Harvard University Press, 1961); Janet D. Chapman, \textit{Real Wages in Soviet Russia since 1928} (Cambridge, MA: Harvard University Press, 1963); Kuromiya, \textit{Stalin’s Industrial Revolution}; and Filtzer, \textit{Soviet Workers and Stalinist Industrialization}. Recently Robert Allen has challenged this interpretation and claimed that the country had attained a higher standard of living by the eve of World War II than would have been possible without an industrialization strategy that entailed massive investment in heavy industry as a conduit for stimulating the consumer goods sector. See Allen, \textit{Farm to Factory}.


\textsuperscript{31} GAMO, f. 773, op. 1, d. 1, l. 103.
cannot create a small business in the Khibiny, even if you want. We came there not to waste our time on trifles. The Kola Peninsula should be a son of industry.”

This conflict with Vsekhimprom followed Apatit throughout much of the chaotic year of 1930. As the central government retreated somewhat in March from the violent collectivization campaign that it had begun at the beginning of the year, industrial enterprises throughout the country found themselves incapable of obtaining necessary supplies, funds, and labor. The result was that by the middle of the year industrial production in the country had started to decline at a moment intended to be one of massive expansion. Apatit predictably staggered in this period. On February 6, 1930, Vsekhimprom slashed Apatit’s annual budget for 1929/1930 in half. This cut further paralyzed urban planning, ore extraction, and construction of the enrichment factory. In May 1930, however, VSNKh and the Council of Labor and Defense (STO) forced Vsekhimprom to reverse the earlier budget reductions. This restored funding required Apatit to increase its quota of extracted ore for 1929-1930 to 250,000 tons, which it reportedly fulfilled, and to expand to mining one million tons the next year. With the decisions to plan a permanent socialist city and to use de-kulakized peasants for the bulk of the labor force that also came about this year, the basic model for Stalinist modernization in the Khibiny Mountains had overtaken the earlier possibilities for the economic transformation of the northern environment.

Planning a City in the North

The creation of a new urban area where not even a village had existed demanded that planners deal with natural conditions and attempt to organize an ideal arrangement of the necessary infrastructure. During the 1930s the Soviet Union built several of these new industry towns, including Magnitogorsk, Novokuznetsk, Komsomolsk-on-Amur, and others. The construction plans for the city of Khibinogorsk on the Kola Peninsula reveal many of the ambitions for arranging optimal relations with the environment. A look at the

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33 Kuromiya, Stalin’s Industrial Revolution, 137-172.
34 GAMO, f. 773, op. 1, d. 1, ll. 109-141.
35 GAMO, f. 773, op. 1, d. 1, ll. 142-144.
36 GAMO, f. 773, op. 1, d. 1, ll. 144, 312 and V. I. Kondrikov, “Sostoianie i perspektivy stroitel’stva v raione Khibinskikh razrabotok,” Karelo-Murmanski krai, no. 5-6 (1931): 10. A local newspaper announced this new output target of 250,000 tons of mined ore for 1929-1930 before the trust’s budget had been restored. See Poliarnaia pravda (April 25, 1930), 6.
planning process also shows the ways that nature was not passive in the process, but could act and occasionally stymie some attempts at human manipulation.

Some of the earliest proposals for the urban design of the new industrial site overlooked the Khibiny region’s environmental conditions. In what was probably part of Kondrikov’s initial plan to Vsekhimprom, a section on housing construction suggested building half of the living quarters for a 1100-person workforce and their families (3300 people total) during the first year plus an array of infrastructure such as a hospital, school, movie theater, bakery, cafeteria, and other items. Not only did this proposal impractically estimate costs, it would have meant leaving many individuals without adequate housing during the first snowy winter. And this construction would have served only a fraction of the 14,700 who actually lived in the Khibiny at the end of the first economic accounting year in November 1930 when the second cold season began.37

But soon the multifarious environmental factors affecting urban construction attracted greater consideration from planners. In January 1930 a commission began to investigate options for building a “socialist city” for approximately 20,000 workers for the Apatit trust that would have modern cultural-enlightenment and domestic services, free workers from individual economic concerns, and allow room for expansion. Major considerations in choosing a location were access to the worksite, climatic and topographical conditions, and the organization of a sewer system and water supply. The commission evaluated four possibilities: on Mount Kukisvumchorr; in a section of a valley along the Iuksproik River; near the Apatity station of the Murmansk railroad; and on the south side of the Great Vud’aiavr Lake. The option near the main mining site on Mount Kukisvumchorr had particularly poor climatic conditions such as strong winds and snowdrifts and lacked the possibility of arranging a sewage system “without pollution of Vud’aiavr which is the single source of a water supply.” The valley of the Iuksproik River would have similar problems with sewage but would offer protection from pollution winds (stochnykh vetrov). The commission also rejected the idea of building the city at the railroad station because its distance from the mines, despite its superior climatic conditions, made it unacceptable. The commission concluded that a modern socialist city

37 The plan I am referring to was unclearly labeled in the archival file but came immediately before the verbatim report from the December 23, 1929 meeting with Vsekhimprom and included the same figures discussed there. GAMO, f. 773, op. 1, d. 1, ll. 81-82, 318.
on the south side of the Great Vud’iavr would be the most ideal, since three separate mining settlements would be irrational and this location optimized transportation, climatic, and sewage considerations. Acknowledging the strong winds and heavy snow cover in this location, the commission instead chose to emphasize the “comparatively” level surface on a dry area, the cover of fir trees on sandy soil, the sufficient effect of the sun, and the possibility of using the White River for dumping wastes while maintaining Great Vud’iavr for the water supply.  

In March 1930 the Apatit trust modified this option to position the city a few kilometers deeper into the mountains, though still along Great Vud’iavr. At this extremely confused moment of planning, given their recent budget cut, the enterprise wanted to reduce the distance from the town to the mining areas and place the enrichment factory where the lake flowed out into the White River. Further outside evaluations in June heaped criticism on this potential location. One report encouraged an urban design that would establish “good sanitary conditions on account of the self-purifying properties of water, soil, and air.” But it noted that the proposed area would create tremendous difficulties with street design due to the steep inclines, winds, and green sections, which should be preserved. Another evaluation agreed with the main objection of the last report that building infrastructure for the sewer system would be impossible. In response to these criticisms the Apatit trust again slightly altered its plan.

Since the design of the city and the enterprise occurred simultaneously, and under the management of the trust, the location of industrial objects determined much of the layout. For Apatit the main item that required choosing a location was the enrichment factory. In February 1930, a commission to determine the location of the enrichment factory created a list of eight factors to consider: the conditions for delivering the ore from the mines; safety during explosions at the mines; safety during avalanches; the possibility of developing a loading route; the possibility of positioning the equipment in a cascade; the presence of an adequate water supply; the conditions for the diversion of tailings; and the quality of the ground. This commission evaluated three potential

38 GAMO, f. 773, op. 1, d. 1, ll. 107-108.
39 Petrova, Salimova, and Podgorbunskaia, eds., Kirovsk v dokumentakh i faktakh, 33-34.
40 GAMO, f. 773, op. 1, d. 1, ll. 149-154.
41 Petrova, Salimova, and Podgorbunskaia, eds., Kirovsk v dokumentakh i faktakh, 33-34.
locations that overlapped with some of the options for the city: on the southern incline of Mount Iuksporr; in the Iuksporr valley on the northeast shore of Great Vud”iavr; and on the southern shore of Great Vud”iavr. Of all of the factors mentioned, the ability to dispose of tailings without polluting Great Vud”iavr predominated in their decision to recommend the final location at the mouth of the White River on lower ground than the lake. The interest in maintaining the lake arose from the need to have an industrial and drinking water supply for both the city and the enterprise and the desire to avoid immediate expenditures on water purification. The White River in this model would serve as an industrial sewer and trust employees developed estimates of the maximum loads of tailings that could be dumped in the river.\textsuperscript{42}

Neither pure recklessness nor genuine antipathy toward nature inspired this environmentally destructive decision about what to do with industrial waste. Instead, enterprise leaders felt confident in the ability to create harmony between industrial modernity and the natural environment in the future. They saw pollution of the White River as only a temporary problem. After the construction of the enrichment factory had already begun, a foreign consultant offered another objection to its proposed location in August 1930. He suggested several reasons why building it in the mountains would be better, including the cost of the project, transportation issues, and the dumping of tailings in the White River. In a reply letter the head of the enrichment factory, Nikolai Vorontsov, defended their decision against the consultant’s objections, dwelling a bit on the “most substantial” one about polluting the river. Vorontsov insisted that in the future the wastes from apatite enrichment would be reused to produce a variety of materials and this further processing would reduce the amount of tailings being dumped.\textsuperscript{43}

Overall, the architectural vision for the Khibiny revealed a desire to harmonize nature. Vorontsov made a point of mentioning the beauty of the settlement areas when giving a summary of the separate mining settlements and the new socialist city.\textsuperscript{44} When outlining the overall features for the new city, the main architect, O. R. Munts, detailed

\textsuperscript{43} GAMO, f. 773, op. 1, d. 2, ll. 238-244. A local newspaper article referred to this episode as a way to claim that Kondrikov was the “first ecologist” in the Khibiny. Maksim Nikolaev, “Pervyi khibinskii ekolog,” \textit{Khibinskii vestnik} (November 12, 1999), 11.
the desired type of urban environment. The project demanded that a “wild, almost uninhabited, region will need to be transformed into a populated one and will need to supply its population with the satisfaction of all the requirements of a normal and cultured existence in the unique conditions of the far north.” To do so, Munts sketched out how housing for workers, a transportation network, illumination, heating, telephone service, a water supply, a sewer system, and various municipal services could be built. Munts also envisioned three parks in the city that would preserve the forest sections remaining on the site and serve the sanitary purpose of protecting the city from noise and dust generated by the enrichment factory. Admitting the current difficulties of cultivating plants in a polar region, the architect proposed that in the future acclimatization could be used to create green belts throughout the city connecting the parks. “It is necessary,” Munts concluded, “that man, simultaneously with a victory over nature and the disturbance of its majestic tranquility, is able to accord his labor with its eternal beauty.”

**Cultural Transformation**

An outpouring of cultural commentary, activities, and institutions accompanied the creation of Khibinogorsk and apatite mining. A general radicalization of Soviet culture during the first five-year plan that highlighted the revolutionary potential of Stalinist modernization inspired much of this enthusiasm. This official culture in the Khibiny region relied on local Communist Party newspapers, popular literature by both renowned and relatively unknown authors extolling the project, and new establishments created by the state for its propagation. Applied to the environments of inhospitable

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peripheries, the rigidly confined cultural productions of the era frequently emphasized heroic narratives of Soviet citizens overcoming natural obstacles. Yet, Stalinist representations of nature were less uniformly antagonistic to nature than posited in some of the historiography.\textsuperscript{50} The place of the natural world in this local culture seems better characterized as a transformative and holistic vision of humans’ relationship to the environment. Anthropocentric in essence, this vision subsumed narratives of conquest but maintained room for divergent discourses about nature. This analysis of the contours of the Stalinist representations of the Khibiny environment demonstrates this holistic logic by outlining descriptions of the natural world as incomplete and meaningless before human interference, as a source of transformation during modernization, and as a feature of socialist harmony in the future.

During the first five-year plan, the Khibiny region as it existed before socialist construction was portrayed as lacking significance. Commentary on the sparse and desolate character of the territory was common among travelers to the region in late imperial Russia and the early 1920s.\textsuperscript{51} These remarks often carried some positive connotations as well: the beauty of pristine nature, the enticing exoticism of the far north, A. E. Fersman and B. M. Kupletskii, eds., Khibinskaia gornaia stantsiia (Leningrad: Izdatel’stvo Akademii Nauk SSSR, 1934). Also see A. E. Fersman, Nash Apatit (Moscow: Izdatel’stvo “Nauka,” 1968).


and a sense of nationhood that incorporated the “meagerness” of Russian nature into its landscape aesthetic.\textsuperscript{52} For instance, a moniker that Mikhail Prishvin coined for the north in the early twentieth century—“the land of fearless birds”—was designed to inspire awe at the uniqueness of isolated patches of wilderness putatively beyond human influence.\textsuperscript{53} In the 1930s, however, the local press used this phrase to refer derisively to the region before Bolshevik transformation.\textsuperscript{54} The revolutionary culture of Stalinist modernization used the desolation of northern nature more exclusively to mark something that needed to be changed.

Two main Soviet modes of characterizing nature’s incompleteness before industrialization highlighted temporal lags and purposelessness. Undeveloped territories symbolized the country’s supposed backwardness. Concern over “backwardness” was a long-standing issue in Russia. “Backwardness” was a category that encompassed a whole range of contemporaneously existing groups of people, conditions, beliefs, and places and relegated them to a diminutive spot on an imagined temporal hierarchy. This temporal hierarchy functioned primarily through spatial comparisons that took foreign countries with industrial economies as advanced and modern. Describing the development of an apatite industry in the Khibiny in 1933, B. I. Kagan and M. M. Kossov wrote, “The Kola Peninsula (the Murmansk district) in old times was one of the most neglected and backward borderlands.”\textsuperscript{55} This characterization implied that the pre-industrial environment of the Khibiny region was deficient in time. The authors continued, expanding on their notion of backwardness, that “wild conservatism, sluggishness, and the Asiatic tempos of the Tsarist government kept this huge region untouched and unstudied.”\textsuperscript{56} In this formulation and the words of other contemporary commentators on

\textsuperscript{52} Christopher Ely, \textit{This Meager Nature: Landscape and National Identity in Imperial Russia} (DeKalb: Northern Illinois University Press, 2002).


\textsuperscript{54} Khabinogorskii rabochii (October, 8 1932), 1; \textit{Poliarnaia pravda} (November 20, 1936), 2; \textit{Poliarnaia pravda} (May, 5 1938), 3; and \textit{Kirovskii rabochii} (February 28, 1939), 2.

\textsuperscript{55} B. I. Kagan and M. M. Kossov, \textit{Khibinskie Apatity} (Leningrad: Izdatel’stvo Lenoblispolkoma i Lensoveta, 1933), 91.

the status of the Khibiny territory in the pre-Soviet era, slow industrial development deprived such peripheral landscapes of their potential significance.\textsuperscript{57} This notion of the meaninglessness of unused nature is another strand that often appeared in representations of the pre-industrial north. The logic here reflected a deeply utilitarian and anthropocentric environmental worldview with clear connections to Marxist labor theories of value. Productive forces embedded in nature could only be released by conscious human activity that rendered such elements of the environment economically useful. The low population density of the region became a key element of a rhetoric that highlighted the insignificance of nature. Many authors would make this point by giving an arbitrary estimate of the number of people per square kilometer in the tsarist era.\textsuperscript{58} Other writers also employed cartographic imagery in referring to the territory as a “blank spot on the map,” emphasizing an ostensible emptiness that elided the populations of pastoralists and fishers and the complex natural systems that existed there.\textsuperscript{59} During his tour of the far north, Maksim Gor’kii lamented the “meaningless work of the elemental forces of nature” of the Kola Peninsula. Nowhere else provided such “a picture of premature chaos than this peculiarly beautiful and severe region. Here you get the impression that “nature” wanted to do something, but only sowed this enormous space of the earth with rocks.”\textsuperscript{60} For Gor’kii polar nature was unable even to fulfill its own intentions and thus required the “reasonable activity of people” to correct its mistakes.

This past played the role of setting the stage for what socialist construction would transform, would complete, would make whole. Descriptions of the process of industrializing the Khibiny in Stalinist culture concentrated on the manipulation,


\textsuperscript{58} Vishnevskii, \textit{Kamen’ plodorodiiia}, 6 and V. I. Osinovskii, “Rol’ khibinskikh apatitov v kolonizatsii Kol’skogo poluostrava,” in Fersman, ed., \textit{Khibinskie Apatity}, vol. 1, 204.


subjugation, and improvement of the natural environment by humans. These ideas often fit into a dialectic of re-forging—“Man, in changing nature, changes himself” in the frequently cited epigraph to The History of the Construction of the Stalin White Sea-Baltic Canal—that implied that through the mastery of nature, industrial labor, and education, prisoners and former “kulaks” could become proper Soviet people. This impulse to totally transform nature and people and to ultimately eliminate conflict between them helps capture the place of the environment in the culture of Stalinist modernization. The re-education efforts among forced peasant migrants to the Khibiny region, for instance, included activities like participation in greening campaigns. Commentators on the transformation of the area combined militaristic metaphors of conquest with more variegated portrayals of nature that romanticized work in an extreme northern environment, venerated the natural resources of the region, and drew attention to the role of science in enabling industrial development.

As discussed in the first chapter, the ideology of the conquest of nature found frequent expression during the militaristic modernization of the Stalinist period. The process of socialist construction in the Khibiny was often lauded by the catchphrase “the Bolsheviks defeat the tundra.” As in the case of railroad construction, nature’s recalcitrance during initial industrial development helped evoke descriptions of the hardnosed treatment of the environment. Confrontations with such obstacles were used to establish the heroic qualities of the geologists, volunteer workers, and local party and industrial leaders in the endeavor. Though corresponding with difficult, chaotic, and reckless moments of interaction with the environment, the conquest of nature did not imply its intentional destruction. In Stalinist culture the environment usually only played the role of an enemy to the extent that it helped positively define human action. The diverse contextual uses of the conquest theme help demonstrate this point. Sometimes, as

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63 Geber, Maizel’, and Sedlis, eds., Bol’sheviki pobedili tundru.

in a song by A. Reshetov called “Hello Conquerors,” authors made an analogy between actual military experiences during the Russian Revolution and the Russian Civil War and the work of industrializing the Khibiny.\(^\text{65}\) Elsewhere, such as in articles in the local party newspaper *Khabinogorsk Worker*, the language of conquest served to align economic development in the north with Stalin’s dominant faction in the central party apparatus.\(^\text{66}\) A key idea in the Stalinist version of the conquest of nature was that it would lead to the mutual improvement of humans and territories. As M. Maizel’ wrote, “the courageous Bolshevik work on the assimilation of the mineral resources of the Khibiny” brings about “the creation of the new man who in the struggle with nature transforms himself into an active builder of a classless socialist society.”\(^\text{67}\)

Representations of Khibiny nature in discussions of the process of industrialization also depicted it as extreme. Descriptions of northern nature as distant, harsh, cold, snowy, windy, barren, dark, and dangerous fit into romantic narratives of economically developing the region. From the beginning of geological research in the Khibiny region, participants in the expeditions to this polar, uninhabited, and alpine terrain became mythologized as pioneers and discoverers of new deposits.\(^\text{68}\) Reflecting on exploration in the Khibiny sponsored by the NIU in the spring of 1929, Grigorii Pronchenko wrote, “the remoteness of the region with its alluring nature and the unusual conditions of life in the north did not frighten several young members of the NIU but on the contrary attracted [them] (*a manili*) with its novelty and interest.”\(^\text{69}\) This enthusiasm for work in potentially frightening nature found widespread expression. Authors often dwelt on the formidable difficulties and dangers posed by nature when establishing narratives of heroism. Take, for instance, this fragment of Lev Oshanin’s poem about


\(^{66}\) *Khabinogorskii rabochii* (October 8, 1932), 1. Additionally, for scientists, military metaphors for the industrial transformation of the environment referred to expanded research that allowed nature to be put further under the rational control of humans. Akademik A. E. Fersman, “Ot nauchnoi problemy k real’nomu delu,” in Geber, Maizel’, and Sedlis, eds., *Bol’sheviki pobedili tundru*, 27.

\(^{67}\) Maizel’, “Bor’ba za apatit v svet sovremennoi khudozhestvennoi literatury,” in Geber, Maizel’, and Sedlis, eds., *Bol’sheviki pobedili tundru*, 222.


shock workers at the Kukisvumchorr mine from 1932: “The all-out wind blows along the ledges, / Thundering on the grounds, sliding on the slopes. / One might freeze under a wolf-skin coat, / But must never simply stand before the wind.” 70 In this lyric it was the threatening wind and frost that set up the conditions for the personal transformation of the miners into heroes of industrialization.

Commentators on the creation of a mining and processing enterprise in the Khibiny also effused about the wealth of the mineral resources on the Kola Peninsula. Continuing to express the colonization of the nature ideology that extended back to the late imperial era and dominated in the 1920s, they referred to the substances in the depths of the earth as a treasure chest filled with inexhaustible mineral resources and assigned value and potency to the land holding such materials. 71 Writer Aleksei Tolstoi exaggerated, “If these mountains were pure gold, they would not be so precious.” 72 For Tolstoi this feature of the northern environment helped it be transformed into a new mainland (materik) for industry. 73 Another striking aspect of this adoration of the minerals below the earth’s surface was the stress on the interconnection between inorganic and organic materials. Related to the geochemistry practiced by some of the scientists involved in the project and the symbolic veneration of metal in Soviet culture, apatite became praised as the “stone of fertility.” 74 Such a moniker attributed animate properties to this rock, extending the claimed worth of mined materials beyond the treasure chest metaphor. The “stone of fertility” implied an ability of apatite to create not


72 Tolstoi, “Novyi materik,” in Nikol’skii and Pompeev, eds., Pul’s Khibin, 68.


just wealth but life itself. To unleash this power, of course, required extracting it from the mountains.

Another category of depiction of the natural world in the Khibiny region during the first years of Soviet industrialization involved a scientific perspective. The main desire of many of the scientists working in the Khibiny was to comprehend nature fully in this peripheral place. This stated aim of their research was common in modernizing states and continued an element of the scientific culture from the pre-Soviet era that emphasized “pure science.” Science in these years became more wedded to specific service to the state, but individuals working in the north, such as Fersman, accepted this change. A practical focus opened new research opportunities in certain fields and helped lead to the creation of the Khibiny Mountain Station of the Soviet Academy of Sciences in 1932. Researchers also came under pressure to popularize their scientific research for the sake of cultural enlightenment. These political pressures on scientists did not change the basic understanding of nature as an object of study for many of the people working in the Khibiny. However, they did require putting generalizations into a more Bolshevik language. Even in such proclamations we can see a focus on justifying expanded research and seeking total comprehension of nature. Fersman wrote “that the path to economic, industrial, and cultural assimilation of distinct territories lies above all on the scientific mastery of them and the conquest of all sides of nature, life, and man not

in separation, but in complete envelopment of all the complex economic and social diversity of their mutual relationship.”

Nature as represented here was not just an object of conquest, but also a complex entity that could only be comprehended through “complete envelopment” with human beings.

Lastly, the vision for the future socialist city included a harmonious relationship between the transformed Arctic tundra and new Soviet people. In this cultural logic Stalinist industrialization would have fulfilled an incomplete landscape through a process of mutual re-forging and made it a beautiful monument to socialist modernity. Through the creation of schools, research institutions, pioneer camps, red corners, cinemas, theaters, conservatories, clubs, libraries, parks and health facilities and with the aid of mass enlightenment campaigns and anti-religious propaganda in the newspapers, the area would go from being “held in the pincers (kleshchakh) of ignorance, a lack of culture, and darkness” to a “blossoming industrial and cultural region.”

From the perspective of Stalinist modernity, a habitat that included these cultural and industrial installations provided an inherently better-suited ecosystem in which humans could thrive than the desolate tundra. The idea of this transformation also opened way for a renewed stress on the beauty of elements of the Khibiny environment, including previously existing features like the mountain relief, the lakes, and the polar night as well as new facilities such as parks and buildings.

New ways for people to experience and take advantage of polar nature through sport and tourism began to be emphasized. Besides following many of the contours of the physical cultural movement in the country, athletics in the Khibiny predictably enough focused on skiing and other winter sports. Events started to be organized in the early 1930s and by the time the annual Holiday of the North began on the Kola Peninsula in

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79 Fersman, Novyi promyshlennyi tsentr SSSR za poliarnym krugom (Khibinskii apatit), 7.
82 Petrova, Salimova, and Podgorbunskaja, eds., Kirovsk v dokumentakh i faktakh, 176-183.
March 1934, the area had become a center of downhill skiing in the northwest part of the Soviet Union. During the 1937 ski season, a newspaper article urged Kirovsk residents to “fully use the splendid topographical and climatic setting of their city.” These distinct characteristics of polar nature also became important in efforts to promote tourist excursions to the Khibiny Mountains. In making the case for the Khibiny as an attractive place to vacation, one writer declared:

I would not exchange the nature of the north for even a section of the Caucasus... It would be much nicer to relax here on the shore of a river or, having climbed up one of the high mountains, to rest with real pleasure after the descent. This tempers and strengthens the organism of a person well, promoting energetic work immediately upon return from the excursion. From the north you always arrive vigorous and strong.

Northern nature under Soviet control could serve to replenish workers in the other parts of country, increasing these highly valued traits of strength and vigor. In this ideal the modernized environment not only became more hospitable but also acted to improve human life beyond what had been possible in a pre-industrial territory.

**Forced Labor in the Tundra**

During the height of these optimistic cultural expressions about finding industrial harmony with nature, the social history of the Khibiny Mountains was turning in a more ominous direction. From the beginning state planners considered using some form of forced labor for mining in the Khibiny, continuing a precedent begun by the wartime tsarist government with the construction of the Murmansk railroad. Though initial suggestions of handing over the entire project to the prison camp administration were rejected for the sake of building a new socialist city in the far north, the government and

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enterprise leaders remained uncertain about how to supply labor for the project. An
impetuous decision in the spring of 1930 to send millions of peasants stripped of their
property during collectivization to settlements around the country determined the
dominant strategy for peopling the Khibiny project.

_Apatit_ was born during the first major drive to collectivize agriculture. The twin
policies of collectivization and de-kulakization aimed at giving the state control of
agricultural output. As part of a mass collectivization campaign during the winter of
1929-1930, millions of comparatively well-off peasants became targeted as class
enemies, or kulaks. They were stripped of their property and excluded from membership
in the new collective farms. The government slated a huge portion of these households
for exile. Deportations began in the winter of 1930 at a time when there was no clear plan
for resettlement, but only a general idea of using these de-kulakized peasants to exploit
natural resources in distant peripheries. This episode of forced resettlement included 918
individuals who arrived in the Khibiny region in mid-March.87 Families arrived in new,
inhospitable, and unfamiliar environments with minimal accommodations arranged.88

In order to try to help solve a severe labor shortage in the early 1930s, the Soviet
state chose to use these de-kulakized peasant migrants, who were known by the
euphemism “special settlers,” in the economic development of the peripheral regions. In
April 1930, OGPU head Genrikh Iagoda outlined the idea of turning these camps into
more or less permanent, self-sustaining “colonization settlements.” Relocated peasants
would work in timber, agriculture, and mining and help “colonize the North in the
shortest possible time.”89 This agency also specifically believed it was “impossible” to
meet the needs of the _Apatit_ trust by “hiring a free labor supply” because of the
“remoteness and natural wildness of the Khibiny.”90 In a request to hire USLON
prisoners as technical specialists, Kondrikov similarly complained that “the severe

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87 Shashkov, _Spetsperselelentsy na Murmane_, 51 and V. I. Kondrikov, “Sovremennoe sostoianie i
perspektivy razvitiia stroitel`stva v raione Khbinskikh razrabotok,” in Fersman, ed., _Khbinskie Apatity_,
88 Viola, _The Unknown Gulag_, 14-88. Also Oxana Klimkova, “Special Settlements in Soviet
Russia in the 1930s-50s,” _Kritika: Explorations in Russian and Eurasian History_ 8, no. 1 (Winter 2007):
105-135.
89 Oleg V. Khlevniuk, _The History of the Gulag: From Collectivization to the Great Terror_ (New
90 RGASPI, f. 17, op. 120, d. 26, l. 151.
climate” of the region inhibited the enterprise’s ability to recruit experts. Indeed, labor recruitment proved exceedingly difficult for Apatit. The trust recruited groups of skilled workers, including ‘enthusiastic’ communists and Komsomol members from Leningrad, but many new voluntary migrants would leave soon after encountering the conditions there. Given this overall shortage, the special settlers provided an extra source of workers that cheapened labor costs in the first year and helped make the industrial project possible.

The special settlers occupied an intermediate status between citizens and labor camp prisoners, being deprived of mobility and civil rights but contractually entitled to wages and (frequently unfulfilled) amenities. In the summer of 1931, the Apatit trust signed a contract with the OGPU for a contingent of up to 15,000 special settlers. This agreement stipulated that the Apatit trust would supply the special settlers with equivalent levels of food, material provisions, and wages (except for the 15% that would be paid to the camp administration) as offered to other workers. It would also be responsible for providing housing, sanitation infrastructure, medical facilities, and schools. The OGPU would offer funds for heating, illumination, and certain communal services. On the more punitive side, the contract prohibited special settlers from going on vacation, demanded that they live in separate areas or buildings, limited their ability to serve in administrative positions without the approval of the OGPU commandant’s office, and put the OGPU commandant in charge of disciplinary issues.

The special settlers became the main source of labor at this industrial site in the Khibiny Mountains. Mortality, escapes, and mass exodus of recruited laborers make it difficult to trace the precise population fluctuations during the 1930s. However, we can estimate that in this period more than 45,000 special settlers came to the Kola Peninsula, which only had a total population of 27,000 in 1927. All but a few thousand of them

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91 Petrova, Salimova, and Podgurbunksiaia, eds., Kirovsk v dokumentakh i faktakh, 91.
92 GAMO, f. 773, op. 1, d. 1, l. 315; GAMO, f. 773, op. 1, d. 5, ll. 22ob, 185-189, 247; GAMO, f. 773, op. 1, d. 8, l. 34; GAMO, f. 773, op. 1, d. 15, l. 225; and Petrova, Salimova, and Podgurbunksiaia, eds., Kirovsk v dokumentakh i faktakh, 41, 95. This lack of retention occurred despite a system of benefits that existed specifically in northern industry that would grant recruited laborers higher wages and more vacation after a year of employment. GAMO, f. 773, op. 1, d. 34, l. 77.
93 GAMO, f. 773, op. 1, d. 1, l. 315.
94 Viola, The Unknown Gulag, 92-96 and GAMO, f. 773, op. 1, d. 6, ll. 230-232.
directly served the apatite works. In comparison to the majority of special settlers who worked in small isolated settlements serving the forest industry, the labor needs of this project required greater integration of these forced migrants with the new socialist city of Khibinogorsk. Though initially the special settlers primarily lived in separate settlements outside the city (see Table 1), close to 20,000 of them resided in Khibinogorsk by 1933. The special settlers came from numerous places in the country, but the largest percentage of them was relocated from parts of the Leningrad region. Excluding the construction site of the Niva Hydroelectric Station, special settlers made up 69% of the total population (25,485) in the Khibiny region in October 1931. At this point the gender ratio was near equal (48.9% were women) and 32% were under sixteen years old.

Table 1. Population of Special Settlers in the Khibiny Region on October 25, 1931

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Population of special settlers</th>
<th>Percentage of the population that were special settlers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khibinogorsk</td>
<td>1340</td>
<td>38%</td>
</tr>
<tr>
<td>Mining Settlement No. 1 (the 25 kilometer mark from the Murmansk Railroad)</td>
<td>3277</td>
<td>56%</td>
</tr>
<tr>
<td>Iuksporiok (Mining Settlement No. 2)</td>
<td>724</td>
<td>80%</td>
</tr>
<tr>
<td>Settlement at the 20-21 kilometer mark</td>
<td>7195</td>
<td>82%</td>
</tr>
<tr>
<td>Settlement at the 18 kilometer mark</td>
<td>3018</td>
<td>99%</td>
</tr>
<tr>
<td>Settlements at the 6,13, 14, 16 kilometer marks</td>
<td>1601</td>
<td>88%</td>
</tr>
<tr>
<td>The state farm Industria and the Closed Workers’ Cooperative</td>
<td>591</td>
<td>67%</td>
</tr>
<tr>
<td>“Apatity” station of the Murmansk Railroad</td>
<td>31</td>
<td>6%</td>
</tr>
<tr>
<td>Nepheline administration</td>
<td>37</td>
<td>54%</td>
</tr>
</tbody>
</table>

95 Shashkov, Spetspereselentsy na Murmane, 32 and Shashkov, Spetspereselentsy v istorii Murmanskoj oblasti, 108-113.
97 Petrova, Salimova, and Podgorbunskaya, eds., Kirovsk v dokumentakh i faktakh, 94-96.
98 Petrova, Salimova, and Podgorbunskaya, eds., Kirovsk v dokumentakh i faktakh, 95.
Human Ecology in the Khibiny Mountains

The species of fauna known as *Homo sapiens* did not thrive in this habitat created by Stalinist industrialization and forced deportations. The visions for making Khibinogorsk a place where life and work would overcome obstacles posed by nature and people would coexist peacefully with this new tamed environment contrasted sharply with the situation on the ground. On the whole, Stalinist modernization did not initially lead to a functioning socialist city above the polar circle, but to a profound human and natural tragedy in which disease, hunger, filth, coldness, deforestation, pollution, and disorder raged. The disastrous situation partially reflected a deeply disharmonious relationship with the environment created, contrary to intention, by the state’s industrialization drive. As in the case of the construction of the Murmansk railroad, political decisions to undertake rapid industrialization with forced labor heightened the vulnerability of migrants to an array of natural hazards, while a perilous environment remained outside state control.

It makes sense to examine the abysmal living conditions that the special settlers encountered in the Khibiny region from an environmental perspective. Issues of housing, clothing, food, and hygiene, for instance, have obvious natural dimensions. Plants and animals nourish humans and supply materials; climatic phenomena and geographical features shape the needs, limitations, and possibilities of habitation. In the case of the Khibiny Mountains the long and snowy polar winter, the limited presence of building materials, the infertility of the soil, the dearth of flora and fauna for human foraging, the steep mountain relief of the worksite, the unsuitable system of waterways, and the distance of the region from supply sources significantly affected the housing situation, the availability of basic domestic supplies, and special settlers’ access to food and water. Nature occasionally exacerbated the situation as industrial activities caused environmental changes such as pollution and increased avalanches.

The habitat that first greeted the forced migrants to the Khibiny region consisted of snowy mountain tundra with ad hoc housing of tents, mud huts, and barn-like

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structures built with thin boards and wood beams called shalmany. A hierarchical allocation of better accommodations first to freely recruited laborers meant that special settlers lived in these temporary dwellings the longest. At one point in late 1930 after the winter had begun, close to 12,000 of 14,000 residents in the Khibinogorsk region lived in these types of houses. As numerous families crowded into these dirty living spaces, pathogens causing diseases such as measles, typhus, typhoid fever, and tuberculosis spread throughout the population. A condemning report from December 1930 by the regional inspector of housing and communal sanitation, I. A. Tikhomirov, claimed that the large portion of the current housing stock that “consists of shalmanov, mud huts, and tents that act as surrogates of housing is unacceptable for the conditions of the polar winter.” Tikhomirov’s overall assessment was that “the housing conditions of the population, particularly during an epidemic situation, are extremely unfavorable.” The mud huts seem not to have survived the winter of 1931 here, but the other housing types and extremely crowded conditions lasted through the first five-year plan. In 1934, Kirov wrote that special settlers in the Khibiny region only had 1.9 square meters of space per person, considerably less than the desired three square meters per person.

Polar nature further complicated the housing situation in the Khibiny Mountains. It exacerbated the endemic problems the Soviet state had in providing basic supplies to new industrial sites. The lack of suitable forest materials on the Kola Peninsula led the city to import wood from the Arkhangel’sk region. The Apatit trust also continually failed to fulfill its own plans for housing construction. Kondrikov described the role of the Kola environment in inhibiting construction: “Unfortunately, large supplies of limestone on the Kola Peninsula have still not been found, there is comparatively little wood, the renewal period of which extends here up to 200 years, and until very recently there was a large deficit of clay.” Trust leaders also explained their failures in housing

101 Petrova, Salimova, and PodgORBunSKAia, eds., Kirovsk v dokumentakh i faktakh, 60-61, 67 and Shashkov, Spetspereselentsy v istorii Murmanskoj oblasti, 271-278.
102 GAMO, f. 773, op. 1, d. 9, ll. 22-23, 191-193.
103 Barabanov and Kalinina, “Apatit”, 38.
104 RGASPI, f. 17, op. 120, d. 26, l. 85; GAMO, f. 773, op. 1, d. 5, l. 190; GAMO, f. 773, op. 1, d. 5, ll. 9-10; and GAMO, f. 773, op. 1, d. 44, ll. 191-193.
construction as partially due to the “harsh climate of the polar tundra” and “the mountain relief of the location with rocky ground.”

Moreover, special settlers who attempted to construct their own housing could not find adequate supplies. One report from 1934 summarized the situation for the special settlers: “there are no funds and also no construction materials—this means that there are no houses.” The frequent forest fires along the Murmansk railroad and the near exhaustion of the limited wood supply near Little Vuđ’iavr Lake also limited special settlers’ options for remedying the housing shortage themselves. After the production of concentrated apatite began in the fall of 1931, dust from the enrichment factory started destroying local flora, which reduced available building materials even further.

For the eight to nine months of the year when temperatures in the Khibiny Mountains were below freezing, snow acted as a dangerous environmental influence. The area had an annual average of over 160 days of snowstorms a year and significantly greater snow cover than other parts of the Kola Peninsula. The mountainous terrain already made the potential for avalanches and rockslides especially great. The use of industrial explosions in the mines during the long winter heightened this risk. A major avalanche from Mount Iuksporr on 5 December 1935 destroyed two buildings, which housed 249 people, and killed eighty-nine individuals, including forty-six special settlers. State and industrial planners clearly contributed to making the migrants vulnerable to this disaster by deciding to place the settlement in an area known to be avalanche-prone. This catastrophe inspired an active campaign in the city to monitor

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106 Petrova, Salimova, and Podgorbunskaja, eds., Kirovsk v dokumentakh i faktakh, 66.
107 Shashkov, Spetspereselentsy v istorii Murmanskoi oblasti, 277.
108 GAMO, f. 773, op. 1, d. 51, l. 92.
110 P. V. Vladimirov and N. S. Morev, Apatitovyi rudnik im. S. M. Kirova (Leningrad: Seriia izdatel’stva po khbinskoj apatitovoi probleme, 1936), 120-121.

The special settlers also often lacked basic items necessary for survival in such a cold climate. The government had stripped them of most of their property except for a bit of money and some clothing and equipment for agriculture, construction, and cooking. The frequently violent expropriations of the de-kulakization campaign left many peasant families with much less than the sanctioned norms.\footnote{Viola, \textit{The Unknown Gulag}, 33-44.} To augment the clothing and tools brought by the migrants, the trust and the city government petitioned for special winter clothing, set up occasional open fairs, and established a few stores. The supply system in the Khibiny region managed to procure a somewhat reasonable level of some of the required clothing such as leather shoes, felt boots, underwear, suits, coats, bags, sheets, and hats by late 1930.\footnote{GAMO, f. 773, op. 1, d. 2, ll. 183-186 and Petrova, Salimova, and Podgorbunksaia, eds., \textit{Kirovsk v dokumentakh i faktakh}, 46-65, 68-69.} However, as forced and voluntary migrants continued to flow to the worksite, these efforts failed to overcome the chronic lack of sufficient items needed for living, working, and staying warm in the tundra. As special settler F. B. Zubkova later summarized it succinctly: “In material terms we lived poorly.”\footnote{F. B. Zubkova, “Opiat’ nas ushchemliaiut,” in \textit{Spetspereselentsy v Khibinakh: Spetspereselentsy i zakluchennye v istorii osvoeniia Khibin} (Kniga vospominanii) (Apatity: Khibinskoie obshchestvo “Memorial,” 1997), 20.}

Food shortages characterized life in the Khibiny region throughout the 1930s. They occurred despite the contractual obligations of the trust and the secret police to supply the special settlers with sufficient food provisions and the settlement’s proximity to the Murmansk railroad, which facilitated food shipments.\footnote{GAMO, f. 773, op. 1, d. 6, ll. 230-232.} The state and party organs in Khibinogorsk attempted to procure foodstuffs through several organizations including a Closed Workers’ Cooperative and a special trust to manage imports. Like elsewhere in the country, they also set up a network of cafeterias where people ate most of their meals.
Far short of supplying the state-sanctioned rations, these institutions were only minimally effective in helping to prevent the population from starving.\(^{118}\)

The natural conditions of this rocky polar land inhibited efforts to feed the special settlers adequately. The infertility of the soil, the region’s alpine elevation, and the short growing season characteristic of such latitudes made agriculture nearly impossible here. Indeed, scientists only conclusively established the possibility of growing certain vegetables in the 1920s and grain cultivation never became a viable option.\(^{119}\) Given these environmental constraints, it is hardly surprising that the initial attempts of the *Apatit* trust to organize local agriculture were largely unsuccessful. The state farm *Industriia*, where a number of special settlers worked, spent its first years on land reclamation, farming only a few hectares of land. The meat and milk economy of the state farm also suffered from a lack of shelters for livestock, which caused many animals to freeze to death.\(^{120}\)

Some special settlers in the Khibiny region dealt with these shortages by making use of natural elements familiar to them in a new environment. The migrants caught freshwater fish in the nearby lakes and rivers and collected mushrooms and berries in the summer. One special settler, L. D. Zverev, later described the tactics employed by his family at the time:

Father made nets. We had ponds around home and there were many fish. He was a craftsman and made nets. He went into the mountains where there were already pools and caught fish. He goes out for mushrooms and fetches netting and fish. The fish is good. And there was perch where the airdrome is. He also goes there and catches. In the White River there used to be a lot of fish, only they've gone away. In this way we didn't starve.\(^{121}\)

In the first years after their arrival many families supplemented their diets with aquatic fauna that they obtained outside of the state-sponsored distribution system. However, in the fall of 1931 *Apatit* began dumping massive amounts of wastewater from enrichment

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\(^{118}\) Petrova, Salimova, and Podgobunskaia, eds., *Kirovsk v dokumentakh i faktakh*, 68-74 and GAMO, f. 773, op. 1, d. 15, II. 76-79.

\(^{119}\) S. A. Diazhilov, “Nauchnoe reshenie problemy poliarhnogo zemledelia,” in Fedorov, Bardileva, and Mikhailov, eds., *Zhivushchie na Severu*, 82-86.

\(^{120}\) Petrova, Salimova, and Podgobunskaia, eds., *Kirovsk v dokumentakh i faktakh*, 54, 74-75.

\(^{121}\) L.D. Zverev, “Rasskaz o zhizni bogatoi,” in *Spetspereselentsy v Khibinakh*, 11-18, 16.
processing into the White River.\textsuperscript{122} This industrial pollution would soon kill off the fish there and eliminate this source of food for the special settlers.\textsuperscript{123}

A famine in 1932-1933 hit the grain-producing regions of the country, especially Ukraine, the hardest. However, the special settlements also suffered terribly from the lack of food and ruthless government action. An immediate response of the central authorities was to reduce food rations for special settlers, thereby guaranteeing the further suffering of this population.\textsuperscript{124} A 1934 report of the Khibinogorsk City Council, after ration levels had been restored, revealed a continued insufficiency in the diets of workers and their families. The lack of food led some to flee; others died of starvation. Food shortage also resulted in widespread incidents of diseases caused by malnourishment. Specific conditions of the Khibiny environment played a role here in the scurvy outbreaks and the fact that 70% of children suffered from rickets in 1934. The lack of local fruits and vegetables inhibited vitamin C intake, causing scurvy, and the long sunless months and insufficient dairy consumption likely led to vitamin D deficiencies, giving rise to rickets.\textsuperscript{125}

The situation with water was no better. The problem here was not so much a dearth of the substance as a lack of the infrastructure needed to arrange a clean water supply and remove sewage. Regardless of whatever ideas urban and enterprise planners had for the use of the region’s water bodies, the first migrants in 1930 immediately began drawing water from the closest sources to their settlements for drinking, cooking, cleaning, bathing, and extinguishing fires. They often filled barrels with water from lakes and rivers or built temporary pipes that froze in the winter. Furthermore, in what became a chronic problem for many years in the Khibiny region, various sources of human contamination from laundry, trash receptacles, cesspits, and used water from the bathhouses began to pollute the water supply. Even without industrial dumping, these everyday forms of pollution already made the unpurified water far from clean. As sanitation inspector Tikhomirov wrote at the end of 1930:

\begin{itemize}
\item \textsuperscript{122} Barabanov, et al., Gigant v Khibinakh, 44-59 and S. A. Diuzhilov, “‘Arkhipelag Svobody’ na Murmane (vтораia polovina 1920-kh—1930-e g.g.),” in Fedorov, et al., eds., Zhivushchie na Severе, 100.
\item \textsuperscript{123} ARAN, f. 544, op. 1, d. 161, ll. 40-42 and GAMO, f. 773, op. 1, d. 51, ll. 92-94.
\item \textsuperscript{124} Viola, The Unknown Gulag, 132-149.
\item \textsuperscript{125} Shashhkov, Spetspereselentsy v istorii Murmanskoi oblasti, 278-279 and GAMO, f. R-163, op. 1, d. 141, l. 13.
\end{itemize}
Independent of the results of the study [on the bacteriologic content of the water] one can already now count all of the available sources of a water supply as to a greater or lesser degree contaminated, the mountain character of the place with a sharp incline represents an almost insuperable obstacle to the protection of them from pollution.\footnote{Petrova, Salimova, and Podgorbunskaja, eds., Kirovsk v dokumentakh i faktakh, 62-63.}

As diseases connected to contaminated water gripped Khibinogorsk and its outlying settlements in 1931-1932, the local government attempted to regulate migrants’ use of water. They often relied on draconian measures that sought to place the burden of environmental protection on the forced migrants instead of the industrial enterprise or the city’s administration. One resolution of the Khibinogorsk City Council from 1931 created a fifty-meter territory around Great Vud’iavr Lake that was to be on a “strict regime” of reduced human activity and construction for the sake of preserving this water source.\footnote{GAMO, f. R-163, op. 1, d. 26, ll. 15-16.} Another resolution of the City Council from 21 August 1931 aimed at sanitary protection of the water supply. One hundred copies of it were printed and presumably posted around the area. The decree prohibited dumping wastes on the ground; placing cafeterias, bathhouses, cesspits, lavatories, stables, and pigsties within fifty meters of any water body; doing laundry in living quarters; and taking water from a specific lake and river for any reason besides housing construction.\footnote{GAMO, f. R-163, op. 1, d. 26, l. 17.} Eventually, the city began onsite chlorination of drinking water drawn from a water body that was already polluted.\footnote{Petrova, Salimova, and Podgorbunskaja, eds., Kirovsk v dokumentakh i faktakh, 152.} In later years the authorities tried to limit the number of trips special settlers made to the bathhouses and accused individuals who reused their tickets of subversive behavior.\footnote{Shashhkov, Spetspereselentsy v istorii Murmanskoj oblasti, 283.}

The steep tundra mountains and the existing water system of the area confounded industrialists’ schemes for organizing the territory’s hydrology to their maximum benefit. The regime’s unwillingness to prioritize sewer construction and the effects of industrial pollution added to the difficulties with arranging a water supply for the new settlement. At the end of 1930 the Apatit trust still intended to begin construction on a sewer system, water pipe, and a purification station during 1931; the drinking water source in this plan would come from the river Loparki and not Great Vud’iavr, which would only be the
industrial water source.\textsuperscript{131} However, as the enterprise lagged in its production quotas, such basic municipal expenditures as the provision of safe water service were repeatedly deferred.\textsuperscript{132}

This postponement delayed the construction of a sewer system until after \textit{Apatit} had polluted the water of the White River and Great Vud’aiavr with byproducts from enrichment. This pollution changed the chemical character of the water and made it even less suitable for domestic use.\textsuperscript{133} Furthermore, without a pipe system to supply water, the ability to extinguish fires that arose at industrial sites or in crowded wooded housing was virtually non-existent.\textsuperscript{134} As a City Council report put it in 1934: “There are a lot of unsanitary conditions and the fire prevention situation is unsatisfactory—there is no water.”\textsuperscript{135} By this point the party leaders in Leningrad had also become somewhat more attentive to the problems with water in the Khibiny region. Kirov wrote to the People’s Commissariat of Heavy Industry (NKTP) and Gosplan in 1934:

In Khibinogorsk and its settlements there is a complete lack of a sewer system and it does not have an independent system of municipal water supply—the supply of the city is produced with unpurified water from Great Vud’aiavr Lake through a pumping station of the industrial water supply. Further postponing the urgent construction of the sewer system might bring the population to mass diseases of an epidemic character.\textsuperscript{136}

Construction of these services did finally begin the next year, but only near the end of the decade did they even approach completion.\textsuperscript{137}

The overall picture of life during the construction of this new socialist city is one in which crowded dwellings, the cold, hunger, filth, darkness, and inadequate water

\textsuperscript{131} Petrova, Salimova, and Podgorbunskaja, eds., \textit{Kirovsk v dokumentakh i faktakh}, 63.
\textsuperscript{132} GAMO, f. 773, op. 1, d. 5, ll. 62-70, 192-193; Barabanov, et al., \textit{Gigant v Khbinakh}, 51; and GAMO, f. 773, op. 1, d. 51, ll. 92-94.
\textsuperscript{133} GAMO, f. 773, op. 1, d. 51, ll. 84-100.
\textsuperscript{135} Shashhkov, \textit{Spetspereselentsy v istorii Murmanskoi oblasti}, 278.
\textsuperscript{136} GAMO, f. 773, op. 1, d. 9, ll. 192-193.
\textsuperscript{137} Petrova, Salimova, and Podgorbunskaja, eds., \textit{Kirovsk v dokumentakh i faktakh}, 143-146. The Axis powers extensively bombed Kirovsk during World War II. The destruction of the town means that most likely a sewer system only began functioning again in the late 1940s or early 1950s. On sewage issues in postwar Soviet cities, see Donald Filtzer, “Standard of Living versus Quality of Life: Struggling with the Urban Environment in Russia During the Early Years of Postwar Reconstruction,” in Juliane Fürst, ed., \textit{Late Stalinist Russia: Society Between Reconstruction and Reinvention} (London: Routledge, 2006), 81-102 and Donald Filtzer, \textit{The Hazards of Urban Life in Late Stalinist Russia: Health, Hygiene, and Living Standards, 1943-1953} (Cambridge: Cambridge University Press, 2010).
pervaded. The sum of this situation from the proximate cesspits to the ill person sleeping on the floor nearby was a sanitary nightmare. As one special settler, Aleksandra Iablonskaia, recalled decades later: “Only at night could I find a place. If you arrived late, you would sleep on the edge in the cold. … I crept among the sick in the cold and dirt.” A meeting of doctors in Khibinogorsk on September 11, 1931 proposed limiting the number of people per tent to 40 or 45 based on their overall assessment of the situation at the settlement at the 18-kilometer mark: “The contamination of the settlement with garbage, overcrowding, the absence of a basic stock of everyday items and the dirtiness of the area undoubtedly is a favorable atmosphere for the development of disease.”

The local environment combined with the oppressive development model of the Soviet state to produce conditions of widespread disease and death among those individuals who did not escape. Children suffered disproportionately. The new residents in the Khibiny region fell ill with similar diseases that hit other special settlements in the north such as typhus, typhoid fever, tuberculosis, scurvy, and measles. The available data of the incidents of these diseases are largely anecdotal. Over 175 children died from measles in September and October 1930, doctors reported fifty-five new cases of typhoid fever in the late summer of 1931 at one of the outlying settlements, and twenty children in Iablonskaia’s shalman died of typhus. These diseases raged throughout the area into 1932 and then began to subside. Starting in this year doctors in the area managed to administer thousands of inoculations against typhoid, small pox, and diphtheria, which primarily accounted for the improvement despite the continued lack of the municipal infrastructure necessary for urban sanitation.

For many special settlers the final outcome of all of these natural phenomena of disease, hunger, cold, and filth in the Khibiny region was death. Special settler V. M. Lebedik later drew connections among these factors: “It is hard to say how many people lived in this barrack. There was no thought about hygiene. Diseases began and every

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139 GAMO, f. R-163, op. 1, d. 26, ll. 8-10.
142 Petrova, Salimova, and PodgORBUNSKAIa, eds., Kirovsk v dokumentakh i faktakh, 152-153.
morning we brought out the dead.” In 1935 a health inspector in the region, A. G. Friliand, noted that the mortality rate, especially for children, at this new site of socialist modernity was considerably higher than the Soviet average. Aggregate figures showing overall deaths in the Khibiny region remain elusive. However, historian Viktor Shashkov has pieced together some demographic data for the city of Khibinogorsk, the population of which had a smaller percentage of special settlers than the other settlements in the region. The figures for the surrounding settlements were almost certainly worse.

### Table 2. Demography of Khibinogorsk/Kirovsk

<table>
<thead>
<tr>
<th>Date</th>
<th>Total pop.</th>
<th>Special settler pop.</th>
<th>Total births</th>
<th>Special settler births</th>
<th>Total deaths</th>
<th>Special settler deaths</th>
<th>Deaths of children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 1, 1932</td>
<td>24,485</td>
<td>17,756</td>
<td>564</td>
<td>420</td>
<td>999</td>
<td>864</td>
<td>589</td>
</tr>
<tr>
<td>Jan. 1, 1933</td>
<td>28,500</td>
<td>19,172</td>
<td>856</td>
<td>506</td>
<td>860</td>
<td>657</td>
<td>339</td>
</tr>
<tr>
<td>Jan. 1, 1934</td>
<td>34,332</td>
<td>19,731</td>
<td>717</td>
<td>374</td>
<td>850</td>
<td>518</td>
<td>352</td>
</tr>
<tr>
<td>Jan. 1, 1935</td>
<td>36,957</td>
<td>21,325</td>
<td>718</td>
<td>310</td>
<td>620</td>
<td>401</td>
<td>192</td>
</tr>
</tbody>
</table>

### Table 3. Birth and Death Rates in Khibinogorsk/Kirovsk

<table>
<thead>
<tr>
<th>Year</th>
<th>Special settler birth rate</th>
<th>Non-special settler birth rate</th>
<th>Total birth rate</th>
<th>Special settler death rate</th>
<th>Non-special settler death rate</th>
<th>Total death rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1931</td>
<td>2.4%</td>
<td>2.1%</td>
<td>2.3%</td>
<td>4.9%</td>
<td>2.0%</td>
<td>4.1%</td>
</tr>
<tr>
<td>1932</td>
<td>2.6%</td>
<td>3.8%</td>
<td>3.0%</td>
<td>3.4%</td>
<td>2.2%</td>
<td>3.0%</td>
</tr>
<tr>
<td>1933</td>
<td>1.9%</td>
<td>2.3%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>1934</td>
<td>1.5%</td>
<td>2.6%</td>
<td>1.9%</td>
<td>1.9%</td>
<td>1.4%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

The data in Table 2 show a total of 3329 deaths, 2440 from the population of special settlers and 1472 children, from 1931 through 1934 in Khibinogorsk. Children made up 44.2% of those who perished in these years, though this percentage declined

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144 GAMO, f. R-163, op. 1, d. 141, ll. 9-26.
145 Births and deaths refer to the previous year. Shashkov, *Spetspereselentsy v istorii Murmanskoi oblasti*, 143, 191.
from a particularly dreadful 59.0% for 1931 to 31.0% for 1934. The figures in Table 3 also reveal a general trend of improvement in the rate of mortality. Interestingly, over this period both the birth rate and death rate of settlers gradually declined. The death rates of 4.9% for the special settlers for 1931 and 3.4% for 1932, compared with the 2.0% for the remaining population for 1931 and 2.2% for 1932, demonstrate the disproportional suffering of these forced migrants over freely recruited laborers and enterprise administrators.

**Scales of Growth**

Over the next decade the establishment of stable mining and enrichment operations in Khibinogorsk and its outskirts involved several spatial scales of industrial development and environmental transformation. Internationally, technicians at *Apatit* relied on foreign equipment and methods to devise a model for industrial operations and the company struggled to make its apatite concentrate into a viable export product. Within the Soviet Union, *Apatit* became the main supplier of material for chemical fertilizers. Regionally, the Kola phosphate industry served as a foundation upon which to expand local mining and transform the area into an industrial center. On each of these scales existed diverse understandings of the economic aspects of nature and the different roles played by the material world.

The interactions of *Apatit* with foreign companies and their representatives relied on vacillations between appreciative dependence and assertive competition. Seeking the means of getting mineral matter to do what they wanted it to do, engineers and scientists made use of techniques already devised in “advanced” Western countries while simultaneously claiming the superiority of socialist industrialization at conquering nature in extreme realms. The project scheme for the enrichment factory in particular utilized information obtained from abroad. The initial plan of fully constructing this object during 1930 quickly staggered as chemists at Mekhanobr and NIU realized that they could not produce high enough concentrations of phosphorous pentoxide from apatite-nepheline ore for superphosphate through selective crushing: a method in which only specific, apatite-rich segments of the mined material underwent additional chemical processing to make superphosphate. Enterprise and state planners therefore turned to an enrichment technique based on the flotation method, which involved pulverizing most of the
removed ore and then separating the contents in liquid solutions.\(^{147}\) In order to figure out the specifics of this technique, *Apatit* sent V. Iu. Brandt and G. F. Smirnov to a consultation visit with *General Engineering Company*—a copper company in Salt Lake City. Relying on international expertise and purchases of foreign equipment, the *Apatit* trust brought the first phase of the enrichment factory into operation in September 1931 and the second phase in 1934.\(^{148}\)

Yet, when faced with criticism or competition from abroad, industrial planners in the Khibiny insisted on the superiority of socialist industrialization over capitalism. The apatite operations in the Khibiny region allowed the Soviet Union to transition from an importer to a major exporter of superphosphate, but not without controversy.\(^{149}\) For instance, in July 1930 a shipment from the Kola Peninsula arrived with contaminated apatite and caused foreign buyers to cancel their orders.\(^{150}\) Around the same time a German specialist on phosphates named Krügel questioned whether it would actually be possible to enrich Khibiny apatite into usable superphosphate and discouraged foreign companies from buying from the Soviet Union.\(^{151}\) The Kola press responded by denouncing Krügel as a “bourgeois specialist” who “defends Moroccan phosphorous.”\(^{152}\) The successful enrichment of Khibiny apatite allowed newspapers to claim a unique ability of the Soviet state to industrialize extreme environments. In October 1932 *Khibinogorski Worker* proclaimed, “Overcoming the ‘unfavorable climate,’ we successfully capture the natural resources wasting away in the earth above the polar circle. We build a large mining and chemical industry in the far north.”\(^{153}\)

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\(^{147}\) GAMO, f. 773, op. 1, d. 5, ll. 58-70 and Petrova, Salimova, and Podgorbunskaya, eds., *Kirovsk v dokumentakh i faktakh*, 39-40.


\(^{149}\) Solov’yanov, *Kol’skii promyshlennyi uzel*; Barabanov and Kalinina, “*Apatit*”, 23; and GAMO, f. 773, op. 1, d. 1, l. 312.

\(^{150}\) GAMO, f. 773, op. 1, d. 6, ll. 25-26 and “Letopis’ sobytii goroda Khibinogorska,” *Zhivaia Arktika*, no. 1 (October 2001): 57.


\(^{152}\) *Khibinogorski rabochii* (October 18, 1932), 1; Nevskii, “Apatity—na vneshnii rynok,” in Fersman, ed., *Khibinskie Apatity*, vol. 2, 121; and GAMO, f. 773, op. 1, d. 7, l. 156.

\(^{153}\) *Khibinogorski rabochii* (October 18, 1932), 1.
Within the Soviet Union as a whole the new industrial settlement on the Kola Peninsula began to fulfill its role as an extraction periphery. Nature on this spatial scale functioned primarily as a production unit: a resource to be taken from the earth at maximally increasing levels and put to use elsewhere in the country. In this case phosphorous-rich apatite mined and processed in the Khibiny supplied fertilizer factories throughout the country such as the ones in Leningrad, Vinnitsk, Odessa, and Konstantinovsk, and then farms applied these fertilizers in agricultural regions. In 1934, 77% of the superphosphate used in the Soviet Union came from apatite. In contrast to capitalist economies, the form of state-socialist economic organization being innovated by the Soviet Union in this period relied less on revenue accrued by an enterprise than on gross production. This privileging of output over profitability was especially pronounced in new industry towns like Khibinogorsk/Kirovsk where the entire project was designed to achieve self-sufficiency in a certain economic sector.

The Apatit trust attempted to implement this use of the Khibiny to serve the national economy by stridently increasing production output to meet rising quotas during the next two five-year plans. This expansion included building the second and third phases of the enrichment factory. At the mine it also entailed mechanizing work with drills powered by compressed air, rearranging the transportation scheme from the mines to the enrichment factory, commencing underground mining, and undertaking preliminary efforts to ventilate these new shafts. In the late 1930s Apatit also began small-scale mining and enrichment of radioactive lovchorrite, titanium, and nepheline. Though the enterprise failed to meet production quotas in 1931 and 1932 and never matched the tempo of some of the early projections, it did raise output consistently.

154 GAMO, f. 773, op. 1, d. 5, ll. 62-70.
155 Vladimirov and Morev, Apatitovyi rudnik im. S. M. Kirova, 12.
156 On the primacy of this goal in Soviet economic planning, see Allen, From Farm to Factory, 203-207.
throughout the 1930s (see Table 4). By the end of the decade, miners had extracted over 13.5 million tons of apatite-nepheline ore and the enrichment factory had produced 6.5 million tons of apatite concentrate.

<table>
<thead>
<tr>
<th>Table 4. Reported Annual Production Output of Apatit in the 1930s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apatite-nepheline ore mined (1,000 tons)</td>
</tr>
<tr>
<td>Apatite concentrate produced (1,000 tons)</td>
</tr>
</tbody>
</table>

Within the context of the Kola Peninsula the expansion of Apatit helped direct the process of regional development—a continuation of the campaign to transform the territory from a supposedly wild and backward hinterland to a strategic industrial center. Over the decade the population of the Kola Peninsula rose to almost 300,000, the fishing industry out of the Murmansk port grew astronomically, the government established the Northern Fleet of the Soviet Navy on the Barents Sea in 1934, and the corridor of the Murmansk Railroad on the Kola Peninsula became a center of mining, non-ferrous metallurgy, hydroelectricity, and chemical processing. Apatit provided the foundation for this latter development. Through the first half of the 1930s, the trust managed the initial projects for a chemical and aluminum processing plant in Kandalaksha on the White Sea, a nickel mining and smelting combine called Severonikel’ on the west side of Lake Imandra, and hydroelectric power plants along the Niva and Tuloma rivers. Kondrikov himself directed most of these entities for a period and in 1936 headed a new

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159 GAMO, f. 773, op. 1, d. 5, ll. 62-70; Barabanov, et al., Gigant v Khibinakh, 51; and Petrova, Salimova, and Podgurbunskaya, eds., Kirovsk v dokumentakh i faktakh, 105.
160 Barabanov, et al., Gigant v Khibinakh, 44-66; Vladimirov and Morev, Apatitovyi rudnik im. S. M. Kirova, 3-4; and Petrova, Salimova, and Podgurbunskaya, eds., Kirovsk v dokumentakh i faktakh, 119.
162 Barabanov, et al., Gigant v Khibinakh, 44-66.
enterprise called Kol’stroi, which was solely focused on regional construction for industry. Of course, his tenure here and as director of the nearby Severonikel’ combine was short. Like many of the local party and industry leaders he was arrested and shot during 1937.  

**Environmental Impediments**

From the very beginning the organizers of mining in the Khibiny Mountains grappled with the obstacles posed by the polar-alpine environment. The agricultural infertility of the land, darkness of the polar night, the seasonal influx of mosquitoes, and meteorological occurrences such as heavy snowfall and avalanches concerned the leaders of the Apatit trust and others involved in the Khibiny economy. Their attempts to overcome these hindrances and the ways that nature could foil their efforts reveal a complex field of interaction. These impediments of the polar environment often occurred with some semblance of predictability and their consequences could be extremely dangerous. Human efforts to ameliorate hazards and accommodate distinct natural limitations sometimes succeeded and sometimes floundered.

The Soviet state managed to establish the cultivation of certain crops north of the Arctic Circle. In late imperial Russia many people suspected that the cultivation of grains, vegetables, and grasses needed for feeding livestock was impossible at such latitudes. This conviction found support in common sense about the lack of farming in these territories. The theories of Vasilii Dokuchaev about vegetation zones and Austrian botanist Gottlieb Haberlandt about the minimal exposure to warmth required for many plants to grow also dissuaded people of the possibility of polar agriculture and limited experimentation. In the early 1920s the Khibiny Experimental Agricultural Point was organized under the leadership of Iogan Eikhfel’d in order to establish the possibility of

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164 An example of the frequent evocation of this idea is A. A. Kamenev, “Iz zhizni Pomor’ia,” *Izvestiia Arkhangel’skogo obshchestva izucheniia russkogo severa* 2, no. 7 (April 1, 1910), 18.
cultivating crops in the north.\textsuperscript{166} Their tests quickly refuted the hypothesis about warmth as a limiting factor and suggested that a lack of moisture and suitable soil on the rocky Kola Peninsula played a much larger role in curtailing the region’s agricultural development. The station succeeded in growing a few types of a variety of crops: potatoes, cereals, grains, grasses, cabbage, peas, lettuce, and others.\textsuperscript{167} It also assisted Apatit by helping establish the suitability of Khibiny minerals as fertilizers.\textsuperscript{168}

Apatit also created the state farm Industriia to help provide food for the new northern settlement. Acknowledging that growing grains was not a viable option, Industriia concentrated on milk and vegetable production. Both of these tasks required that the state farm transform the land of the Kola Peninsula. During the 1930s, the agricultural establishments of the Khibiny region performed land reclamation on a large territory of marshland, put 1634.9 hectares under cultivation, and yielded a harvest of 6295 tons of potatoes, vegetables, and edible roots in 1939.\textsuperscript{169} Furthermore, the development of non-pastoral animal husbandry depended on the creation of grassland pastures. To this end agricultural organizations in the Khibiny drained marshes and planted 1244.4 hectares of grass during the 1930s, which allowed Industriia to keep cattle, horses, and pigs.\textsuperscript{170} These experiments with local food production, nevertheless,


\textsuperscript{169} Petrova, Salimova, and Podgorbunskaya, eds., Kirovsk v dokumentakh i faktakh, 54, 94-95, 132-133. In 1945 the state farm “Industria” had 1735 hectares cultivated. RGASPI, f. 17, op. 122, d. 104, l. 163.

\textsuperscript{170} Petrova, Salimova, and Podgorbunskaya, eds., Kirovsk v dokumentakh i faktakh, 54,132-133 and Osinovskii, “Rol’ khibinskikh apatitov v kolonizatsii Kol’skogo poluostrova,” in Fersman, ed., Khibinskie Apatity, vol. 1, 204-211.
remained of secondary importance in the overall scheme of regional economic
development. The possibility of the comparatively cheap importation of food combined
with the environmental impediments to agriculture in the polar north limited the
transformation of land for this purpose.

The Polar-Alpine Botanical Garden also endeavored to make the Khibiny
environment more accommodating to human use. Created in 1932 and led by Nikolai
Avrorin, this institution had the specific goal of introducing new flora to the region. The
botanical garden concentrated on characteristics that made the region’s environment
unique—its polarity and high altitude—and began testing different species of plants,
trees, and bushes to see if and under what conditions they could grow there.\footnote{N. A. Avrorin, \textit{Poliarno-al’piiskii botanicheskii sad v khibinakh (proekt)} (Leningrad: Izdatel’stvo Akademii Nauk SSSR, 1931); Petrova, Salimova, and Podgorbunskiaia, eds., \textit{Kirovsk v dokumentakh i faktakh}, 81-83; and N. A. Avrorin, “Poliarno-al’piiskii botanicheskii sad,” in Fersman and Kupletskii, eds., \textit{Khibinskaja gornaia stantsiia}, 49-58.} An astute
promoter of the practical value of his research, Avrorin from the beginning stressed the
garden’s cultural value. He argued that the botanical garden was part of “a wide front of
the struggle for succulent meadows (tuchnye pokosy), unprecedented berry gardens,
splendid parks, and a healthy and comfortable life for the laborers of the socialist
north!”\footnote{N. A. Avrorin, “Poliarnyi botanicheskii sad v zapoliarnoi tundre,” in Geber, Maizel’, and Sedlis, eds., \textit{Bo’sheviki pobedili tundru}, 170.} Throughout the next few decades, the botanical garden put particular effort into
the greening of Kirovsk through the introduction of acclimatized species.\footnote{Kalinnikov and Vinogradov, “Stanovlenie i razvitie Kol’skogo nauchnogo tsentra RAN kak istoricheskui opyty Rossisskogo puti promyshlennoi tsivilizatsiia severnykh territorii v XX veke,” in Kalinnikov, ed., \textit{Priborodopol’zovanie v Evro-Artikheskom regione}, 5-6; N. A. Avrorin, \textit{Chem ozeleniat’ goroda i poselki Murmanskoi oblasti i severnykh raionov Karelo-Finskoj SSR} (Kirovsk: Izdanie Ispolnitel’nogo Komiteta Murmanskogo oblastnogo Soveta deputatoj trudiaxhikhshcia, 1941); and GAMO, f. 773, op. 1, d. 52, l. 506.} In a 1941
handbook outlining how cities in the polar north could create green spaces, Avrorin
specifically connected the research of the Polar-Alpine Botanical Garden to the
Lamarckian science of agronomist Trofim Lysenko.\footnote{Avrorin, \textit{Chem ozeleniat’ goroda i poselki Murmanskoi oblasti i severnykh raionov Karelo-Finskoj SSR}, 4.}

Responses to environmental impediments related to seasonal variation came more
in the form of attempts to accommodate nature rather than transform it. Every year the
Khibiny region experienced several weeks around the winter solstice when the sun did
not rise above the horizon and over a month and half in the summer without darkness at
night. Party and enterprise leaders wanted to figure out how to utilize the advantages of the fluctuations in daylight and cope with the disadvantages. The Apatit trust concentrated mining work in open pits during the summer in the first year and later implemented a regime of three work shifts a day to maintain constant mining.\textsuperscript{175} In the winter the trust and the city relied extensively on artificial light sources, including simple torches before a temporary steam-based electric station began to operate in 1931.\textsuperscript{176} Regional leaders also sought to understand the effects of such extreme seasonal variation on the human population. As part of a health inspection report in 1935, Friliand presented preliminary data on the acclimatization of humans to the climatic and geographical conditions of Kirovsk. Noting theories that the polar night can cause depression and the polar day can lead to insomnia, the inspector rejected the claim that polar seasonality harmed human health. He dismissed reported incidents of adverse conditions during these periods as part of the process of adaptation.\textsuperscript{177}

In the late summer and fall mosquitoes caused a great nuisance. As V. Iu. Fridolin put it: the mosquitoes of the Khibiny Mountains were “one of the biggest obstacles for the colonization of the region” and have been known to kill horses and small children through excessive blood loss.\textsuperscript{178} The mosquitoes in the area were indeed ravenous creatures whose brief life span in the Arctic required them to forage and mate quickly and aggressively when the opportunity arose.\textsuperscript{179} A prime concern about mosquitoes, however, was the role that they might play in spreading malaria. As a countermeasure the Apatit trust and the Malaria Commission of the Zoological Museum of the Academy of Sciences sponsored research beginning in the summer of 1930. Fridolin led this study and sought to assess the entirety of the mosquito habitat in the Khibiny and the relationship of the insects with predators and prey. He argued against a standard belief at the time that the

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\textsuperscript{175} Kondrikov, “Sostoianie i perspektivy stroitel’stva v raione Khibinskikh razrabotok,” Karelo-Murmanskii krai, no. 5-6 (1931): 10 and Vladimirov and Morev, Apatitovyi rudnik im. S. M. Kirova, 42.


\textsuperscript{177} GAMO, f. R-163, op. 1, d. 141, ll. 9-26.

\textsuperscript{178} V. Iu. Fridolin, “Izuchenie nasekomykh Khibinskikh gor v sviazi s voprosom o kolonizatsii kraiia,” in Fersman, ed., Khibinskie Apatity, vol. 2, 446.

\textsuperscript{179} ARAN, f. 544, op. 1, d. 161, ll. 19-26.
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draining of marshes was the primary tactic in the ‘struggle with mosquitoes.’ Fridolin showed that drainage of certain peat bogs and marshes could alter the hydrology of the area and cause new moist zones to emerge. The drainage of black poplar marshes, in particular, could actually increase the mosquito population by destroying the larvae of dragonflies, one of the few local predators. The main finding of this research on Khibiny mosquitoes, however, was that they do not carry malaria. The inability of the protozoan parasites that cause the disease to thrive in such cold environments ameliorated this threat to industrial projects on the Kola Peninsula.

As mentioned earlier, avalanches plagued the Khibiny region in the 1930s. From 1933 to 1938 observers recorded about three hundred avalanches of 200 cubic meters or more. These avalanches destroyed buildings and caused injuries and death, including that of two miners in 1934 and the tragedy on Mount Iuksporr in 1935. Part of the immediate response to the latter event was to create an avalanche prevention service headed by Pronchenko, an exploration geologist and secretary of a local Communist Party cell. In late December Pronchenko wrote about the work that the monitoring crew had done in his diary: “the gusty wind from the snow storm covers the eyes, hits the forehead and cheeks, and prevents [you] from moving forward. All around only a blizzard whizzes. … Climb up in the blizzard under overhanging rocks and cornices of snow! What do you do? – the people of the settlement live in constant fear. “

180 Fridolin, “Izuchenie nasekomykh Khibinskikh gor v sviazi s voprosom o kolonizatsii kraia,” in Fersman, ed., Khibinskie Apatity, vol. 2, 446-451. On Fridolin’s conservationist ideas, see ARAN, f. 544, op. 1, d. 161, ll. 40-42. One author promoted the idea that a subsidiary benefit of draining and burning marshes to cultivate grassland for animal grazing was the elimination of mosquitoes and flies: Osinovskii, “Rol’ khibinskikh apatitov v kolonizatsii Kol’skogo poluostrova,” in Fersman, ed., Khibinskie Apatity, vol. 1, 208.
182 Enterprise leaders continued to express concern about mosquitoes, though. GAMO, f. 773, op. 1, d. 51, l. 203.
“Avalanche, avalanche, watch out!” His death under tumbling snow secured him a place as a hero in local lore.

The reaction to the considerable loss of life during the winter of 1935-1936 entailed several strategies in the invigorated ‘struggle with avalanches.’ Local scientific organizations devoted more energy to the study of the phenomenon by establishing a permanent meteorological base on Iuksporr, holding conferences to discuss the issue, researching the morphological dynamics of snow cover, and attempting to determine zones most prone to avalanches. The city allocated more money to the construction of stone buildings that could better withstand the tumbling snow and rocks and to the erection of four-meter high walls protecting the settlements. The leaders at the Apatit trust were in a more ambiguous position since the explosions they were using in mining exacerbated the problem. The enterprise established a snow service, began to use controlled explosions to reduce the randomness of avalanches, and instituted new safety requirements for mining work. At a party meeting of miners in February 1938 after another avalanche, the depth of the tension over these phenomena was apparent. The bosses at the mine had refused to clear the work site as called for by protocol after wind speeds exceeded 10 meters per second (22.4 miles per hour). Still in the crux of the terror within the Communist Party, attendees denounced enemies of the people as responsible and reported the spread of rumors that the Bolsheviks had intentionally killed people. That same year Apatit had to stop operating its lavchorrite mine on Mount Iuksporr because of frequent avalanches. In the long run the efforts to mitigate injuries and damage from avalanches in the Khibiny Mountains paid off. By the 1950s and 1960s...

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187 Fersman, Vospominaniia o kamne, 57.
188 ARAN, f. 544, op. 1, d. 334, ll. 1-6; ARAN, f. 544, op. 1, d. 335, ll. 1-22; ARAN, f. 544, op. 8, d. 388, ll. 1-2; and Belen’kii, “Iz istorii issledovaniia snega i lavin v khibinakh,” in Zamotkin and Egorova, eds., Priroda i khoziaistvo Severa, vol. 2, part 2, 305-310. Some of the researchers involved in studying snow cover and avalanches here later produced monographs on the subject generally: G. D. Rikhter, Rol’ snezhnogo pokrova v fiziko-geograficheskom protsesse (Moscow: Izdatel’stvo Akademii nauk SSSR, 1948).
190 ARAN, f. 544, op. 1, d. 334, l. 1; Belen’kii, “Iz istorii issledovaniia snega i lavin v khibinakh,” in Zamotkin and Egorova, eds., Priroda i khoziaistvo Severa, vol. 2, part 2, 305-310; GAMO, f. P-152, op. 1, d. 1v, ll. 18-21; and GAMO, f. 773, op. 1, d. 63, ll. 162-169.
191 GAMO, f. P-152, op. 1, d. 1v, ll. 18-21.
192 Rzhevskaia and Rzhervskii, “‘Malye’ rudniki tresta “Apatit” kak popytka kompleksnogo osvoeniiia mineral’nykh bogatst Khibin,” in Chetvertye Ushakovskie chtenii, 121.
people had learned to accommodate these natural occurrences and largely avoid the catastrophic consequences of the 1930s.\footnote{The \textit{Apatit} combine in this period, for instance, routinely would receive funds for snow removal equipment. RGAE, f. 4372, op. 62, d. 565.}

**The Waste that Does Everything and Nothing**

Some of the planners of this project in the far north made strident efforts to manage industrial waste as resourcefully as possible. The dominant idea behind this approach was referred to as the complex utilization of natural resources, and the main materials subjected to such schemes were the nepheline by-products from apatite mining and enrichment. The story of nepheline in the Khibiny reveals some striking aspects of Stalinist economic transformation. First, the Soviet economy in this period had a conservationist strand in its approach to wastes from industry. The revolutionary hopes of building socialism helped inspire it and some of the particularities of the emerging centralized command economy allowed for it to be pursued initially. Additionally, the impulse maximally to reuse certain mining by-products and reduce pollution coexisted comfortably with the idea of harmoniously transforming nature. Finally, nepheline itself first inspired the elaboration of this grand design to utilize all elements of extracted mineral ore and then inhibited its realization.

As geologists and local enthusiasts began to get excited about the possibilities of apatite development in the 1920s, they simultaneously turned to another nagging question: What should be done with the massive amounts of nepheline in the area?\footnote{Borisov, “Khibinskie nefelinovye sienity i pervoe stelko iz nikh,” \textit{Karelo-Murmanskii krai}, no. 4 (1927): 14-16; Labuntsov, “Poleznuye iskopaemye Khibinskikh tundr i Kol’skogo poluostrava,” \textit{Karelo-Murmanskii krai}, no. 5-6 (1927): 7-9; and Inzh. P. Gaevskii, “Promyshlennoe ispol’zovanie nefelinogo sienita,” \textit{Karelo-Murmanskii krai}, no. 7-8 (1927): 15-16. The nepheline rock gave rise to many of the rare minerals of the Khibiny Mountains, including crystalline pegmatite rocks, and therefore was also partially responsible for having attracted mineralogists to the area.} The bulk of the Khibiny Mountains was a large igneous intrusion of this rock form, making the reserves of nepheline in the region seem “inexhaustible” to many commentators.\footnote{\textit{Poliarntaia pravda} (November 17, 1936), 2; Ivanov, “Predislovie,” in Vishnevskii, \textit{Kamen’ plodorodiiia}, 3; Borisov, “Khibinskie nefelinovye sienity i pervoe stelko iz nikh,” \textit{Karelo-Murmanskii krai}, no. 4 (1927): 14; Iakovlev. “Osvoenie minerala,” \textit{Karelo-Murmanskii krai}, no. 4 (1933): 8; Sedlis, “Khleb i metall (znachenie khibinskoi promyshlennosti v dele khimizatsii narodnogo khoziaistva),” in Geber, Maizel’, and Sedlis, eds., \textit{Bošheviki pobedili tundra}, 87; and GAMO, f. 773, op. 1, d. 51, l. 200.} Nepheline in the Khibiny occurs as nepheline seynite, an alkaline rock containing sodium, potassium, aluminum, and silicon. Unlike the deposits of apatite that
existed in isolated slivers along a narrow ring that could quickly and fairly cheaply be transformed into fertilizers, nepheline did not have an industrial significance that would have warranted building a settlement from scratch. However, its potential status as subsidiary material inspired scientists and industrial planners to outline its multifarious uses.196

Four different forms of nepheline were of interest. The mass of urtite (nepheline seynite) outside the apatite deposits could in theory be used to make a whole array of nepheline products but would be economically inexpedient. The nepheline sands on the eastern shore of Lake Imandra could serve the glass, ceramic, and porcelain industries. However, the supply of these sands came to only 5 million tons, a relatively small total. The main forms of nepheline that attracted attention were the sections of mined apatite-nepheline ore that were not suitable for processing as phosphates and the tailings from apatite enrichment that contained 70-75% nepheline and, barring reuse, would be dumped into the White River.197 Breaking down the chemical structure of Khibiny nepheline to 21-22% alkaline, 34% alumina (aluminum oxide), and 44% silicon dioxide, Fersman elucidated twenty-three different uses for these molecular agents.198 The most important of these possibilities was the potential use of nepheline as an alumina source.199 Throughout the 1930s the Apatit trust endeavored to transform the nepheline wastes it produced into a source material for the aluminum industry.

The main framework of industrial waste management advocated by planners of the Khibiny project entailed what they called the “complex utilization” of natural

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resources. This model sought to use maximally all of the material removed from the earth and develop industry that would achieve regional self-sufficiency. The idea of complex utilization developed through the practical work of scientists like Ferman with Khibiny nepheline.\footnote{Olli Salmi and Aino Toppinen, “Embedding Science in Politics: ‘Complex Utilization’ and Industrial Ecology as Models of Natural Resource Use,” \textit{Journal of Industrial Ecology} 11, no. 3 (2007): 93-111; GAMO, f. 773, op. 1, d. 9, ll. 8-10; and GAMO, f. 773, op. 1, d. 5, l. 174.} At a Gosplan conference in April 1932, Fersman defined a combined economy as resting “not in the external combining or the summation of diverse manufacture, united only by a determined territory or in the best case by a general power and energy economy, but in the deep interweaving of production processes, depending on the complete use of all mining mass extracted from the earth during the maximum constriction of the radius of use of raw materials.”\footnote{A. E. Fersman, \textit{Kompleksnoe ispol`zovanie iskopaemogo syr`ia} (Leningrad: Izdatel`stvo Akademii Nauk SSSR, 1932), 1.} As his main example of this model, he cited the apatite industry he had helped create in the Khibiny Mountains.\footnote{Fersman, \textit{Kompleksnoe ispol`zovanie iskopaemogo syr`ia}, 11-15.} He further described how this complex utilization of mineral material would rely on technological innovations in heavy industry processing and the recycling of tailings from enrichment in order to manufacture other valuable products.

Fersman’s optimism about the potential of this model in a planned socialist economy came through especially when he turned to its environmental implications. Complex utilization “is the idea of the protection of our natural resources from their predatory squandering, the idea of using raw material to the end, the idea of the possible preservation of our natural supplies for the future,” exclaimed Fersman, “where not one gram of extracted mining mass is lost, where there is not one gram of waste, where nothing is emitted into the air and washed away by water.”\footnote{Fersman, \textit{Kompleksnoe ispol`zovanie iskopaemogo syr`ia}, 19.} The goal of complex utilization in the Khibiny, therefore, was not only to use mined ore efficiently, but also to prevent nepheline waste from polluting the local environment.

This idea of industrial production that was maximally efficient with the raw materials extracted from the earth and minimized nepheline waste and pollution inspired the initial planning and modes of expansion pursued by trust leaders. In December 1929, before the basic plans for the project had even been worked out, Kondrikov pressed the
issue of the potential applications of nepheline.\textsuperscript{204} The next year Vorontsov justified dumping nepheline tailings into the White River as a temporary measure until reprocessing began.\textsuperscript{205} From 1931 onward the Apatit trust became involved in a protracted campaign to turn nepheline wastes into a source material for aluminum production and to create a processing plant in nearby Kandalaksha. Near the end of the year trust leaders estimated that they could gradually increase their annual output of nepheline concentrate from tailings from 140,000 tons in 1933 to 750,000 in 1937, providing enough material for almost a half million tons of alumina over this period.\textsuperscript{206} In February 1932, various agencies involved in the project protested a decision to place the alumina plant under the Aluminum Union of the Main Administration of Non-Ferrous Metallurgy of the NKTP, taking it away from Apatit.\textsuperscript{207} In a complaint that would reach Stalin, one chemist objected to this move because it would separate aluminum production from the “complex utilization of the minerals of the Khibiny.”\textsuperscript{208} A few months later, in May 1932, the issue was solved for the time being when the state transferred Apatit to the NKTP and allocated it approximately 17 million rubles for the construction of the new combine.\textsuperscript{209} At the time dubbed the Northern Chemical Combine, the facility was planned to have three main sections—cement, thermophosphate, and alumina—that would process materials extracted from the Khibiny.\textsuperscript{210}

The processing of nepheline tailings into alumina was uncommon. Bauxite was and has remained the primary source material of the aluminum industry globally. Rich deposits of bauxite rock contain up to 40-60\% of alumina and the main process for isolating this substance has been used since the late nineteenth century.\textsuperscript{211} The Soviet Union, however, had a comparative dearth of this raw material that was especially stark before low-grade deposits of it just south of Lake Ladoga in the Leningrad region began

\textsuperscript{204} GAMO, f. 773, op. 1, d. 1, ll. 100-106.
\textsuperscript{205} GAMO, f. 773, op. 1, d. 2, ll. 238-244.
\textsuperscript{206} RGAE, f. 4372, op. 29, d. 832, l.1.
\textsuperscript{207} GAMO, f. 773, op. 1, d. 9, ll. 7-11.
\textsuperscript{208} GAMO, f. 773, op. 1, d. 9, l. 8 and GAMO, f. 773, op. 1, d. 15, ll. 102-104.
\textsuperscript{209} GAMO, f. 773, op. 1, d. 9, l. 11 and Barabanov, et al., Gigant v Khibinakh, 50.
to be exploited in 1931.\textsuperscript{212} Though alumina production required a significantly larger amount of nepheline than bauxite (four tons of nepheline concentrate per ton of alumina), the process created several useful by-products: cement, soda ash (sodium carbonate for glass manufacture), and potash (a form of potassium carbonate that can be applied as a fertilizer).\textsuperscript{213} The value of these substances figured into the calculations that advocates of re-processing nepheline tailings at \textit{Apatit} made to demonstrate its economic viability. The main obstacle to using this method was the lack of limestone (needed as a reagent) in the region and the transportation and energy costs associated with the manufacturing scheme.\textsuperscript{214} These negative factors ultimately made alumina production from nepheline more expensive. Nevertheless, a combination of concern over a lack of bauxite sources and attraction to processing technology that minimized waste and maximized the output of an array of products inspired initial investment in the construction of a new combine.\textsuperscript{215} It is likely that an economy primarily concerned with profit instead of output would not have embraced this path of waste recycling for nepheline.

After the initial decision to build a chemical combine in Kandalaksha, the project faltered. State agencies refused further funding requests from the trust, allocating only one-fifth of the proposed amount for 1932-1935. During this period none of the main industrial objects was built and the surveying for local limestone sources had come to naught.\textsuperscript{216} The discovery of new rich bauxite deposits in the Urals in the mid-1930s strengthened the position of the segments of the non-ferrous metallurgy industry that

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\textsuperscript{214} ARAN, f. 544, op. 1, d. 378, l. 9-9ob and GAMO, f. 773, op. 1, d. 9, ll. 252-266. Of course, the \textit{Apatit} trust claimed that even considering these factors an alumina plant in Kandalaksha was economically expedient. GAMO, f. 773, op. 1, d. 9, ll. 53-77, 94-107, 267-274.

\textsuperscript{215} The proposed process of obtaining alumina from nepheline would create sludge (\textit{shlam}) and alkali wastes, but significantly less than from the bauxite process. GAMO, f. 773, op. 1, d. 9, l. 310. In the 1970s the nepheline process could claim to turn 4 tons of nepheline concentrate and 8 tons of limestone into 1 ton of alumina, 10 tons of cement, and 1 ton of a soda-potash mixture. Shabad, “News Notes,” \textit{Soviet Geography} 15, no. 6 (June 1974): 386-387. Though neglecting the anthropogenic loads of energy use and transportation, such a production equation does reveal the minimal material waste resulting from the process.

\textsuperscript{216} GAMO, f. 773, op. 1, d. 9, l. 283ob.
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opposed using nepheline. Nevertheless, engineers and consultants for the trust continued to promote research on nepheline and in 1935 succeeded in getting an alumina plant in Volkhov, outside of Leningrad and near a limestone quarry, to convert to using nepheline concentrate. G. F. Solov’ianov enthused about this time that “the only raw material source able to play a decisive role as a substitute of the world aluminum industry is Soviet /Kola/ nepheline.” At this point, as Apatit began to pay some attention to the effects of dumping in the White River, the enterprise commenced construction on a nepheline enrichment facility to produce nepheline concentrate out of tailings. A full-capacity, combined apatite and nepheline enrichment factory, initially begun in 1933, went into operation in 1939 and that year construction began on a redesigned aluminum refinement plant (producing aluminum from alumina and not alumina from nepheline) in Kandalaksha. Limestone’s presence and absence partially determined this alteration.

As the project began moving again in the mid-1930s and the development of the nearby nickel industry was underway, researchers and enterprise leaders searched for additional applications for nepheline waste. In 1935 a controversy arose as Apatit attempted to sell nepheline concentrate as a coagulant for water purification and the State Sanitation Inspectorate prohibited this use. The agency was concerned about the relationship between the purifying fluorine and the potentially poisonous phosphorous anhydride in Khibiny apatite and forced the enterprise to continue testing before giving its approval. At a meeting of a bureau of the scientific research sector of the NKTP in January 1936 devoted to “the questions of the complex utilization of Khibiny apatite-nepheline ore” attendees passed several resolutions. One endorsed the construction of a new factory in Leningrad, “Red Chemist,” that would process alumina from nepheline with sulfuric acid. Others called for the State Institute of Applied Chemistry (GIPKh) to devise a chlorination method for processing nickel and copper ore, to examine the relationship between the purifying fluorine and the potentially poisonous phosphorous anhydride in Khibiny apatite and forced the enterprise to continue testing before giving its approval.

ARAN, f. 544, op. 1, d. 378, l. 9ob.
GAMO, f. 773, op. 1, d. 9, ll. 157-166, 267-274, 309-326, 371 and GAMO, f. 773, op. 1, d. 59, ll. 39-47, 218-244.
GAMO, f. 773, op. 1, d. 59, l. 47.
GAMO, f. 773, op. 1, d. 55, ll. 237-265.
GAMO, f. 773, op. 1, d. 52, ll. 61-82, 114-115, 248-251; GAMO, f. 773, op. 1, d. 51, ll. 402-409; and Teppor, “Primenenie nefelina dlia ochistka vody po sposobu koagulirovania,” in Fersman, ed., Khibinskie Apatity i nefeliny, vol. 4, 246-250.
potential use of chlorine as a gas, to research applications of tailings from nickel and
copper processing, and to study the enrichment of rare minerals in the region.223

During this meeting, the participants joked playfully about the entire issue of
reusing industrial wastes and revealed some of their thinking about the problem. For
instance, Kondrikov quipped, mocking opponents of complex utilization, “it is the same
in heavy industry. ‘Yes ‘the tails of bulls’ interest me’ /laughter/. ‘And only them. But I
do not need the ‘bull.’’ And let’s end this business. Here and now. They want to receive
refined alumina and to the 'holy mother' with everything else.”224 After explaining the
need for more research on a chlorination method of nickel processing that would utilize
nepheline tailings, A. N. Kuznetsov of the GIPKh told Kondrikov to build the factory
with old methods if it was so pressing. To this comment Kondrikov replied, “We will
leave all the dumping mounds and save them (otvaly) /laughter/” and Kuznetsov retorted,
“Please. I collect all kinds of trash.”225 While continuing in a jovial vein, Kondrikov did
blurt out the crux of the issue from the perspective of Apatit: the need for the
“modernization of methods” as ore qualities fall and that the issue is “not how to throw it
away, but how to use it.”226 The overall disposition that was displayed at this meeting of
Soviet industry demonstrates the convictions both that minimizing industrial waste was
inherently economical and that human manipulation would eventually be able to get
nature to do what they wanted it to do.

In the long run, we can judge Fersman’s environmentally hopeful vision of the
complex utilization of nepheline as a failure. The nepheline tailings produced by apatite
production never came close to being completely reused and the dumping of them in the
White River continued for many years, supposedly turning the water literally white by the
late 1930s.227 Apatit produced very little nepheline concentrate before the Second World
War devastated Kola industry. Two alumina plants south of Lake Ladoga, Volkhov and
Pikalevo, began using Khibiny nepheline in 1949 and 1959, respectively, and the
Kandalaksha Aluminum Factory finally opened in 1951.228 As production figures for

223 GAMO, f. 773, op. 1, d. 59, ll. 5-7.
224 GAMO, f. 773, op. 1, d. 59, l. 16ob.
225 GAMO, f. 773, op. 1, d. 59, l. 30.
226 GAMO, f. 773, op. 1, d. 59, ll. 31ob-32ob.
227 ARAN, f. 544, op. 1, d. 161, l. 41.
228 Shabad, Basic Industrial Resources of the USSR.
apatite concentrate grew astronomically, thereby creating an equivalently large amount of nepheline tailings, the amount of nepheline concentrate manufactured by the trust staggered, only reaching the level of 750,000 tons a year that had been estimated for 1937 in the 1960s.\textsuperscript{229} To the chagrin of Apatit the country’s aluminum industry remained more attracted to the idea of importing foreign bauxite than increasing processing with nepheline after Soviet bauxite sources began to dwindle in the 1970s and 1980s.\textsuperscript{230} Through that time only around 15\% of the nepheline wastes created by the mining and processing of Kola apatite were used to make nepheline concentrate; the rest of it was either discharged into local waterways or placed in one of several tailing dumps (khvostokhranilishcha).\textsuperscript{231} Until 1957 the company poured unfiltered wet tailings into the White River and continued to pollute this waterway on a large scale after this point. The three dry tailing dumps eventually filled and became point sources for hazardous dust.\textsuperscript{232} By 2002, one scientist estimated that half a billion tons of nepheline sat in these tailing dumps and still spoke of the possibility of someday processing aluminum from these wastes.\textsuperscript{233} Another scholar made a more critical estimate in 2004, putting this figure at close to 900 million tons and additionally noting that over half of the 3 billion tons of ore (over a cubic kilometer in area) extracted from the Khibiny Mountains remained in rock heaps near the mines.\textsuperscript{234} This estimation would mean that at most 20\% of the material taken from the mountains had been transformed into an industrial product.

But why were so many grams of extracted mining mass lost, so many grams of waste produced, and so much emitted into the air and washed away by water? An explanation focusing solely on human intentions and economic logics misses the fact that

\textsuperscript{229} Barabanov, et al., \textit{Gigant v Khibinakh}, 77, 96.
nepheline rock was not passive in this process. Nepheline’s potential as both a pollutant and aluminum source inspired the schemes of complex utilization to turn it into the latter, but its intractability hindered these plans and resulted in it primarily functioning as an agent of environmental destruction. The point here is not that political and economic will could not have overcome nepheline’s recalcitrance, but that in this case they did not. Though the behavior of mineral ore does not explain the human craving for industrial production in the Khibiny, it does reveal both part of the origin of these environmental hopes during Stalinist industrialization and an important reason why they did not come to fruition.

**Confronting Pollution**

To a surprising extent, the leaders of *Apatit* in the 1930s knew about the problems being caused by air and water pollution and made some attempts, albeit often impotent and half-hearted, to address these issues. Different groups within the state apparatus carved out divergent positions: sanitation inspectors were the most concerned; local government leaders worried about the impact on human health; scientists seemed eager to extend their expertise into further realms; and enterprise leaders defended the measures they had taken and resisted new ones. If the promotion of complex utilization reflected the environmental optimism of Stalinist modernization, debates about pollution in the 1930s pointed more to the contradictions that abided in Soviet socialism between efforts to render nature economically useful and attempts to harmonize humans’ relationships with the environment.

The issue of pollution came to the forefront as state planners began devising a scheme to expand the city of Khibinogorsk in the fall of 1934, raising the population of the town and the mining settlements at Kikusvumchorr and Iuksporiok to 68,000.235 Concerns about this proposal spread through planning bureaucracies at the city, regional, republic, and state levels. A number of agencies expressed concern about remedying the poor organization of the water system, preserving the remaining green areas in the city, reducing dust in town created by the enrichment factory, and closing or moving an experimental phosphorous factory that had been in operation since 1933.236 A report of

235 GAMO, f. 773, op. 1, d. 51, ll. 88-90.
236 GAMO, f. 773, op. 1, d. 51, ll. 84-100.
V. E. Lebedeva of the Main State Sanitation Inspection of the RSFSR from January 25, 1935 sent to Apatit and other organizations was particularly explicit. The report claimed that overall, Kirovsk was a difficult place in which to arrange good sanitary conditions. She noted that currently a layer of dust sat on top of the roofs and steps of buildings and had begun to kill coniferous trees. She suggested installing new electric filters at the enrichment factory and greening the area to bulwark air quality, but acknowledged that the location of the enrichment facility meant that it would continue to represent “definite insalubrities for the city.” Lebedeva also called on Apatit to filter out “resinous substances and kerosene” from the water it dumped. These materials “can spoil the water of the lake and kill the fish it has there. The White River itself might turn into a canal of liquid sewage.” The report advocated that the location of the town’s food combine, currently in close proximity to sources of water and air pollution, should be changed. It also predicted that the conversion of the mines at Kukisvumchorr and Iuksporiok to underground work would raise new possibilities for polluting the water supply.

A major topic discussed in this report and by others in this period was the experimental phosphorous factory a half kilometer from the mining settlement of Iuksporiok. Lebedeva claimed it was “a source of extraordinarily dangerous water and air” because of its phosphorous discharges. The trust decided to build this installation quite close to a site that had been rejected for the apatite enrichment factory because of the stated need to maintain Great Vud’iavr as a safe source for drinking and industrial water. After only a few years of operation the phosphorous factory had already begun to deplete the fish population in the ostensibly protected Great Vud’iavr Lake and gases such as carbon monoxide threatened human health.

In March 1935 an engineer for Apatit, upon noticing a stench from the water in the Iuksporr valley, tested samples and

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237 GAMO, f. 773, op. 1, d. 51, ll. 91ob-94.
238 GAMO, f. 773, op. 1, d. 51, l. 92.
239 GAMO, f. 773, op. 1, d. 51, l. 92ob.
240 GAMO, f. 773, op. 1, d. 51, l. 92ob.
241 GAMO, f. 773, op. 1, d. 51, l. 92ob.
243 GAMO, f. 773, op. 1, d. 51, l. 92ob.
established the presence of the poisonous phosphine (PH$_3$). He insisted that immediate action should be taken to reduce this hazard.

Despite the litany of environmental problems with the proposed expansion of Apatit, the State Sanitation Inspection of the RSFSR concluded that it did not need to oppose it if certain issues were addressed. Shortly thereafter Gosplan of the RSFSR approved the expansion. The resolution highlighted the priority of increasing production at the Kikusvumchorr mine to 4 million tons and at the Iuksporr mine to 2 million tons. The Council of People’s Commissars of the RSFSR also approved the project and supported the request of the recently renamed Kirovsk City Council for comprehensive research into potential sources for the water supply, the purification of industrial and fecal wastewaters, sewer construction, and the preservation of the existing green areas in the city.

Controversy over pollution soon appeared again. At a meeting of local party and enterprise leaders on April 8, 1935, it was clear that concern about dust and poisonous drinking water circulated throughout the city. At a gathering of the Society of Regional Studies the previous evening there was what one critical attendee called “unwarranted racket” about the water quality of Great Vud’iavr. S. I. Vol’f kovich presented some of the preliminary results of an ongoing government study that indicated that sewage water from the phosphorous factory was reaching Great Vud’iavr. Though the present levels seemed safe, the enterprise urgently needed to purify the industrial sewage from the phosphorous factory and add fluorine to the water, which could oxidize and stabilize phosphorous substances. Fridliand focused his comments on dust from the enrichment and phosphorous factories. He claimed that these particles could cause tuberculosis. Encouraging ventilation measures on the work sites, Fridliand concluded: “if we do not take sanitary (ozdorovitel’nykh) measures, there will be poisoning.” Other speakers

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244 GAMO, f. 773, op. 1, d. 51, ll. 317-318.
245 GAMO, f. 773, op. 1, d. 51, ll. 93ob-94.
246 GAMO, f. 773, op. 1, d. 51, l. 100.
247 GAMO, f. 773, op. 1, d. 51, l. 84.
248 GAMO, f. 773, op. 1, d. 51, l. 282.
249 GAMO, f. 773, op. 1, d. 51, ll. 297-301.
250 GAMO, f. 773, op. 1, d. 51, ll. 276-278.
brought up the failure of the enterprise to build the planned sewage system and the general location of the city as factors exacerbating the effects of pollution.\textsuperscript{251}

The dominant voices at this meeting, especially those from \textit{Apatit}, ignored the reports of Vol’fkovich and Fridliand and the recent discovery of toxic phosphine in the water. They emphasized the uncertainty about the issue as a means of dismissing its seriousness. One obstreperous speaker, Isakov, retorted that raising concern over the issue before the completion of testing in August was “indecent” if not “politically disloyal.” He reported that he was receiving calls day and night about phosphorous in the water and that “panic is already beginning to be felt” in the city. Though he used the lack of thorough knowledge about pollution to depict discussion of this environmental issue as dangerous in a borderland region, Isakov also was quick to evoke his own subjective impression to dismiss the issue. “But in the meantime the drinking water from Vud’iavr in my opinion does not represent a danger in relation to poisoning. People not only haven’t been poisoned, but over the last two years our mortality rate has not increased.”\textsuperscript{252} The technical director of \textit{Apatit’s} enrichment factory, A. L. Kasparov, employed a similar tactic in dismissing the consequences of air pollution. He noted that he felt fine after four years there, including two years when filters were not being used at all.\textsuperscript{253}

Kondrikov had the last word at this meeting and displayed impatience with all of the criticism being leveled. Responding to the notion that the location of the city was less than ideal, Kondrikov defended the choice as preferable given other issues such as transportation and the availability of a water source. For him air and water quality were subsidiary issues in a totalistic vision of industrial planning; improving housing and establishing conditions to make the city attractive to potential workers were more important.\textsuperscript{254} The manager also defended the dust-collecting filters they were currently using as more effective than anticipated and argued that the long winter and icy conditions there helped prevent the dispersal of the dust already emitted.\textsuperscript{255} On the issue of the potential contamination of water with an active form of phosphorous, he was

\textsuperscript{251} GAMO, f. 773, op. 1, d. 51, ll. 279-281, 292-297.
\textsuperscript{252} GAMO, f. 773, op. 1, d. 51, ll. 281-283.
\textsuperscript{253} GAMO, f. 773, op. 1, d. 51, l. 288.
\textsuperscript{254} GAMO, f. 773, op. 1, d. 51, ll. 307, 309-310.
\textsuperscript{255} GAMO, f. 773, op. 1, d. 51, ll. 307-309.
bombastic in his refutations. He expressed skepticism that the concerns about the health
effects of this pollution were legitimate.\textsuperscript{256} He forcefully stated the position of \textit{Apatit}:

\begin{quote}
In regard to the question of the water supply. Above all the issue being pushed by
the Health Protection and Sanitation Inspections is that perhaps something will
happen. … Well, you know, perhaps the Kola Peninsula will collapse and we will
not extract apatite then. Give figures. If we ourselves do not understand, then the
issue needs to be put before an authoritative commission and not confessed to all
gods, not confessed at all intersections. All analyses need to be checked
thoroughly. Do not speak of an off-chance because for an off-chance we will not
give one kopeck.\textsuperscript{257}
\end{quote}

There is something interesting going on here. Kondrikov’s response displayed a typical
opportunistic employment of uncertainty in the face of environmental problems that one
might expect from captains of industry in many political-economic systems. Uncertainty
about problems more closely tied to production in the short-term would not have justified
such inertness.

Though the response of \textit{Apatit} to concerns being raised about pollution
demonstrated that it was indeed a low priority and that its leaders attempted to avoid
some of these new tasks, the enterprise did take some actions. Over the next few years it
funded more organized greening campaigns, a ventilation system in the underground
mines, and new construction at the enrichment facilities partially as means of reducing
the effects of industrial dust.\textsuperscript{258} Management and consulting agencies discussed the idea
of reusing water during the enrichment process.\textsuperscript{259} \textit{Apatit} also looked into using Little
Vud‘iavr Lake as a new drinking water source and sought more investment in the sewer
system.\textsuperscript{260} These measures reveal that the idea of building a new socialist city where
humans would be in harmony with the environment maintained some salience in these
echelons. However, the fact that \textit{Apatit} continued to fund the experimental phosphorous
factory, thereby potentially poisoning the water originally intended for drinking, speaks
of an inability of this form of industrial modernization to do what advocates claimed it
would.\textsuperscript{261}

\textsuperscript{256} GAMO, f. 773, op. 1, d. 51, ll. 305-306.
\textsuperscript{257} GAMO, f. 773, op. 1, d. 51, l. 305.
\textsuperscript{258} GAMO, f. 773, op. 1, d. 52, l. 506; GAMO, f. 773, op. 1, d. 55, l. 241; and GAMO, f. 773, op.
1, d. 63, ll. 162-169.
\textsuperscript{259} GAMO, f. 773, op. 1, d. 55, ll. 388ob, 442-443.
\textsuperscript{260} GAMO, f. 773, op. 1, d. 55, l. 256.
\textsuperscript{261} GAMO, f. 773, op. 1, d. 55, ll. 238, 251 and Barabanov, et al., \textit{Gigant v Khibinakh}, 59.
Several scientists involved in the economic development of the Khibiny region continued to think creatively about environmental protection in the late 1930s. Geographer Gavriil Rikhter studied the internal water system of the Kola Peninsula in these years and urged further research on the relationship between aquatic organisms and pollution. He proposed that a general plan for the “complex utilization” of water resources needed to be devised to balance industrial, municipal, and ecosystem needs. Fersman, typically, was quite ambitious when he turned to the issue. In an unpublished essay on nature protection on the Kola Peninsula from 1940, he advocated the preservation of water bodies near industry, the reduction of dust from processing, the complete use of mined apatite-nepheline ore, and the establishment of new nature reserves in the area. He sought to explain how putative impediments of the local climate such as wind, high tides, snow cover, the polar sun, and low temperatures could serve the region’s energy economy, allow for certain technological innovations, and provide unique transportation opportunities.

In contrast to this continued environmental optimism, Fridolin offered a bleak assessment of the anthropogenic loads that apatite production was having on the Khibiny ecosystem in December 1938. Every year, Fridolin reported, sections of forested land near Little Vud’aiavr were being cut or burned. Economically valuable fish such as salmon (losos’) that require fresh water rich in oxygen became threatened by industrial activity after 1932. “But since this time factory sewage waters in particular and the abundant concentration of thin dust of crushed apatite has so changed the character of the previously absolutely pure and typical mountain lake Great Vud’aiavr, on the shore of which the city Kirovsk is located, that the large fish that were found there earlier already do not live there.” The dust from apatite production, which despite the efforts of the enterprise’s engineers already had become concentrated so thickly that it blocked sunlight “like during a forest fire,” accumulated on leaves of nearby flora and disturbed their normal functions. In the longer term the cramped landscape of Kirovsk prevented the expansion of the city from ever reaching the 68,000 inhabitants discussed in 1934-1935.

Notes:

263 ARAN, f. 544, op. 6, d. 207, ll. 1-6.
264 ARAN, f. 544, op. 1, d. 161, l. 40.
265 ARAN, f. 544, op. 1, d. 161, ll. 40-41.
266 ARAN, f. 544, op. 1, d. 161, l. 41.
The significant increase in the population of the socialist settlement and the production capacity of the company in the 1950s and 1960s required building the new town of Apatity twenty kilometers away on a main railroad line and placing a new enrichment facility between the two cities.\textsuperscript{267}

**Conclusion**

The rapid creation of a new industrial civilization north of the polar circle in the Khibiny Mountains was part of a deliberate effort of the Stalinist political system to transform a periphery into a center of socialist modernity. The story of socialist construction during the first five-year plan is a familiar one for students of Soviet history. In this chapter I have argued that an under-recognized omnipresence of environmental factors influenced the essential character of Stalinist modernization.

I began this chapter by noting that within a cauldron of revolutionary optimism, forced labor, and disorganized central planning a seemingly contradictory approach toward the environment emerged: one that both embraced the metaphor of nature as an object of conquest and also sought to establish a non-destructive harmony between humans and the rest of the natural world. I then endeavored to show how this tension played out in everything from the visions of the project and its initial organization to the dastardly hardships faced by the migrants to the new town and the diverse methods employed to cope with environmental problems. Throughout the analysis I strove to demonstrate how nature functioned as an actor capable of foiling human designs for it but also of acquiescing in the short run to forms of manipulation and exertions of power. The specific role of the environment in Stalinist modernization can ultimately be seen in several spheres: the attempt to transform territories with the potential for detached resource extraction into self-sustained industrial centers; the gap between the assertive ideas of mollifying the natural world for human use and the brutal social conditions nature helped create; and the way that a combination of a totalistic vision during rapid and chaotic industrialization and the unanticipated behavior of nature gave rise to an irreconcilable tension between the dictates of maximizing production and those of building socialism.

\textsuperscript{267} Barabanov, et al., *Gigant v Khibinakh*, 94-129.
Chapter 3. Knowledge Ecologies and Reindeer

The Kola Peninsula, like most Arctic environments, had never been teeming with life. Climate and other natural phenomena significantly curtailed the ability for flora to grow there and for herbivores to thrive. A large portion of the small number of people who lived in the region before the twentieth century relied critically on hunting reindeer to maintain their livelihoods. When advocates of modernization turned their attention to this territory, this dearth of biomass and the difficulties of cultivating crops led them to consider special strategies for making organic nature economically beneficial. Diverse forms of ecological knowledge crucially shaped a process of radical transformation of human interactions with reindeer during the twentieth century. Attempts to create a productive reindeer economy on the Kola Peninsula required more explicit dependence on living nature and the participation of non-human animal agents than railroad construction and phosphate mining.

This chapter posits that knowledge about animals, landscapes, and sustenance decisively shaped the transformation of Kola reindeer economies through both the imposition of abstract frameworks aimed at establishing legibility and the adoption of environmental understandings based on experiential interaction with the natural world. The elaboration and employment of these forms of knowledge served diverse and contradictory political purposes, but on the whole contributed to the emergence of an extensively modernized reindeer economy that is also now a site for emphasizing the preservation of an alleged tradition. I propose classifying the two powerful modes of knowledge production about reindeer as legible and sentient ecologies. They each appeared in various manifestations in the ethnic politics of reindeer herders, the economic project of making reindeer husbandry productive, and the endeavor of conservation scientists to protect wild reindeer.

Legible ecologies most clearly contributed to the process of modernization. I use this term to capture the environmental dimensions of the creation of “legibility” in the modern world. Legibility, in James Scott’s rendering, is ultimately a tool for the manipulation of societies and nature by states that functions through standardizing, simplifying, classifying, abstracting, and making “rational” complex and not entirely reducible phenomena. The production of legible knowledge serves state power by
enabling it to manage, control, and change society at heightened levels, though these efforts at modern transformation have often, Scott insists, failed. Environmental legibility can occur through the cultivation of carefully maintained timber forests, the creation of large reservoirs for dams, or the selective breeding of particular species to promote traits that benefit human societies. Departing somewhat from Scott, I venture that this form of ecological knowledge was propagated not only by sovereign entities like the state but also by a diverse array of actors, including sometimes reindeer herders themselves, in promoting the modernist project. On the Kola Peninsula campaigns to organize and consolidate herding communities along ethnic lines involved embracing rigid categories of national difference and simplistic understandings of herding techniques. The efforts to industrialize reindeer herding entailed a bias toward monocultural megafauna, which could be predictably monitored. Lastly, scientists sought to conserve the local population of wild reindeer by attempting to maintain a pristine ecosystem that was minimally modified by people.

Sentient ecologies yield understandings of specific animals and environments through practical, communicative, and tactical involvement with the natural world. David Anderson develops this concept in his ethnography of Evenki reindeer herders who “act and move on the tundra in such a way that they are conscious that animals and the tundra itself are reacting to them.” Expanding on Anderson’s theory, Tim Ingold discusses sentient ecology as “knowledge not of a formal, authorized kind, transmissible in contexts outside those of its practical application. On the contrary, it is based in feeling, consisting in the skills, sensitivities and orientations that have developed through long experience of conducting one’s life in a particular environment.” This sensitivity and responsiveness roughly corresponds to what has been called intuition. This ecological knowledge is not limited to pastoral communities living in close proximity to animals and tundra landscapes. State reformers and scientists also relied on practical experiences, interactions, and understandings that are difficult to reduce to abstract reason. As such,

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sentient ecological knowledge also constitutes a vital element of modernist environmentality. This chapter demonstrates how sentient ecologies informed the process of transforming the Kola reindeer economy on multiple scales. Diverse types of interaction with reindeer among the Sami, Komi, Nenets, and Russians contributed to the nationalization of reindeer herding. The on-the-ground efforts of state agents to reform the reindeer economy frequently depended on action that adapted to local social and environmental conditions, albeit often in crude and forceful ways. Conservation scientists incorporated indigenous insights into their knowledge about wild reindeer populations and developed passionate commitments to this particular species.

The efforts to transform human/reindeer interactions additionally gave rise to the imagined traditionalism of pastoralism on the Kola Peninsula. Such traditionalism has become a major form of symbolic identity and political capital for the Kola Sami in the contemporary world. However, reindeer herding, which is often taken as a traditional rural activity today, only became dominant in the region during the twentieth century. Historicizing the invention of this tradition demonstrates continuities that connect late imperial Russia and most of Soviet history, during which policy makers focused on the modernization of the reindeer economy, and tie together the later Soviet era and the post-communist one, during which reindeer traditionalism received significant emphasis. I wish to highlight the overall Soviet contribution to the image of reindeer herding as traditional, as well as the way that traditionalist symbolism emerged as a manifestation of legibility during modernization campaigns. This point agrees with much of the anthropological literature about indigenous peoples, and especially reindeer herders, living in northern Eurasia.

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4 For a classic statement on the invention of tradition, see Eric Hobsbawm and Terrence Ranger, eds., The Invention of Tradition (Cambridge: Cambridge University Press, 1983).
The Ethnic Organization of Reindeer Herding

The transformation of reindeer/human relations on the Kola Peninsula during the twentieth century largely developed through the interaction of different ethnic groups and attempts by state reformers to order rural economies in the far north along these lines. The politics of ethnic relations on the Kola Peninsula shaped the introduction of reindeer pastoralism in the region, proposals for reform, economic restructuring, and the cultural promotion of reindeer traditionalism. On the one hand, the move to classify Kola reindeer herding as appropriately Sami despite its multiethnic origins fed into abstract and preconceived state logics that marked this territory and modes of livelihood in ethnic terms. On the other hand, differences in the ways that Sami, Komi, Nenets, and Pomors understood and experienced their interactions with animals and landscapes contributed to changes on the ground in important ways. The combination of types of knowledge ultimately led to the emergence of a reindeer economy based on hybrid forms of herding techniques that included participants of multiple ethnic groups, but that was defined as Sami.

The Development of Pastoralism on the Kola Peninsula

The rise of large-scale reindeer herding on the Kola Peninsula did not occur until the end of the nineteenth century, though people living there had hunted the animals for a long time. This development transpired to a considerable degree because of changing ecological relations that affected inhabitants of different places of the Russian north. It resulted primarily from Komi (or Izhemtsy) and Nentsy (or Samoedy) herders in the Pechora-Izhma River basin attempting to escape increased environmental pressures by migrating to the Kola Peninsula with large herds of reindeer. The Sami, who already

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6 In this discussion I am translating references to the Izhemtsy in primary sources as Komi. The Izhemtsy were a specific group of Komi, which included those who migrated to the Kola Peninsula. I am doing so for the sake of readability. This practice differs from how I refer to the Sami and Nenets. For them I keep the words Lapp and Samoed when they appeared in a primary source.
faced a dwindling stock of wild reindeer available for hunting, now encountered greater competition for lichen pastures. They responded by orienting their livelihoods more towards reindeer pastoralism and modifying some of their own strategies for keeping the animals. Thus, unlike most of the economic activities analyzed in this dissertation, the key first step in the growth of “modern” reindeer herding did not come from state reform efforts. Instead, it emerged from northern communities using their ecological knowledge to adapt to changing circumstances.

Reindeer and people have been some of the most prominent mammalian megafauna on the Kola Peninsula for millennia. With dense furs, seasonal antlers, and an instinct to form herds, reindeer (Rangifer taranda), or caribou as they are known in North America, seek cold environments and often migrate long distances to forage on seasonal pastures. Current archaeological evidence dates the earliest human inhabitants on the Kola Peninsula to between 7,000 and 8,000 years ago.\(^7\) The ancestors of a group that came to be called the Sami (Laplanders and Lapps in earlier terminology) first arrived in the region sometime after 2,000 B.C.E. They spoke dialects of a Finno-Ugric language common to a number of other, more populous, groups of Sami in northern Scandinavia. Slavic-speaking residents known as the Pomors began inhabiting the Tersk coast as far back as the thirteenth century. Both the Sami and the Pomors relied predominantly on fishing for sustenance for much of their history, but also hunted wild reindeer and kept limited numbers of domesticated draft animals. Due partially to their inland orientation, the Sami allocated reindeer a more significant place in their culture and spiritual beliefs than the Pomors. The prerogatives of reindeer hunting were also inscribed in their loose system of territorial organization deemed *pogosty* (parishes), which often involved different seasonal settlements for given kin groups and included areas officially belonging to the Orthodox Church or the imperial government.\(^8\)

The domestication of reindeer depended on intimate understandings of the animal and responsiveness to the variable behavior of individual creatures. Communities

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throughout Eurasia first innovated methods for training individual wild reindeer for transportation, milk, and as hunting decoys. This process occurred without much of the selective breeding that characterized the domestication of other animals, but gradually led to the presence of certain traits in domestic reindeer that make the animals more prone to interact with humans in a variety of ways. Beginning in the seventeenth and eighteenth centuries domestication extended to allow for the manipulation of grazing, migration, and reproduction of entire herds and accordingly to provide the basis for pastoralism (reindeer herding). 

Ingold describes this development as “a change in the terms of engagement” between humans and animals from a predatory relationship based on trust to a protective one of domination. Pastoralists honed different skills and knowledge as they began to interact primarily with domestic reindeer.

In the late nineteenth century the Kola Sami still relied more on fishing and hunting wild reindeer than on harvesting the products of domesticated animals. However, according to an ethnography from the time by Nikolai Kharuzin, the hunting economy had begun to decline because of a dwindling stock of wild reindeer. Kharuzin stressed, “not only Lapps but also Russian residents unanimously say that Lapps are becoming poor in reindeer.” In response to these resource limitations the Kola Sami became more orientated toward pastoralism as the population of domestic reindeer increased noticeably between the 1860s and 1880s. Herding practices remained organized in a way that allowed opportunities for engagement in other occupations. Most families kept only about 15-19 reindeer and would release them for grazing in the summer and collect them

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11 Nikolai Kharuzin, Russkie lopari (Ocherki proshlago i sovremennago byta) (Moscow: Izvestiia imperatorskago obschestva liubitelei estestvoznania, antropologii i etnografii, 1890), 101-120. Nathaniel Knight demonstrates how Kharuzin became one of the first Russian ethnographers to embrace evolutionist theory in his scholarship, but shows that this volume fit more in line with an earlier framework of Russian ethnography that concentrated on gathering and systematizing information about peoples without the application of theory. See Nathaniel Knight, “Nikolai Kharuzin and the Quest for a Universal Human Science,” Kritika: Explorations in Russian and Eurasian History 9, no. 1 (Winter 2008): 83-111.

12 Kharuzin, Russkie lopari, 105.

13 Kharuzin, Russkie lopari, 104.
again in the fall. Migration patterns varied noticeably between the western and eastern sides of the peninsula in part because of topographic differences.¹⁴

Wild reindeer possessed deep spiritual significance for the Kola Sami in this era, which reflected cognition of the creatures’ active role in their hunting economy. While Sami communities nominally had converted to Orthodox Christianity centuries earlier and regularly attended church services in the late nineteenth century, they still held religious beliefs in shamans (noiday), sorcerers (kolduny), rock formations (seidy) and animal spirits.¹⁵ One of their rituals involved sacrificing wild reindeer under the direction of village sorcerers and displaying the animal’s horns on the roof of their dwelling.¹⁶ Additionally, legends of a man-reindeer called Miandash who traversed between human and non-human worlds circulated among the Kola Sami. These stories drew on Miandash’s ability to transform from a wild reindeer into a human in certain locations such as a tent and associated separate lands of the Sami and reindeer with the realms of the living and the dead.¹⁷

Across the Arkhangelsk province in the Pechora River basin, a quite different reindeer economy and ecology existed. The Nenets pastoralists in the region began to keep large reindeer herds comparatively early and taught herding to the Komi migrants of the sixteenth century. Having actively collected and traded furs with Russian merchants, the Komi in the Izhma region embraced market-oriented economic practices in their reindeer herding. Well-off Komi kept massive herds, hired other herders, profited from selling reindeer products to traders, and managed a total of close to twenty times the number of domestic reindeer as the Sami. The migration patterns of these pastoralists

were also distinct. Unlike the Kola Sami, who were confined to a peninsular environment, Komi herders continually guided the animals over hundreds of kilometers of territory every year and guarded them during every season, including summer grazing. This more intensive protective role of their domestic herders resulted in greater intimacy with how the animals behaved in expansive tundra lands. As lichen pastures became crowded and outbreaks of epidemics became increasingly common among the reindeer, the Komi searched for new lands and expanded the territorial presence of their herding activities. This expansion included a move to the Kola Peninsula in the 1880s by a group of herders from Izhma.

Suffering from a decline in their herds at the time, several Komi in the Izhma region learned of abundant lichen pastures and a lack of reindeer epizootics on the Kola Peninsula. According to anthropologist Nikolai Konakov, Komi migrants tended to seek similar environments that could support the basis of their current economic complex. The Kola Peninsula only partially fit this model because of its distance and detachment from other Komi lands and its different climate. These features dissuaded most pastoralists with smaller herds from making the trek. Nevertheless, two wealthier herders provided several thousand domestic reindeer to allow for a group of sixty-five individuals, including several Nenets herders, to make the journey. They set out from the Pechora-Izhma River basin in the autumn of 1883 and arrived the following spring. After a few years of migration around different parts of the Kola Peninsula, the Komi and Nenets families settled in the small Sami settlement of Lovozero. A large anthrax outbreak in 1896 among reindeer on the Komi homelands inspired a number of additional families to join the herders on the Kola Peninsula.

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The introduction of the Komi reindeer economy to this new environment established large-scale reindeer herding on the Kola Peninsula. The arrival of the Komi and Nenets alone dramatically increased the domestic reindeer population of the Kola Peninsula. Furthermore, the influence of their pastoralism starkly raised the productivity of the reindeer economy, resulting in an over sevenfold growth in the domestic reindeer population in the region by World War I.\(^{21}\) The Komi continued many of their conventional herding methods here that conflicted with Sami practice, especially with the summer release of reindeer for the sake of concentrating on fishing.\(^{22}\) Antagonism between the groups grew especially tense as some Sami made accusations that the Komi stole free-grazing Sami reindeer during the summer—branding them with their own earmarks—and used lichen pastures intentionally reserved by the Sami.\(^{23}\) Confronted with a disappearing population of wild reindeer available for hunting, some groups of Sami also responded by altering their herding practice: beginning to keep much larger numbers of animals, constructing fences during summer grazing, and more vigilantly attempting to round up all their animals before the autumn rut.\(^{24}\) These changes in Sami practice marked their shift to a pastoralist reindeer economy.

**Debating Nationality and Modernity through Reindeer**

Discussions about the fate of Kola reindeer during the final decades of the Russian empire reflected anxieties about nationality in a multiethnic polity and about the type of modern economy best suited for the country. The commentators involved—primarily state officials, scientists, journalists and regional enthusiasts centered in other parts of the Arkhangel’sk province—tended to agree on the need for some type of reform of indigenous societies and their economic practices. They frequently evoked the images, which extended back to at least the eighteenth century, of northern indigenous peoples


\(^{24}\) Luk’ianchenko, Material’naia kul’tura saamov (loparei) Kol’skogo poluostrova v kontse XIX-XX v., 29-34.
and their economic practices as backward and lacking civilization.\textsuperscript{25} By doing so, they engaged in the cultural construction of Sami and other groups’ ethnic identities, while discursively inscribing the “wildness” of their environments and societies. Thus, state categorization for the sake of control was a dominant part of this story. Yet, the sometimes acerbic debates among late imperial reformers reflected not just political or scientific differences about the desired national ordering of the empire, but also their distinct environmental experiences and knowledge.

In an assessment of the potential economic benefit of the Russian north to the central state from 1897, the governor of the Arkhangel’sk province, Aleksandr Engel’gardt, relied on a brief travel experience to advance a general evaluation of the ethnic organization of the Kola reindeer economy. An ephemeral summer encounter with the Kola environment supplemented preconceived stereotypes about the Sami as appearing “gnome-like” and being on the path to extinction as he insisted that there were plentiful natural resources available to them on state lands.\textsuperscript{26} According to Engel´gardt, the Sami were bad pastoralists who did not care about increasing their herds and let their reindeer roam freely in the summer. He contrasted them to the recent Komi migrants, who “conduct the reindeer trade correctly and sensibly guard reindeer against attack from predatory beasts.”\textsuperscript{27} This comparison of ethnic herding practices would become a major element in discussions about the Kola reindeer economy until after collectivization. Engel´gardt here implicitly imposed an ethnic hierarchy that placed the Komi somewhere between Russians and the Sami on a scale of modernity.

A little over a decade later another commentator, writing under the pseudonym V—r, evoked a similar hierarchical arrangement of groups involved in the reindeer economy on the Kola Peninsula. This time, however, the author’s observations of the practices of tending transportation reindeer led him to invert the established order by placing the Russians below the other ethnicities. At the time the fledging assistance efforts of outside scientists to improve Pomor fishing techniques and competition from

\textsuperscript{25} Slezkine, \textit{Arctic Mirrors}.
\textsuperscript{26} A. P. Engel’gardt, \textit{Russkii sever”: putevyia zapiski} (Saint Peterburg: Izdanie A. S. Suvorina, 1897), 1, 64-66.
\textsuperscript{27} Engel’gardt, \textit{Russkii sever"}, 67-68. On representations of the Komi among policy makers and others in late imperial Russia, see Indreek Jääk, “The Komi, Ethnic Stereotypes, and Nationalities Policy in Late Imperial Russia,” \textit{The Russian Review} 68, no. 2 (April 2009): 199-220.
foreign trawling ships was a matter of great controversy among educated society in Arkhangelsk.\textsuperscript{28} V—r criticized the “excessive exploitation of the strength of the reindeer” by some Kola herders. The author continued, “this carelessness is very harmful and unprofitable, but worst of all it has penetrated not only the life of savages or semi-savages, but also of the Russian peasant who is almost fully deprived of cultural influence on the Kola Peninsula.”\textsuperscript{29} In this rendering, the environmental and social context of the region undermined the Pomors’ status as the supposedly superior group and spoke to the direness of the need for reform. V—r believed that “more rational use of resources from the natural environment” could allow Kola reindeer herding to become profitable.\textsuperscript{30} By “more rational” he meant, like Engel’gardt, adopting Komi methods of husbandry and land use.

In the years immediately preceding the outbreak of the First World War, divergent ecological visions of the economic role of the North informed debates about the nationality among reformers in the Arkhangelsk province. The proprietor of the Pechora Experimental Agricultural Station, Andrei Zhuravskii, espoused a romantic view of reindeer herding as an inherently productive activity that required minimal labor. Estimating that reindeer could give pastoralists an 800% return on invested capital after five years, he stressed that indigenous practitioners were on the whole well-off economically. Other commentators on the reindeer economy in the Arkhangelsk province, including the Kola Peninsula, shared this optimistic assessment of tundra nature use. One wrote, “receiving everything from the tundra and nothing from humans, reindeer give them everything.”\textsuperscript{31} The ease of the herding economy, rather than a lack of


\textsuperscript{29} V—r, “Iz oblasti olenevodstva,” Izvestiiia Arkhangelskogo obschestva izucheniiia Russkogo Severa 1, no. 7 (August 15, 1909): 41-42.


\textsuperscript{31} Quoted in V—r, “Iz oblasti bibliografii i kritiki: A. N. Makarevskii i V. D. Petrushevskii, Severnyi olen’. Domashnee zhivotnoe poliarhnykh stran” (SPb: Izdatel’sto zhurn. Vystn. Obsh. Vserinarii,
culture, served to prevent northern realms from being worked for crops. Indeed, Zhuravskii elaborated this assessment of reindeer herding for the sake of launching into the promotion of agricultural colonization of herders’ tundra lands by Russians. His general approach for understanding and transforming the “primitive landscape” of the north involved relying on Russian “self-knowledge” instead of “Western European science” and the introduction of traditional agricultural activities of rural Russians to the tundra.

Promoters of Komi herding V—r and Sergei Kertselli, who were likely the same person, attacked Zhuravskii’s position. They accused him of exaggerating the viability of reindeer pastoralism and using pseudoscience in his study of tundra landscapes. V—r, for instance, remarked on Zhuravskii’s ignorance of veterinary medicine and held him culpable for spreading the inaccurate idea that reindeer herding was especially profitable. Kertselli engaged in an even more polemical critique. Besides questioning Zhuravskii’s credentials as a scholar, Kertselli disputed his ideas about tundra landscapes and their mutability. Kertselli described his opponent’s position thusly: “the polar tundra—this is an ordinary uncultivated plot of land that is superficially marshy and thus easily transformed into a meadow.” He quoted Zhuravskii, who wrote, “wherever there is the donkey of a settler in 2, 3, or 4 years magnificent meadows appear in the places of former “marshes” (tundra).” According to Kertselli, Zhuravskii also claimed that migrating herds of domestic reindeer had been trampling the tundra mosses and thus preventing the regeneration of grasslands, which could support less mobile livestock and

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32 Kertselli, Po bol’shezemel’skoi tundre s kochevnikami, 70-77 and A. V. Zhuravskii, Evropeiskii Russkii Sever”: K voprosu o griadushchem i proshlom ego byta (Arkhangelsk: Gubernskaia Tipografiia, 1911).
33 Zhuravskii, Evropeiskii Russkii Sever”, 32-33. Zhuravskii was close, financially and intellectually, to conservative journalist Mikhail Osipovich Men’shikov at the newspaper, The New Times (Novoe Vremia). Also around this time Zhuravskii was involved in a major scandal with Lev Shternberg at the Museum of Anthropology and Ethnography in Saint Petersburg in which the former’s anti-Semitism and conservatism came out even more strongly. See Sergei Kan, Lev Shternberg: Anthropologist, Russian Socialist, Jewish Activist (Lincoln: University of Nebraska Press, 2009), 172-177.
35 Kertselli, Po bol’shezemel’skoi tundre s kochevnikami, 81.
36 Kertselli, Po bol’shezemel’skoi tundre s kochevnikami, 70-71.
fertile soils, capable of cultivating crops. Kertselli attempted to refute Zhuravskii’s vision of the tundra point by point. He challenged the accuracy of the historical and contemporary examples of meadows existing in the region and claimed that Zhuravskii exaggerated the profitability of pastoralism. Kertselli also showed that the tundra was less marshy than Zhuravskii thought, denied that reindeer trample moss, and demonstrated the heavy manure requirements to make these lands agriculturally fertile. For his part, Kertselli generally emphasized the comparative immutability of the tundra and the suitability of it for Komi activities such as reindeer herding.

Despite the distinctions in nationality politics and the models of economic development present in these two positions, they coalesced around the stance that the current reindeer economy required transformation: either conversion to agricultural practices more common in other regions of the country or further expansion of the commercial approach of some Komi groups. Both sides left little room for Sami economic practice to evade reform. Writers discussing the Kola Sami during the last years of the Russian Empire reflected agreement with this sentiment. For instance, Vladimir Vize prefaced an article from January 1917 on Sami legends with the words: “the process of the “Russification” and the infection of Russian Lapps with new ideas is going very quickly and will hasten even further with the installation of the Murmansk railroad. That is why we should realize that it is not far from the time when the legends of olden times will completely fade from the memory of the Russian Lapps.” A sense that the indigenous knowledge of this historically defined “other” was irretrievably slipping away inspired a number of other journalists and researchers to collect Kola Sami folklore and write ethnographic accounts of this group and its lifestyle. This desire to capture the past while embracing the future would become more assertive in the 1920s.

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37 Kertselli, Po bol’shezemel’skoi tundre s kochevikami, 70-77, 81-82.
38 Kertselli, Po bol’shezemel’skoi tundre s kochevikami, 70-77, 81-82, 106-107.
The Promotion of “Sami” Reindeer Herding

Plans for reforming the Kola reindeer economy in the early years of the Soviet Union turned to a more consistent focus on raising the status of specific national minorities. Within the context of the Kola Peninsula this strategy evolved so that the reindeer economy became legible as a Sami terrain, despite the actual incorporation of Komi and Nenets herding techniques into the collective farms. Through the 1920s, assessments of the Kola reindeer economy shifted from emphasizing “poor Lapp practice” to positing the potential suitability of Sami land use patterns. The process of restructuring the reindeer economy in ethnic terms involved top-down applications of nationalities policy, in particular standardized institutional forms and abstract assessments of variations in herding among different groups. It also included the articulation of experiential forms of land use, mediated through local bureaucrats and scientists, as being somehow appropriate for the region.

The lives of reindeer and the ecosystem of the Kola Peninsula were modified to fit the nationality politics of the Soviet Union: a post-colonial and avowedly non-imperial empire bent on nation-building as a form of operationalizing socialism. Recent scholarship on nationality in the Soviet Union has interrogated the treatment of non-Russian groups to develop deeper understandings of modern nationhood and elucidate the resemblances of the country to an empire. This research has revealed much about the nature of nationality politics during the formation of the Soviet Union: the significance of the Leninist commitment to self-determination and the reliance on territorial units aimed at making populations national in form but socialist in content; the belief that encouraging ethnic identities was a temporary part of a historically necessary process to advance the country culturally and economically; and the tense overlap of policies that offered special opportunities to members of minority groups and ones that repressed
overly assertive articulations of nationality. There is a division in this historiography between scholars who highlight the significance of a coherent policy and the institutions of implementation, most notably Terry Martin, and those who point to the critical role of knowledge production, in particular Francine Hirsch. The attempts to deal with Kola reindeer herders offer a good site to examine the interaction between state institutions and ethnographic knowledge, since not only were both present and instrumental here, but they also involved many of the same people. The influential ecological knowledge produced by these early Soviet organizations emerged not only through the elaboration of classificatory schemes, but also from researchers’ practical experiences in the tundra.

The Soviet promotion of the Kola reindeer economy as Sami began with public commentary that stressed its perils and potentials. The turbulence of the wars and revolutions of 1914 to 1921 caused the domestic reindeer population to shrink sharply: the Sami in particular lost 70-75% of their herds. Reflecting on this situation, Kertselli claimed that the wars only exacerbated the extant problems rooted in the irrational system of keeping reindeer used by the Sami. He continued to employ an ethnic hierarchy that placed the Sami below the Komi: “Lapp reindeer herding can be regarded as the subsidiary reindeer herding of a hunting and fishing tribe, while Komi (zyrianskoe) reindeer herding should be regarded as a type of industrial reindeer herding.” Journalist Zinaida Rikhter more sensationally evoked the place of reindeer in Sami culture, including stories of an annual reindeer holiday and the appearance of reindeer on old

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Orthodox icons, as evidence of backwardness. Popular portrayals like Rikhter’s also employed reindeer as a metonym for the natural wildness and lack of civilization of the region. Writers also publicized the potential value of reindeer, dubbing the animal the “gold of the tundra” and proclaiming, “no animal in nature is more industrially productive than reindeer.”

The institutional mechanisms for targeting the Sami for ethnic promotion emerged from a state framework that placed them at the bottom on a scale of national minorities. The Sami and the Nenets fell into the category of the “small peoples of the north,” which was devised in the first decade of Soviet rule. This grouping associated them more closely with hunter-gathering societies than pastoralists tending animals besides reindeer. The classification included twenty-six indigenous groups seen as occupying the most traditional level on a historicist hierarchy that was ideologically dominant in modernizing and colonizing regimes. This conviction in their extreme backwardness inspired aid programs designed to lift their cultural status quickly so that they could be incorporated fully into a modern socialist state. Neither the Russian Pomors nor the Komi belonged to this category of ethnicities and they were not seen as geographically indigenous to the Kola Peninsula. In contrast to the special attention they received in the imperial era, the Pomors received no ethnically based aid and witnessed a total government embrace of the industrial fishing practices that had earlier threatened their livelihood. The Komi, despite being an indigenous group living in the north and engaging in reindeer pastoralism, had a status closer to other large nationalities. In the regional realignment of the 1920s and 1930s the mainland territory of the Komi first became an autonomous region and then an autonomous republic. This separate territory and their higher status on

45 Zinaida Rikhter, Pervoe desiatiletie: zapiski zhurnalista (Moscow: Sovetskii pisatel’, 1957), 127-144.
47 Slezkine, Arctic Mirrors.
the imagined temporal scale underlying nationalities policy meant that the Kola Komi received little institutional support and evoked less ethnographic interest.  

Institutional and ethnographic support for Sami reindeer herders arose simultaneously. The Committee of the North (officially, the Committee for Assistance to the Peoples of the Northern Borderlands) was created in June 1924 to boost the status of the small peoples of the north. The functional head of the organization, Anatolii Skachko, warned that if native northerners went extinct, the tundra lands on which they lived would become uninhabited deserts that lacked the beneficial influence of their economic activities. Under the leadership of Vasilii Alymov, the Murmansk Branch of the Committee of the North worked specifically on raising the economic and cultural level of the Sami and Nenets of the region but not the Komi. In 1927 the Russian State Geographic Society sponsored the Lapp Expedition to the region, which used on-site fieldwork to evaluate the physical anthropology, health, and cultural and economic conditions of the Kola Sami. The primary ethnographer of the expedition, Vladimir Charnoluskii, intensively studied the reindeer economy and Sami folklore. His evolutionist ethnographic work embraced a special sympathy for the plight of the Sami, a conviction in the value of deep and detailed research that included practical experiences in the tundra, and an eagerness to find applications to help make his research assist the subjects being studied. Based on this ethnographic work and discussions with local

49 Habeck, What it Means to Be a Herdsman, 75-86 and Hirsch, Empire of Nations, 62-98.
50 Slezkin, Arctic Mirrors, 150-152.
53 V. V. Charnoluskii, “Zametki o past’be i organizatsii stada u loparei,” in Zolotarev, ed., Kol’skii sbornik, 23-70; V. V. Charnoluskii, Materialy po bytu loparei: Opvy opredeleniiia kochevogo sostoiania loparei vostochnoi chasti Kol’skogo poluostrova (Leningrad: Izdanie Gosudarstvennogo Russkogo Geograficheskogo Obshchesvta, 1930); Charnoluskii, Legenda o olene-cheloveke; and V. V. Charnoluskii, V kraiu letuchego kamnia (Moscow: Izdatel’stvo “Mysl’,” 1972).
populations, the Murmansk Committee of the North drew up plans for two Lapp native districts in the east and the west of the Kola Peninsula.  

A main means through which the Murmansk Committee of the North and ethnographers studying the Kola Sami sought to promote that group’s national distinctiveness were their plans for reforming the reindeer economy. Both Alymov and Charnoluskii believed that proper regulation of lichen pastures was a key element in serving Sami interests and increasing the profitability of herding. In 1929 Alymov lamented a lower than desired growth rate of the domestic reindeer population and blamed the “multiplicity of farms with few reindeer”—80% of Sami herders had fewer than 50 animals at this point—and the “irrational, primitive running of the economy,” which allowed many reindeer to be lost to wolves. A primary strategy of the Murmansk Committee of the North for reforming the reindeer economy was the process of territorial formation (zemleustroistvo). Territorial formation involved surveying landscapes to assess the presence and varieties of lichen, figuring out the optimal arrangement for seasonal grazing and migration paths, establishing the capacity of reindeer on certain territories, and performing a number of other tasks to develop a basis for economic and administrative reform. The preference for this method of reform clearly reflected the sympathies of the Murmansk Committee of the North for the Sami since a major concern justifying territorial formation was preventing Komi from using Sami pastures.

For his part, Charnoluskii produced works of ethnography that explicitly valorized the Sami methods of land use. He chose to study a research site on the eastern part of the Kola Peninsula because it had been the least influenced by Komi and Nenets.

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54 The proposed borders of these areas sought to implement the nationality principle in regionalization by maximizing the Sami presence in territories through the exclusion of Komi, Russian, and Finnish settlements and the isolation of different sections of reindeer pastures. In this case regional authorities in Leningrad altered the scheme, rearranging the borders of the eastern Lapp native region to overlap with the already existing Lovozero district, which at that point had more Komi residents than Sami. Sorokazher'd ev, “Alymov i Komitet Severa,” Nauka i biznes na Murmane 16, no. 2 (April 2004): 14; Fedorova, “Murmanskii komitet Severa,” Nauka i biznes na Murmane, no. 4 (August 2003): 61-62; and GAMO, f. R-169, op 1, d. 7, ll. 3-5.
57 GAMO, f. R-169, op 1, d. 6, ll. 10, 23, 41, 52, 60-64, 72-74 and GAMO, f. R-169, op 1, d. 7, ll. 3-5.
58 GAMO, f. R-169, op 1, d. 6, ll. 6-10, 21.
reindeer herding. While attentive to the significance of fishing and hunting in the Sami economy, Charnoluskii also stressed the primacy of reindeer: “Reindeer in the everyday life of a Lapp is everything: food, a means of transportation and a source of secondary earnings. Consequently, one can say without exaggeration that the entire budget of a Lapp of moderate means is provided by reindeer.”

He further posited that aspects of the Sami grazing methods, in contrast to Komi practice, were appropriate for the Kola Peninsula. The Kola Sami felt “deep indignation” at the “the Komi methods of using lichen” because it unnecessarily trampled and destroyed pasturelands through overgrazing. According to Charnoluskii, the Sami desired a “totally conditional designation of the boundaries of several sections of land (in general land that no one owns) with natural markers, which are necessary for avoiding the mixing of herds.”

When outlining his vision of how the Kola reindeer economy should be reformed, Charnoluskii insisted that the “prudent herd management” of the Komi and Nenets be combined with Sami means of “carefully treating the pastures of their region, which are disappearing before our eyes.” Here the environmental and ethnic concerns coalesced as Charnoluskii offered a more sustainable vision of development that made use of indigenous knowledge.

This rejection of a system of pasture usage based on Komi methods extended to natural scientists working for the Murmansk Committee of the North. Geobotanist Aleksandr Salazkin conducted detailed surveys of flora on Kola lands, which pointed out that only a quarter of the abundant foraging resources for reindeer herding were being used. The Kola Peninsula was unique, he asserted, in the richness of its summer lichen pastures and in the comparative surplus of pasturelands in the forest zone, usually

59 Charnoluskii, Materialy po bytu loparei, 77. At about this time the Polar census was collecting statistics on nomadism in the Kola tundra. It estimated that 286 Sami households (277 of which owned reindeer) were nomadic and 85 (72 of which owned reindeer) were sedentary in 1926-1927. The census also recorded that of the households that had reindeer herding as a main occupation 47 of them were “settled, native” and 85 were “nomadic.” See Pokhoziaistvennaiia perepis’ pripoliarnogo Severa SSSR 1926/1927 goda: Territorial’nye i gruppovye itogi pokhoziaistvennoi perepisi (Moscow: Tsentr’ noe statisticheskoe upravlenie SSSR, 1929), 13-26, 140-141 and Luk’ianchenko, Material’naia kul’tura saamov (loparei) Kol’skogo pohostrova v kontse XIX-XX v., 20, 24.

60 Charnoluskii, “Zametki o past’be i organizatsii stada u loparei,” in Zolotarev, ed., Kol’skii sbornik, 23.


occupied in the winter, over those in the tundra, typically used for summer grazing. Salazkin argued that these traits made the Kola environment better suited for Sami pasture usage, including the summer release of reindeer, which had been criticized as a sign of their backwardness. “The Komi-Nenets system of grazing herds for the whole year certainly does not respond to the particularities of the local lichen pastures and quite harmfully affects their condition during summer pasturage,” he wrote. Instead, he blamed this practice for the problems of the reindeer economy: “despite the far from full use of the foraging resources, one observes places with crowded pastures in the tundra.” Like Charnoluskii, this emphasis on the proper foraging techniques placed the historic Sami practice as an appropriate foundation for the development of “socialist reindeer herding.”

Ethnicity and Repression

During the 1930s the debate about Sami and Komi herding methods took a violent turn. The ethnographers and members of the Murmansk Committee of the North ceded to larger state policy on the basic terms for forming collective farms. However, the markers of class distinction based on ethnicity among reindeer herders came to be used in decisions to subject the Kola Komi to disproportional de-kulakization. In the middle of the 1930s the target of state oppression shifted to the Sami, who were accused of organizing a nationalist plot with the support of Finland. Throughout these bloody episodes, the complexities of the ethnic composition of the indigenous communities and herding techniques challenged the stability of the classificatory frameworks used by collectivization activists and the secret police. Ethnic identity first became a distorting lens for what were intended to be class-based policies. Later accusations of Sami “nationalism” were waged against a diverse group that included many non-Sami individuals.

The conviction that indigenous peoples had been somehow frozen in time affected interpretations of the class composition of native northerners. Advocates at the Committee of the North initially sought to sidestep class distinctions within indigenous communities by associating them with the primitive communist stage of development.

However, this notion came under attack by the middle of the 1920s, causing the Committee of the North to cede ground. Part of its strategy in the Murmansk region was to help organize separate Sami, Nenets, and Komi collective farms.\(^{64}\) Beginning in 1928 several small collective farms based on a few Sami families were created, including the work association *Saam* in the Voron’ë *pogost* and one called *Olenevod* (later *Krasnaia Tundra*) in the Semiostrrov *pogost*.\(^{65}\) These on-paper collective farms essentially broke up when herders left their winter pastures in the spring and the intentional maintenance of ethnic composition in collective farms ceased by the end of 1929.\(^{66}\) In an attempt to defend their gradualist approach to reform, Skachko also proposed a scheme that denied the measurable class stratification among hunters and fishers but admitted to the existence of kulaks among reindeer herders.\(^{67}\) Individuals who owned more reindeer could be ascribed the class status of kulak.\(^{68}\) As those assisting the Kola Sami made abundantly clear, these kulak herders were disproportionally Komi.

The focus on comparatively wealthy Komi herders as class enemies emerged primarily from the generalities of state policy and the information about the class composition of indigenous groups supplied by the Murmansk Committee of the North. Alymov clearly bemoaned the efforts to apply class categories to indigenous society, complaining that the middling group (*sredniaki*) was so porous that it rendered simple indices of economic stratification inaccurate.\(^{69}\) But he also contributed crucially to the outcome of these efforts by compiling data that demonstrated a disproportional number of Komi households owned larger reindeer herds and hired laborers.\(^{70}\) In his continual

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\(^{64}\) The Murmansk Committee of the North’s specific advocacy of ethnic collective farms appears in GAMO, f. 169, op. 1, d. 11, ll. 70-78.


\(^{66}\) Kiselev and Kiseleva, *Sovetskie saamy*, 68.

\(^{67}\) Slezkine, *Arctic Mirrors*, 192-193.


\(^{69}\) GAMO, f. 169, op. 1, d. 6, ll. 7, 21, 23 and Fedorova, “Murmanskii komitet Severa,” *Nauka i biznes na Murmane*, no. 4 (August 2003): 53-63.

promotion of Sami herding methods, he relayed “the unanimous opinion” of “Lapps and their Russian neighbors” that the presence of “rich Komi” with 600-700 reindeer “systematically harms their reindeer herding.” These critiques of Komi herders became more vocal as the forced collectivization campaign neared. Alymov reported that he “more and more frequently” received grievances from Sami about “unauthorized occupation of Lapp pastures by large and predominantly Komi reindeer herders,” and urged the Murmansk Executive Committee “to raise the issue of prohibiting the unauthorized occupation of reindeer pastures by large herds and the unauthorized migration of reindeer herders to already settled places.” The optimal reindeer ecology remained central to the new class-based ethnic politics on the Kola Peninsula.

As collectivization unfolded in the 1930s, the majority of herders oppressed as kulaks were Komi. In one instance at the Krasnaia Tundra collective farm in Ivanovka the conflict between Komi and Sami fell on the ancestors of the village’s founder Ivan Artiev—a Komi herder who had migrated there in the nineteenth century. Targeted as kulaks, several of the Artievs faced arrest, expropriation of their animals, and exclusion from the collective farm. Around this time, Charnoluskii complained of continued Komi dominance to the Committee of the North, stating that, “labor was assigned improperly. The Lapp group carried a large load and completed more difficult work than reindeer owned. The second table revealed that over half of Kola Sami owned fewer than 50 reindeer and only a few percent had more than 300 animals. Most Nenets, 69% of them, owned between 51 and 300 reindeer and none of them had more than 300 animals. For the Komi, 38.2% of them had fewer than 50 reindeer, 49.5% had between 51 and 300, and 12.3% owned more than 300 reindeer. The percentages in Alymov’s table for the Sami add up to 110%. Assuming a typographic mistake of putting a 3 instead of a 2 in one of the table’s subdivisions, the figure for Kola Sami with fewer than 50 reindeer is 58.9%. As it appears in Fedorova’s publication, this amount would be 68.9%. The other columns for the Nenets and Komi add up to 100%.

72 GAMO, f. 169, op. 1, d. 6, ll. 7, 21, 23.
73 T. A. Kiseleva, “Iz istorii kollektivizatsii olenevodcheskikh khoziaistv Kol’skogo poluostrova,” in Voprosy istorii Evropeiskogo Severa (Petrozavodsk: Petrozavodskii gosudarstvenny universitet, 1979), 24. Reverberations of the sentiment that the majority of kulaks were Komi and that the Sami had few among them appear in a statement by I. M. Isaichikov in Kiselev and Kiseleva, Sovietskie saamy, 73, and in Budovnits’s explanation for the existence of a Sami kulak in the Pulozero region because of the lack of Komi in the area, Budovnits, Olenovodcheskie kolkhozy kol’skogo poluostrova, 37.
75 Budovnits, Olenovodcheskie kolkhozy kol’skogo poluostrova, 79-83.
Meanwhile, Communist Party activists attributed difficulties in collectivization to ethnic tensions. Trying to explain the minimal Sami presence in the Tundra collective farm in Lovozero, party reporter I. Budovits vividly evoked the existence of atavistic national antipathies: “Lapps, who sucked in hatred for the Komi nationality (the great power in the conditions of the Kola Peninsula) from their mother’s milk, do not understand that among the Komi there are farm hands, bedniaki, sredniaki, as well as predatory money-lenders, thieves, and exploiter-kulaks.”

As the Komi became disproportionally demonized as kulaks, the vocal promotion of Komi herding methods as “Komi” instead of “Soviet” ceased. The Komi continued to dominate Kola reindeer husbandry, keeping significantly larger herds than the Sami and earning more. Additionally, the economic success of certain Komi allowed for some features of their herding to be embraced (large herds, year-round surveillance, etc.) as elements of modern reindeer husbandry. However, the rejection of the specific “Komi” character of this model combined with the simultaneous abandonment of the effort to delineate and preserve “Sami” herding led the multiethnic Kola reindeer economy to become more discursively generalized as “Sami.” This development, above all, reflected historical precedent and longstanding generalizations of the area as Sami lands. Accordingly, less overt attention to the ethnic composition of the reindeer economy after the early 1930s made it appear more Sami.

Like much of the rest of the country, the 1937-1938 terror targeted segments of the Kola reindeer economy, uprooting and undermining previous class and ethnic distinctions promoted by the state. During the mid-1930s the ethnographers and reformers of the Kola Sami continued to try to develop a Sami literary culture and later renewed their campaigns to create an autonomous Sami region in the western part of the Kola Peninsula. Then a series of arrests connected to the mass operations against Finns in Karelia halted these efforts. These mass operations scheduled specific populations—former kulaks, criminals, anti-Soviet elements, and specific nationalities believed to pose

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76 GAMO, f. 169, op. 1, d. 11, l. 172.
77 Budovnits, Olenevodcheskie kolkhozy kol’skogo poluostrova, 101.
a potential military threat to the country—for arrests and exterminations by quota. In 1938 state security agents accused Kola reindeer herders and Sami advocates of participating in a conspiracy involving fascists in Finland and nationalists in Karelia to unite the Kola Peninsula with Finland. Part of this plot included the establishment of an independent Sami state, which would aid in the creation of a Great Finland extending to the Urals. The efforts to promote Sami ethnicity served as the main link in the case that allegedly connected this group to anti-Soviet plots.

Though this bout of repression suppressed linguistic and cultural expression of the Sami, it conversely and unintentionally highlighted the Sami identity of the region. This development occurred primarily through the multiethnic targeting of individuals involved in plans for creating an independent Sami government that lumped together Komi, Russians, and Nentsy with Sami. During the terror, state police agents elided the ethnic distinctions in Kola herding communities and implicated Komi in promoting “Sami nationalism.” Several Komi herders who had faced earlier repression as kulaks lost their lives in this case, including several of the Atrievs. On the whole fewer than half of the approximately thirty individuals repressed for alleged involvement in a counter-revolutionary Sami nationalist plot were actually Sami. Just as many were Komi or Nenets, and at least 18 were reindeer herders. Under the duress of interrogation, Alymov confessed that he planned on becoming president of a new Sami state and that Salazkin would be the War Minister. On October 22, 1938 state agents executed fifteen of the individuals involved in this case, including Alymov, Salazkin, the Atrievs, and other Sami, Komi, and Russian individuals.

The Rise of Sami Traditionalism

In the late Soviet era Kola reindeer began to be increasingly celebrated as a traditional Sami animal. The rise of traditionalism resulted in part from the previous half-

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83 Kiselev, “Saamskii zagovor (Delo No. 46197),” Zhivaia Arktika, no. 3-4 (December 1999): 58-60 and “Vozvrashchennye imena.”
century of the modernization campaigns that had reshaped the reindeer economy through collectivization, amalgamation, and resettlement. This shift from a focus on reform to preserving tradition at first occurred as a cultural practice surrounding indigenous groups and the reindeer economy in an era of the fully developed state farm system of late socialism. The official celebration of folkways after the Second World War intermixed a romantic Soviet traditionalism with an enervated form of ethnic particularism and culturally elevated reindeer as quintessential tundra animals. This Soviet origin reflects a connection between the communist and post-communist eras that has often been obscured by narratives that stress ethnic repression in late socialism. Nevertheless, the promotion of tradition grew into a new development strategy only in the post-socialist era. At this point local ecological knowledge, which had also contributed to understandings of what was traditional, became itself an institutionalized and imposed form of legibility.

The performance of Sami reindeer traditionalism already existed in the 1930s, but became a prominent element of Kola regional culture in the post-Stalin era. The Holiday of the North, an annual sports festival that would come to be known locally as the “Polar Olympics,” began in 1934 and included reindeer races as one of its most popular events. For many urban Kola residents, this was the only time they would see reindeer and herders. The athletes and animals would wear the historic attire of native groups and several of the competitions would specifically require the use of old technologies like Sami sleighs.84 In the 1960s, Charnoluskii, who survived the terror but served a lengthy stint in Gulag camps, began publishing some of the Sami folklore he had collected earlier in popular science books.85 One of them included numerous fragments of Charnoluskii’s earlier conversations with Sami who stressed reindeer herding as a traditional activity. He quoted one old Sami man saying “And how are we not reindeer? We are reindeer and reindeer are us” and “We are not plowmen, we are not mowers. … We are a reindeer

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85 Charnoluskii, *Legenda o olene-cheloveke* and Charnoluskii, *V kraiu letuchego kamnia*.
people. Our bread is father-reindeer.”86 A film on the Kola Sami from 1983, *We are Reindeer People*, repeated this association.87

Soviet policies aimed at productivism and rural consolidation also contributed to the rise of traditionalism. The case of the village of Lovozero can illustrate this point. As Natalia Gutsol, S. N. Vinogradova, and A. G. Samorukova argue, “the contemporary role of Lovozero as an ethnic and reindeer-herding center on the Kola Peninsula came about as the result of historical, political, and socio-economic processes and events that occurred in the Murmansk region during the twentieth century.”88 An old yet average-sized settlement of the Sami dating back to the sixteenth century, Lovozero had only become a center of reindeer herding with the Komi migration of the nineteenth century. At the time of collectivization, Komi households dominated the *Tundra* collective farm.89 Yet, the influx of 435 Sami from resettled villages to Lovozero in the 1960s more than doubled the Sami population of the village and played into a new romantic framing of indigenous ethnicity.90 The construction of the Museum of the History of Kola Sami in Lovozero in 1962, for instance, positioned the village as a traditional center of Sami culture and reindeer herding.91 Finally, as the productivist transformation of the reindeer economy stabilized in the 1970s, older Sami herding methods such as the use of fences and the free release of animals in the summer again became standard practice on the Kola Peninsula.92

Beginning in the perestroika era, Sami activists started using notions of tradition to pursue political ends and international agencies sought to reform the reindeer economy in ways that would more closely resemble pre-Soviet forms. Increased contacts with the Sami in Scandinavia and the newfound acceptance of oppositional national and ethnic

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86 Charnoluskii, *V kraiu letuchego kamnia*, 16-21.
politics in the late 1980s influenced the expansion of a social movement focused on preserving, protecting, and promoting Sami culture. Ethnic activists of the Kola Sami at the Social Organization of the Sami of the Murmansk Region in Lovozero and the Association of Kola Sami in Murmansk promoted a development model that has been characterized as neo- traditionalism.\(^93\) Ethnographer Alexander Pika described it as: “a rejection of the state ‘modernizing drive (modernizadorstvo)’ in favor of demands for legal protection for northern peoples, freedom for independent economic and cultural development, and self-government.” He continued that “a ‘neo-traditionalist’ economy for northern native communities presents the possibility for combining traditional native land use, natural economy (khoziaistvo) and market relations, on the one hand, with reliance on state help, and compensation from the processing of oil, mineral, sea, forest and other natural resources in the north, on the other.”\(^94\)

The attempts to enact neo-traditional reforms in the Kola reindeer economy have led to tensions between the ethnic Sami activists and the multiethnic reindeer herders in the post-Soviet period. The divergent social statuses and rhetoric embraced by participants in this conflict reveal the confused political purposes of the notions of modernity and tradition. Sami activists have often been best able to take advantage of the opportunities of post-Soviet modernity and, while they advocate traditionalist politics, have employed similar assumptions about herders as currently behind the times. The herders, for their part, often maintain allegiance to Soviet modernity, criticizing ethnic activism as promoting a move back to primitivism while also seeing it as corrupt in part because of its newness and foreignness.\(^95\) As one reindeer herder expressed his resistance

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to neo-traditionalism, “They (i.e. foreign activists) shall not drive us back to the Stone Age!”  

Lastly, the multiethnic composition of the actual herding brigades has given the avowedly Sami political promotion less legitimacy among some of the herders. 

The incorporation of a putative focus on local knowledge and historic land use into reform programs supported by outside organizations has effectively created a traditionalizing form of modernization that has exhibited a similar propensity for institutionalized abstraction. The most blatant examples of employing a legible tradition have been the calls to develop a system of reindeer husbandry akin to the ranching practices of the Scandinavian Sami, but that have no precedent on the Kola Peninsula. 

An internationally funded project in the 1990s sought to employ Canadian-style co-management as a reform model for the Sami economy. Co-management intended to democratize nature use by “combining indigenous and cultural environmental wisdom about wildlife…with scientific knowledge.”  

The results of the project never extended beyond the initial work with a few Sami communities. A somewhat more successful effort began in 2003 with attempts by Aleksei Lapin, a Sami man from Lovozero, to create a private reindeer-herding commune (obshchina) called Kedd’k with the financial and organizational backing of the Danish non-governmental organization Infonor. Ideologically justified as promoting traditional, ethnic, and privatized reindeer herding, Kedd’k initially strove, however, to embrace economic modernity and social and institutional forms that resembled the state farm model of organization, as Vladislava Vladimirova has shown.  

Together these projects of bringing ethnic traditionalism to the Kola reindeer economy demonstrate the intimate connections between modernist and avowedly non-modernist forms of knowledge.

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96 Quoted in Vladimirova, Just Labor, 405.
97 Vladimirova, Just Labor, 59-102.
100 Vladimirova, Just Labor, 317-390.
Reindeer Productivity in a Communist State

The Soviet project of bringing socialism to Russia entailed the complete economic transformation of the country, including of activities that seemed as outside of industrial modernity as reindeer herding. The campaigns to turn the complex and somewhat incomprehensible occupational activities of Kola tundra dwellers into a systematic branch of animal husbandry that could be monitored and controlled involved many classic techniques of modern statecraft. Representatives of the Soviet state applied abstract frameworks designed to reform agriculture to the reindeer economy, insisted on surveillance over the animals, sought to maximize the productivity of the industry by increasing herd sizes, and constricted the space available for reindeer and herders. At the same time the modernization of the reindeer economy also relied on ecological knowledge that could not be subsumed into this systematizing and simplifying logic. Despite policy that was cavalier toward local nuance, its implementation was forced to grapple with environmental conditions beyond state control or, indeed, understanding. The process of attempting to make reindeer herding a productive industry, therefore, incorporated practical ways of knowing the land and animals that remained below the surface of regulations from the center. This knowledge was reflected in experiential interactions with reindeer and practical understandings of the capacities of grazing lands, the haphazard solutions applied by state agents to natural obstacles, and the attitudes of herders toward different episodes of reform.

Collectivization of Kola Reindeer Herding

The formation of new agricultural institutions known as collective farms (kolchozy) in the late 1920s and 1930s permanently transformed the Kola reindeer economy. The collectivization of Kola reindeer gradually allowed indigenous communities in the region to become more legible for socialist modernity. The application of certain techniques of acquiring knowledge about and control over the reindeer economy crucially served these reforms. Most fundamentally, reindeer pastoralism only became comprehensible and manageable to Soviet authorities as an agricultural activity. The state utilized scientific research and institutions and established new forms of monitoring the mobility and the size of herds. It focused on expanding the productivity of the newly industrialized reindeer economy, which largely meant
increasing the number of domestic animals kept by herders and de-emphasizing the importance of fishing and hunting. Yet, even during the violent episodes of collectivization, the interactive relations between people and reindeer influenced the local social and environmental outcomes of the policy.

Soviet reformers of the 1920s acclaimed not only the usefulness of reindeer for the Sami and other groups, but also the potential for them to serve regional industrialization as a whole. In order to promote a recovery of the herding economy from the devastation of World War I and the Russian Civil War, Kertselli offered a vision for industrializing reindeer herding that sought to build on extant practices instead of radically reorganizing them. His model relied on individual initiative and state assistance in the form of establishing a reindeer herding station on the Kola Peninsula to study animal diseases, feeding techniques, and methods of processing reindeer products. He also encouraged the government to arrange wolf hunts by supplying participants with guns and offering prizes to assist in predator eradication.101 During this decade, reform primarily occurred through the aid of credit cooperatives that provided subsidized loans to individual herders. Their operation accompanied a marked growth in the Kola reindeer economy, which included the commencement of exporting venison from the Kola Peninsula in 1927 and a more than doubling of the domestic reindeer population between 1923 and 1929.102 Efforts were also made to use the transportation services of reindeer to help develop the north. Since draft reindeer could reach otherwise inaccessible places, geological surveyors, construction workers, and miners employed the animals in the Khibiny Mountains to haul loads of ore and other materials.103

The collectivization of agriculture in the Soviet Union was above all a modernization program designed to establish central state control over output and force increased production of food. In most instances collectivization concerned restructuring farms involved in crop cultivation or livestock breeding, improving state capacity to acquire grain to feed urban areas, and putting a socialist veneer over the peasantry. As we have seen in the case of the special settlers in the Khibiny Mountains, a war against wealthier rural inhabitants laid a foundation for collectivization by providing expropriated land, property, and animals that would be redistributed among members of the new collective farms and state farms. While in theory poor and middle class peasants would volunteer to create or join collective farms, in practice many entered them through coercion employed by party activists. Reindeer collectivization posed special problems because of the migratory character of the animal and the long regeneration period of the lichen pastures. These features meant that reindeer could not be kept like cattle or other farm animals but instead required considerable mobility for foraging. Collectivization also carried with it a conviction about the need to surmount the country’s backwardness once and for all. This ideological imperative doubly affected the indigenous groups involved in the Kola reindeer economy because, as Skachko put it, “the small peoples of the north, in order to catch up with the advanced nations of the USSR, must, during the same ten years, cover the road of development that took the Russian people one thousand years to cover, for even one thousand years ago the cultural level of Kievan Rus’ was higher than that of the present-day small peoples of the north.”

Scholars often relate Soviet gigantism to large industry, but this impulse also became influential in the Stalinist transformation of the reindeer economy. This overall mentality directed Soviet reindeer herding toward using meat, milk, and fur production to accumulate capital instead of simply providing food and clothing for indigenous communities. In 1929 Kertselli predicted that the country could eventually support 15-20 million domestic reindeer and other reformers boasted that the lichen supplies in the


Murmansk region could supply food for up to 300,000 animals. Neither figure ever came close to materializing. To achieve an intended tenfold improvement in the productivity of Kola reindeer herding, the initial collectivization plans anticipated getting 91% of households to join the fourteen new collective farms and a state farm by 1933. The earliest proposals mentioned that this state farm (sovkhoz) would include 50,000 reindeer, which was close to the entire population of this species on the peninsula at the time.

Local ecological knowledge, nevertheless, mollified this productionist focus. Insisting that “the observations of the Lapps about weather and other geographical phenomena in the tundra” and “about the life and habits of wild and domestic reindeer” could aid Soviet science, Charnoluskii sought to detail this “indigenous knowledge” (znatikhi) in a published overview of the complex and diverse herding methods employed in the eastern half of the Kola Peninsula. Alymov attempted to utilize these insights and argued that “Every reindeer-herding settlement, every pogost requires its own particular approach when organizing collective farms.” He also suggested that in order to build up the domestic reindeer population, herding communities should reduce slaughter numbers, cease venison exports, and rely more on subsidiary activities like fishing and hunting during the first years of collectivization. The Murmansk Committee of the North further drafted a scaled back plan for the state farm that would require importing fewer reindeer from other parts of the country and thus reduce the likelihood of disease among the animals.

Beyond helping establish the class composition of native northerners, scientists contributed to collectivization through the application of information about the natural environment. The government created the Murmansk Experimental Reindeer-Herding

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107 GAMO, f. 169, op. 1, d. 11, l. 56.
108 GAMO, f. 169, op. 1, d. 11, l. 27.
110 GAMO, f. 169, op. 1, d. 11, l. 71.
111 GAMO, f. 169, op. 1, d. 11, ll. 70-78 and GAMO, f. 169, op. 1, d. 7, l. 13.
112 GAMO, f. 169, op. 1, d. 11, l. 24-27, 44-48.
Point near Krasnoshchel’e in the mid-1920s to research pasture use, feeding techniques, breed difference among animals, predator protection, and herding methods. Less successful efforts were also made to provide veterinary services to herding regions and develop a means of restricting the spread of reindeer diseases. In 1934 Salazkin conducted a botanical assessment of the territory used by the Sami. He proposed that the utilization of forested territories for summer pastures instead of the exclusive dependence on mountain tundra areas would raise herd capacity. Collectivization activist Budovits adopted some of the biological aspects of Charnoluskii’s research, including a classification system of the different types of reindeer, to suggest a model of diversified herding. He claimed, “the exploitation of a herd would produce much better results if part of it was specially suited for the goal of cultivating venison, another part of it for hides, a third would be selected to produce milk, a fourth would be used for transit, etc.”

Another major tactic for exerting more control over the reindeer economy during collectivization was the innovation of new forms of surveillance. Authorities instituted a notoriously inaccurate system of counting reindeer bi-annually to estimate the number of animals after the birthing period in the spring and after the annual slaughter of reindeer in the winter. This pretense of knowing reindeer numbers enabled the promulgation of economic plans and the development of scientific methods for increasing productivity. The entire program of industrializing reindeer herding also involved heightened regulation over space and mobility in the tundra. Accepting the necessity of migration as a requirement of the animals and the natural conditions of the north, reformers during the collectivization campaign emphasized clearly delineated pasturelands, techniques like

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116 Budovnits, Olenevodcheskie kol’sko kol’skogo poluostrova, 111.

territorial formation to maximize effective use, the constriction of migration routes, and a replacement of the previous pogost system of spatial organization.\textsuperscript{118}

During collectivization, the government sought to restrict reindeer herders’ mobility. Though the pogosty often became the territorial basis for the new collective farms, collectivized communities became confined to one primary settlement with temporary tundra bases serving herding activities. Only the herders, who were men, and a few camp workers, often the wives of senior herders, traveled with the animals to the tundra; many residents, including the families of herders, stayed in the village year-round.\textsuperscript{119} These spatial politics began a gradual process of the resettlement and concentration of herding communities that would accelerate in the 1950s and 1960s.\textsuperscript{120} One specialist on Kola reindeer economy, E. V. Bunakov, expressed the common desire to transform nomadic peoples into sedentary animal breeders whose occupation, as opposed to way of life, required some seasonal movement. In 1934 he wrote, “we believe that a more progressive reindeer economy that is suitable for the interests of socialist reconstruction is a system of year-round stationary pasturage, given an increased herd size and the organization of steady corralling.”\textsuperscript{121}

The evasiveness of the social and natural environment to legible categories shaped the chaotic implementation of the state’s collectivization policies. Roughly following national trends, up to 62.5% of the Kola reindeer economy was temporarily collectivized during the winter of 1930 before many of the new farms broke apart in the spring.\textsuperscript{122} The activities of Ivan Pen’kov, a government operative in some of the most

\begin{footnotes}
\item[118] On the need for some migration in the reindeer economy, Skachko wrote in 1930: “In known geographic conditions nomadism is absolutely unavoidable since it is a rational use of land.” Quoted in Gutsol, Vinogradova, and Samorukova, \textit{Pereselenie gruppy kol’skich saamov}, 26. GAMO, f. 169, op. 1, d. 6, ll. 6, 9-10, 21-23, 29-50, 60-64, 72-74 and Kiselev and Kiseleva, \textit{Sovetskie saamy}, 67-83.
\end{footnotes}
remote areas of the Kola Peninsula, help reveal in part why this occurred. As the head of the *Krasnaia Tundra* collective farm in Ivanovka, Pen’kov sought to apply a wage and investment system used at agricultural communes elsewhere in the country to the occupationally distinct conditions of an Arctic reindeer economy. Pen’kov found few obliging organizations in the regional center of Murmansk when he tried to procure supplies for herders’ tents and faced an almost farcical series of pleas, negotiations, and bargains with provisioning agencies. Furthermore, the warnings of the Committee of the North members about the risks of importing reindeer from other parts of the country proved prescient. After purchasing a large number of animals, the new state farm suffered an outbreak of hoof disease (*kopytka*) and many reindeer perished. Indeed, the difficulties that reindeer had in surviving collectivization undermined the productivist rationale of the policy. Thus, while approximately 40% of households and 75% of reindeer on the Kola Peninsula belonged to collectivized or state institutions in 1932, the domestic reindeer population after this point declined to below its pre-collectivization level.

The resistance of herding communities to collectivization contributed to its lack of economic success. Throughout the country, rural residents slaughtered and feasted on animals slated for state expropriation and sometimes let carcasses rot to prevent authorities from profiting from a policy they denounced as a second serfdom. While the 1932-1933 famine also caused people to turn to this tactic out of desperation, Lynne Viola and Sheila Fitzpatrick have appropriately seen such episodes of killing animals as forms of resistance. Bunakov estimated that the “frantic resistance” of kulak herders on the Kola Peninsula helped lead to the loss of approximately 7500 reindeer during

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123 Pen’kov was a participant in the 25,000er movement, which recruited urban Communist workers to bring collectivization forcefully to the village. Viola, *The Best Sons of the Fatherland.*


127 For instance, Fitzpatrick cites that peasants slaughtered an astounding 25% of cattle, 53% of pigs, 55% of sheep, and 40% of chickens in the Central Black Earth region during the winter of 1930. Fitzpatrick, *Stalin’s Peasants,* 66.

Specific cases of reindeer slaughter on the Kola Peninsula expose how the classificatory frameworks of state policy elided much more nuanced social relations. For instance, a Sami man in the Pulozero region, Kondrat Arkhipov, faced accusations of being a kulak and a sorcerer who stole and burned other herders’ reindeer. The details of his apprehension and trial point instead to community cohesion and his paternal authority in Sami society. Arkhipov evaded the state for months and villagers, who likely knew his approximate location the whole time, only helped find him when pressured by the state. In another case, six individuals from Tundra were convicted of killing at least 144 reindeer from other herders. Though authorities wanted to frame such actions as kulak exploitation, all of the herders had been deemed lower class and, indeed, two of them had begun to forge Communist Party affiliations.

The treatment of nature by herders also affected the outcomes of the efforts to reform the reindeer economy in the 1930s. The Sami had developed a system of carving personalized earmarks to distinguish their reindeer, which would frequently herd with other pastoralists’ animals. Part of the initial complaint against Arkhipov had been that he refused to let others search the herd for reindeer with their earmarks. During the case of the six Tundra herders, the defendants had supposedly attempted to cut new earmarks into stolen reindeer to make them resemble those of their own animals. The herders’ understanding of how to interact with these animals facilitated this act of resistance to collectivization. The relationship of herders and some of the sympathetic reformers to reindeer and the land also became a source of criminal allegations during the terror. The police accused individuals of committing arson on lichen pastures, deliberately disseminating hoof disease among the animals, leaving the reindeer without

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129 Bunakov, “Ekonomicheskoe obosnovanie razvitiiia olenevodstva Murmanskogo okruga,” Sovetskoe olenevodstvo 4 (1934): 126-127 and Kiselev and Kiseleva, Sovetskie saamy, 73. As part of a national policy of correcting “excesses,” the government transferred approximately 2000 reindeer directly to non-collectivized herders, including to nine Sami who had been classified as kulaks. Local party cells at the Apatit trust approved these “corrections.” GAMO, f. P-152, op. 1, d. 1, l. 32.

130 Budovnits, Olenevodcheskie kolkhozy kol'skogo poluostrova, 37-41; Zolotarev, Kol'skie lopari, 184; Kiselev and Kiseleva, Sovetskie saamy, 94-95; and Z. E. Cherniakov, Ocherki etnografii saamov (Rovaniemi: University of Lapland, 1998).

131 Budovnits, Olenevodcheskie kolkhozy kol'skogo poluostrova, 91-100.

132 Budovnits, Olenevodcheskie kolkhozy kol'skogo poluostrova, 37-38 and Zolotarev, Kol'skie lopari, 184.

133 Budovnits, Olenevodcheskie kolkhozy kol'skogo poluostrova, 91-100.
supervision, and slaughtering calves.\textsuperscript{134} This line of inquiry by the People’s Commissariat of Internal Affairs (NKVD) reveals the state's unease with its inability to manage the Kola reindeer economy. Fires were a natural occurrence in such regions and the efforts to systematize and regulate the pastures of the collective farms before adequate fire prevention services existed likely impeded the ability of herders to adapt. The spread of hoof disease was a predictable outcome of pursuing the relentless increase in herd numbers without adequate veterinary facilities. Conceding that natural conditions outdid the Soviet attempt to control the tundra was less acceptable than placing the lack of human omnipotence in a framework of intentional counter-revolutionary wreckage.

Collectivization resulted in a reindeer economy that both conformed to state power and embraced modified customary practices. It proceeded gradually after the initial drives; according to Soviet-era sources, the herders were almost entirely collectivized only by the end of the decade.\textsuperscript{135} A safer estimate of full collectivization would be after the post-World War II reconstruction.\textsuperscript{136} By shifting away from fishing and hunting, collectivization created an industrialized reindeer economy in which the number of animals and amount of venison were the ultimate criteria of success. By 1937 the domestic reindeer population in the Murmansk region had more than recovered from the disruptions of collectivization, reportedly reaching 76,918 animals.\textsuperscript{137} In the collective farms, herders split into several brigades that tended large herds composed of collective and private reindeer, which were roughly equivalent to the private plots that peasants were allowed to use for personal gardens. In the second half of the 1930s a new land use system that designated specific seasonal pastures for each collective farm brigade was instituted.\textsuperscript{138} This arrangement of pastures entailed year-round surveillance

\textsuperscript{134} Sorokazherd’ev, “Po stranitsam sledstvennogo dela No. 46197,” Nauka i biznes na Murmane 16, no. 2 (April 2004): 55-64.
\textsuperscript{135} Luk’ianchenko, Material’naia kul’tura saamov (loparei) Kol’skogo poluostrova v kontse XIX-XX v., 20-24 and Kiselev and Kiseleva, Sovetskie saamy, 80-83.
\textsuperscript{136} I base this assertion on the vague ways that published Soviet-era sources refer to full collectivization by the end of the 1930s and Alymov’s claim, albeit made under considerable duress, from March 1938 that no more than 45% of households in the Lovozero district were collectivized. Sorokazherd’ev, “Po stranitsam sledstvennogo dela No. 46197,” Nauka i biznes na Murmane 16, no. 2 (April 2004): 58.
\textsuperscript{138} Vladimirova, Just Labor, 139-140.
over the animals and abandoned the Sami technique of free summer grazing. Based on extensive research on Kola reindeer herding, anthropologist Yulian Konstantinov argues that the keeping of private reindeer was not a simple vestige of the pre-collectivized economy. Instead, collectivization paradoxically functioned as a form of privatization of reindeer by establishing more formal relations of ownership. He further notes how herders, who were well aware of divergences between official statistics and reality, chose to play along with the rationalizing state practices when social circumstances required it.

Postwar Amalgamation

From the Second World War to the heart of the Brezhnev-era in the 1970s, the efforts to bring Soviet modernity to the Kola herding economy continued through processes of increased concentration of people and animals and the simplification of indigenous livelihoods. While lacking the violence that accompanied collectivization, the amalgamation of numerous reindeer-herding collective farms into a few large state farms from the late 1950s to the early 1970s isolated herding communities from historically important forms of nature. The logic of the program involved a spatial re-organization of the rural taiga and tundra that prioritized energy, industrial, and military installations over continued land use patterns of herding communities and that embraced a quasi-urban confinement of pastoralism as a strategy for increased production. As with collectivization, the local sites in which the state’s amalgamation policy was implemented also reveal the influence of sentient ecological knowledge.

The conditions in the region during the Second World War led to a notable decline in the Kola reindeer economy. Many herders served in the Red Army during the war and left their animals unattended. Reindeer also assisted the army on the Finnish front as an unsustainable means of transport, sustenance, and other supplies. The reindeer population almost completely disappeared from Karelia and fell from 70,300

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139 Luk’ianchenko, Material’naia kul’tura saamov (loparei) Kol’skogo poluostrova v kontse XIX-XX v., 32-33.
141 Kiselev and Kiseleva, Sovetskie saamy, 108-120.
animals in 1940 to 42,900 in 1945 on the Kola Peninsula.  

As the war wound down, central party and economic organizations sought to remedy the exhaustion of the local food supply in the north by again increasing the development of the Kola reindeer economy and attempting to expand polar agriculture. The gradual recovery of the reindeer industry during the postwar reconstruction occurred, however, more because of the activities of pastoralists and ecological factors related to reindeer population dynamics than as a result of new policy interventions.

In the late 1940s and 1950s the government gradually began to pay more attention to agriculture. After another drought and famine took over one million lives in 1947, the policy makers turned to a re-invigorated trust in Trofim Lysenko’s vernalization techniques to establish more stable agricultural surpluses. In the 1950s Nikita Khrushchev eagerly sought to revive Soviet agriculture by devising a series of policies such as the Virgin Lands program. A key element of Khrushchev’s agricultural policy was the consolidation of collective farms into larger state farms: between 1953 and 1958 the total number of collective farms in the USSR fell by over a quarter. As these agglomeration policies continued into the 1960s, central agencies used 1959 census data to draw up a list of 580,000 “non-viable” villages slated for liquidation. The idea was to leave only two concentrated agrocities in each region. On the Kola Peninsula this policy of amalgamation led to a remarkable reduction in reindeer herding enterprises from over a dozen before World War II to two state farms by the end of the Soviet era.

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143 RGASPI, f. 17, op. 122, d. 104, ll. 162-168.
Amalgamation aimed at increasing the productivity and profitability of the herding economy by enlarging the scale of operations in concentrated locations. In terms of this goal, the policy brought about mixed results. The first reindeer-herding collective farm to be liquidated was the mostly Sami Vpered in Chudz’iavr, which was forced to move to Lovozero in 1959 after many years in the red. Its herders and reindeer joined Tundra.\textsuperscript{149} By the end of amalgamation a decade later the performance of collective farms mattered less in determining their fate. Thus, the collective farm Bol’shevik in Varzino, which had been fulfilling its production plans consistently in the 1950s and 1960s, also joined Tundra in 1969.\textsuperscript{150} The productivist economic logic of creating larger and larger herding organizations to grow the reindeer economy led to the domestic population on the Kola Peninsula reaching its twentieth-century peak in 1971 as the resettlement process was completed. However, it began a period of decline after this point, mirroring the general economic difficulties of the Soviet Union in the 1970s.\textsuperscript{151}

Economic motivations related to desired models of land use besides reindeer herding also played an important role in determining the geography of resettlement. Several small reindeer-herding villages were forced to move because of new hydroelectric power stations. The economically successful Dobrovolets collective farm moved from Voron’e to Lovozero and its members joined Tundra in the early 1960s so that their village, including an old Sami cemetery, could be transformed into a reservoir for the Serebriansk Hydroelectric Station.\textsuperscript{152} A similar development occurred at the Krasnaia Tundra collective farm in Chal’mny-Varre (Ivanovka). Residents moved to nearby Krasnoschchel’e in the 1960s when the village became slated for flooding to serve a planned electric station on the Ponoi River. The collective farm combined with one in

\textsuperscript{149} Gutsol, Vinogradova, and Samorukova, Pereselenie gruppy kol’sikh saamov, 27-33.
\textsuperscript{150} Gutsol, Vinogradova, and Samorukova, Pereselenie gruppy kol’sikh saamov, 37-43.
the new location and eventually became the state farm *Imeni V. I. Lenina* (In the Name of Lenin).  

The formalized process of local decision-making during amalgamation suggests that Kola reindeer herders managed to impart their insights about tundra ecology and express their interests to at least a limited extent. Members of the collective farm *Bol’shevik* voted convincingly, but not unanimously, for resettlement. Collective farm members in favor cited the lack of supplies and electricity in the village, the distance from amenities, and the fact that young people were already abandoning Varzino. When the members of *Tundra* took up the issue, they expressed concern about limited pastureland for reindeer herds. *Tundra* member V. A. Podoliak declared, “the most complicated question concerns pastures for reindeer. We have so few winter pastures and will need to accommodate another three-thousand animal herd.” Tundra ultimately agreed to accept *Bol’shevik* on the condition that they receive pastureland back from the *Imeni V. I. Lenina* collective farm and that current members of *Tundra* get to move into any new building first instead of the migrants. During the earlier resettlement of *Dobrovolets*, collective farm members secured moving expenses and two new apartment buildings in Lovozero from the new hydroelectric plant. However, this time housing planners botched this construction project and many former members of *Bol’shevik* remained without the promised accommodations for years.

Amalgamation remade the tundra. As an apogee of the Soviet modernization of reindeer herding, the consolidation of collective farms and the resettlement of villages left the Kola Peninsula with only two reindeer-herding state farms, *Tundra* and *Imeni V. I. Lenina*, in the agrocities of Lovozero and Krasnoshchel’e. Like many places that dotted state-socialist landscapes, Lovozero became a community of a few thousand living in large concrete apartment blocks. Amalgamation continued decades of confining reindeer

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and herders into reduced territories; Dobrovolets, Vpered, and Bol’shevik lost 120,000 hectares as they were combined with Tundra.\footnote{Gutsol, Vinogradova, and Samorukova, Pereselenie gruppy kol’sikh saamov, 60.} More than the total reduction of territory, the concentration of people and reindeer modified tundra livelihoods. Throughout the 1930s to the 1950s, fishing and hunting remained key to, if not the dominant components of, herding communities’ economies. For the inhabitants of Varzino in particular, salmon (semga) fishing at numerous points on the rivers of the Semiostrrov region was more significant than reindeer herding.\footnote{Gutsol, Vinogradova, and Samorukova, Pereselenie gruppy kol’sikh saamov and Gutsol, Vinogradova, and Samorukova, “Istоричeskie uslovii i sotsial’no-ekonomicheskie posledstviia pereselenii Kol’sikh saamov v sovetskii period,” in Petrov and Razumova, ed., Chelovek v sotsial’nom prostranstve, 97-114.} Combined with isolation from fishing grounds and hunting territories, a singular focus on reindeer herding helped further make this economic activity be seen as the main traditional indigenous occupation on the Kola Peninsula.

_The Sovkhoz Tradition and Post-Soviet Reforms_

The attempts to modernize indigenous communities on the Kola Peninsula had so modified the patterns and practices of the reindeer industry by the Soviet collapse in 1991 that new forms of the state-socialist economy became valorized as traditions by herders in the post-Soviet era. The state farm system brought a modicum of stability to the people and animals involved in the Kola reindeer economy, which became a source of retrospective legitimacy when renewed reforms based on attempts to implement market mechanisms again brought disruptions to the tundra. The politics of ecological knowledge played a partially familiar and partially distinct role in the local manifestation of capitalist reforms. The legibility of the market depended on the explicit incorporation of international actors and changing land-use according to the whims of abstract buyers instead of an abstract state. However, the environmental and social relations of the reindeer economy never fit within the formal structures of the communist system and did not quickly integrate into markets.

During the late Soviet era, the state farm system of reindeer herding that emerged from amalgamation and its corresponding environmental relationships became deeply entrenched on the Kola Peninsula. In contrast to collective farms, the government took more responsibility for keeping state farms financially afloat by providing investments...
and loans and detaching salaries from direct dependence on economic productivity. With the use of new technologies such as snowmobiles, helicopters, and all-terrain vehicles, the Kola state farms focused on producing and delivering venison to a steady purchaser, the Murmansk Meat Combine. Konstantinov, Vladimirova, and Hugh Beach describe how the ecological associations that herders had with reindeer changed after amalgamation. Operating out of concentrated agrocities, several brigades of each state farm were responsible for tending huge herds of reindeer. In a return to earlier practices on the Kola Peninsula, the brigades left their herds for free grazing in the summer. In the context of state ownership of the previously collective reindeer, personal animals became an even greater priority for many pastoralists. At the same time the increased sizes of the herding enterprises, the general behavior of these nomadic herbivores, and the mixing of personal and state farm animals further impeded any direct contact with one’s own reindeer. Only during the winter corral would personal reindeer, which were distinguished by earmarks and slated for slaughter, come to the attention of their owner.

For all of the energy devoted to making reindeer herding a productive industry, Soviet policy interventions seem to have had less of an impact on the population of domestic reindeer than the ecological relationship of this herding species to its environment. Reindeer populations have a tendency to grow until an exhaustion of foraging resources and then decline rapidly. Excepting the obvious episodic social influences such as the arrival of the Komi, the devastation of World War I and the Russian Civil War, the reverberations of the 1932-1933 famine, the impact of World War II, and perhaps the disorder of the late 1990s, the population dynamics of domestic


\[160\] Vitebsky, Reindeer People, 21.
reindeer in the twentieth century appear fairly unresponsive to collectivization, agglomeration, and attempted marketization (see Table 5). For instance, the massive expansion of the reindeer population in the earlier twentieth century, when no official policy of industrializing reindeer herding existed, was far greater than the results of any deliberate efforts to increase herd sizes in the Soviet era. While these population estimates have obviously limited accuracy and reflect a prominent practice of establishing legibility, the contours of the fluctuations seem large enough to trust in assessing general changes.

Table 5. Reported Population of Domestic Reindeer in the Murmansk Region

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic reindeer population</th>
<th>Year</th>
<th>Domestic reindeer population</th>
<th>Year</th>
<th>Domestic reindeer population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1886</td>
<td>13,000</td>
<td>1929</td>
<td>56,500</td>
<td>1963</td>
<td>78,152</td>
</tr>
<tr>
<td>1887</td>
<td>18,000</td>
<td>1932</td>
<td>63,100</td>
<td>1968</td>
<td>79,117</td>
</tr>
<tr>
<td>1896</td>
<td>45,000</td>
<td>1934</td>
<td>54,000</td>
<td>1971</td>
<td>82,832</td>
</tr>
<tr>
<td>1905</td>
<td>59,000</td>
<td>1937</td>
<td>76,918</td>
<td>1981</td>
<td>63,000</td>
</tr>
<tr>
<td>1910</td>
<td>67,200</td>
<td>1940</td>
<td>70,300</td>
<td>1985</td>
<td>71,449</td>
</tr>
<tr>
<td>1914</td>
<td>81,000 / 74,000</td>
<td>1947</td>
<td>42,045</td>
<td>1991</td>
<td>73,356</td>
</tr>
<tr>
<td>1923</td>
<td>23,000</td>
<td>1950</td>
<td>53,883</td>
<td>1998</td>
<td>72,438</td>
</tr>
<tr>
<td>1927</td>
<td>48,300</td>
<td>1959</td>
<td>74,800</td>
<td>2002</td>
<td>57,000</td>
</tr>
</tbody>
</table>

The post-Soviet reforms of Kola reindeer herding aimed at making it part of a capitalist market economy, but ended up allowing important elements of the Soviet state farm system to abide. An episode of impoverishment and disempowerment, which have often accompanied top-down modernization campaigns, preceded efforts to implement a vision of neo-traditionalism in indigenous communities. Russian neoliberalism was ushered in by shock-therapy policies—hasty privatization, the de-regulation of price controls, withdrawal of state subsidies, and increased openness to foreign trade—and a political overhaul that gave the country institutions of representative democracy. The fate

of agricultural property in these reforms involved legal and practical complexities in the distribution of rights and the moral anxieties in society over the reorganization of ownership. Ethnographic research has probed effectively the on-the-ground contradictions in many realms of the post-socialist world that complicate understandings about how capitalist property regimes function.\textsuperscript{162} Initially privatized as Limited Liability Partnerships, meaning that managers and employees received the majority of the shares of the firm, the Kola state farms Tundra and Olenevod later became Agricultural Production Cooperatives (SKhPK). In part because the basic structures of mixed collective/private ownership of reindeer has remained in place through these cooperatives, the post-Soviet administration and management of Tundra and Olenevod resemble the state farm system more than overt entrepreneurship.\textsuperscript{163} Konstantinov and Vladimirova call the continuation of many of the everyday economic practices and structures associated with the state farm “sov khoism” and argue that it has been “a much more stable tradition, than anything that dates before.”\textsuperscript{164}

The new market orientation of herding institutions has also transformed environmental relations in similar directions as Soviet-era reforms. Unlike reindeer husbandry in much of Siberia, the Kola herding cooperatives benefited from their close proximity to the venison market in Scandinavia and were able to secure a monopolistic buyer, the Swedish firm Norfrys-Polarica. Combined with herders’ ability to access natural resources from the tundra during crisis moments, this relationship allowed the reindeer cooperatives to play a sustaining role in Lovozero and Krasnoshchel’e.\textsuperscript{165}

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actions of international companies also contributed to the further isolation of indigenous communities from fishing areas in the region. While amalgamation had separated communities from fishing grounds, many continued to catch salmon in rivers and streams when the opportunity arose. In the 1990s foreign tourism companies attained the exclusive right to use certain rivers in the eastern part of the Kola Peninsula. These companies advertised their salmon fishing expeditions by overtly referring to the fact that locals are not allowed to fish in the rivers. Such developments have continued the elevation of reindeer as a means of material well being for indigenous communities.

### Efforts to Protect Wild Reindeer

Institutionalized conservation on the Kola Peninsula was a modern innovation. It began in the 1930s during the first fit of Stalinist industrialization with the creation of the Lapland nature reserve, which aimed at preserving aspects of the ecosystems seen as traditional. To a large extent this protected area concentrated on restoring the wild reindeer population in the western part of the peninsula. The scientists working there combined a desire to use their expertise to rationalize an ecosystem with a romantic attachment to supposedly pristine environments. Especially in the 1950s and 1960s, this commitment to controlling a landscape led to conflicts between conservationists and reindeer herders. Many scholars have criticized scientific conservation as disconnected from local communities. Tim Ingold contends that the doctrines of scientific conservation hold that “the world of nature is separate from, and subordinate to, the world of humanity” and asserts that, on the contrary, for hunter/gatherer societies “conservation and participation” are compatible. For them, “caring for the environment is like caring for people: it requires a deep, personal and affectionate involvement, an involvement not just of mind or body but of one’s entire, undivided being.” I intend to show here that while conservation scientists pursued the protection of wild reindeer on the Kola Peninsula with a strong conviction in the superiority of their rationalist knowledge, they were also influenced by personal, participatory, and affectionate

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166 Overland, “Politics and Culture among the Russian Sami,” 69-73.
involvement with the environment. Not just reindeer communities, but conservation scientists as well, were informed by sentient ecological knowledge.

_The Rise of Reindeer Conservation on the Kola Peninsula_

In the 1920s and 1930s a small group of marginalized scientists initiated a campaign to protect the population of wild reindeer on the Kola Peninsula. Motivated in part by their own intimate connections to the natural world and desires to put their expertise into practice, they endorsed the establishment of a protected space for species study and restoration. Their conservation efforts involved making public arguments about the economic value of creating a nature reserve, while relying on indigenous insights and assistance to do the work of protecting wild reindeer. This strategy succeeded in convincing state authorities to allocate land for the creation of the Lapland nature reserve in 1930.

Organized nature protection in Russia predated the revolutions of 1917, but the nationalization of land after the Bolshevik takeover presented a unique opportunity to expand the system of nature reserves in the country. In late imperial Russia representatives of educated society, who were concerned about the transformation of landscapes and the disappearance of species, formed conservation groups that convinced several large landowners to set aside significant tracts for nature reserves called _zapovedniki_. They planned to establish an entire system of protected areas that would represent diverse ecological models of untouched wilderness. During the Russian Revolution, the state acquired vast lands that had previously belonged to nobles or the Orthodox Church. With top-level government support, the _zapovednik_ system underwent a remarkable expansion of the size and number of reserves throughout the 1920s.169

As Douglas Weiner has emphasized, the initial conception of nature protection in the Soviet Union was quite radical, even by global standards at the time. Conservation scientists embraced a model of the reserves based on the principle of the inviolability of specific natural systems. All humans not involved in the scientific management or security functions, including tourists, would be completely excluded from the territories. The scientific justification for this approach came from the concept of biocenosis. Early

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Soviet conservation biologists believed that all of living nature could be divided into subsystems called biocenoses that exhibited the properties of species interdependence and long-term equilibrium. In their view both of these ecological properties required strict and enduring protection of representative samples of these unaltered environments.\textsuperscript{170}

Serious scientific concern about preserving the population of wild reindeer on the Kola Peninsula, which had been in decline since even before the Komi migration of the 1880s, emerged in the late 1920s.\textsuperscript{171} A single botanist named German Kreps led the campaign and elaborated a strong case for conservation.\textsuperscript{172} In the local Communist Party newspaper \textit{Polar Pravda} in the spring of 1928, Kreps publicly announced the idea of setting aside a territory of approximately 200,000 hectares in which all forms of economic activity would be prohibited in order to save the region’s wild reindeer from extinction.\textsuperscript{173} He elsewhere noted the inadequacy of the current hunting prohibitions because of the impossibility of enforcement and insisted, “the only effective measure for the protection of wild reindeer is the organization of a nature reserve (\textit{zapovednik}) on the Kola Peninsula.” This \textit{zapovednik} would have the “goal not only of protecting a single animal, but also of preserving the entire geographical landscape in natural inviolability.”\textsuperscript{174} Kreps outlined justifications for this reserve that highlighted its value for science, the future hunting economy, and the domestic reindeer industry.\textsuperscript{175} He proposed using the lands surrounding the Chuna tundra to the west as the site for the future nature reserve, since this territory had sufficient forest and lichen cover, a mountain tundra area, an existing population of wild reindeer, a diverse range of other plant and animal species, and distance from centers of human activity.\textsuperscript{176}

\begin{footnotes}
\item[172] On Kreps’s background, see V. E. Berlin, \textit{Grazhdanin laplandii: Odissea Germana Krepsa} (Moscow: “Mysl’,” 1985).
\item[173] \textit{Poliarnaia pravda} (March 24, 1928), 1 and \textit{Poliarnaia pravda} (April 24, 1928), 4.
\item[175] Kreps, “Dikii severnyi olen’ na Kol’skom poluostrove i proekt organizatsii laplandskogo zapovednika,” \textit{Karelo-Murmanskii Krai} 6, no. 10-11 (October-November 1928): 40. A specific argument about the advantage of crossing-breeding wild and domestic reindeer convinced members of the Murmansk Committee of the North. GAMO, f. 169, op. 1, d. 6, ll. 9-9ob.
\end{footnotes}
In addition to the formal rationalist elements of the plan, Kreps relied crucially on the ecological knowledge of the Sami living to the west of Lake Imandra. The proposed territory for the reserve was uninhabited except for two or three Sami families who fished there during the summer. These individuals participated in the work of the reserve by offering their recollections of previous environmental conditions, helping count the existing wild reindeer population, and later serving as security guards. Based on memories of older Sami hunters, Kreps ascertained that the population of Kola wild reindeer underwent periodic booms and busts as the animals over-consumed the available lichen pastures. During the previous three or four decades, however, the expansion of reindeer herding and the establishment of the Murmansk railroad had caused a precipitous drop in the wild reindeer population beyond these normal fluctuations. This change, according to Kreps, necessitated an intervention. Kreps also depended on the ability of Sami hunter Fedor Arkhipov to distinguish between wild and domestic reindeer from a distance during his first attempt to estimate the population in April 1929.

Government agencies officially established the Lapland nature reserve on January 17, 1930 and soon after named Kreps as its director. In the fall he hired three security guards and a botanist named Oleg Semenov-Tian-Shanskii, who would come to play a decisive role in the history of the reserve. The desire to commune with nature enticed Semenov-Tian-Shanskii, who at the time worked at a meteorological base along the Murmansk railroad. After receiving the offer to join the Lapland nature reserve, he wrote in his diary, “work observing and studying nature is more to my liking and I would very much welcome”.

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much like to take up his offer.”¹⁸² Just before the reserve staff moved out to the Chuna Tundra for their first winter on the reserve in 1930-1931, they learned of the discovery of valuable metal deposits by geologists in the nearby Monche region. Semenov-Tian-Shanskii recorded Kreps’s despair at the prospect that industrial activities would commence on the territory of the zapovednik: “The whole nature reserve, the result of several years of his labor, will be ruined since the exploitation of one of these basic parts of the territory of the nature reserve will soon bring about the disappearance of the wild animal.”¹⁸³ The scientists avoided this result by adjusting the reserve’s borders, but challenges to maintaining a lack of industrial influence on the territory would continue.¹⁸⁴

**Difficulties and Successes of the 1930s**

Over the first decade of its existence the Lapland nature reserve made considerable gains in its mission to restore wild reindeer, but both state pressure and ecological factors forced an abandonment of the ideal of it as an inviolable model of a natural system. For one thing reindeer simply did not stay within the confines of the protected territory. Despite his public appeals to utilitarian rationales for conservation, Kreps seemed attracted to the idea of maintaining natural systems with minimal economic influence. His pursuit of these methods of nature protection ultimately placed him in a vulnerable position for denunciation during the 1937-1938 terror. Unlike many leaders of the regional economy, however, he escaped the ordeal with his life but not his job. The economy-centered logic of state policy at the time clashed with the multivalent motivations and practices of the employees of the Lapland reserve. The successful recovery of the wild reindeer population from near extinction and the ability to campaign for an expansion in the protected territory marked accomplishments for Soviet conservation.

Though Kreps used the concept of inviolability in his initial plan for the reserve, it was already under attack by the time of its creation. Inviolability implied permanence in space and time. Parcels of untouched nature would be kept with minimal human interference. This notion not only contradicted the priorities of a rapidly industrializing

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state, but it also seemed inadequate to some zapovednik scientists who pointed out that the territories they were protecting were not in fact “untouched” but had also suffered anthropogenic influences that could be remedied.\textsuperscript{185} The vexed issue of acclimatizing exotic species served as the practical embodiment of this debate at the Lapland nature reserve. Since the early 1920s biologists working in the People’s Commissariat of Agriculture had been advocating for the introduction of North American muskrats to the northern realms of the country as means of expanding the hunting economies there.\textsuperscript{186} Though they almost certainly opposed such species introduction to non-native ecosystems, Kreps and Semenov-Tian-Shanskii cooperated and released imported muskrats onto the Lapland reserve in 1931.\textsuperscript{187} The acclimatization of beavers, which had lived in the region until some point in the nineteenth century, received considerably more enthusiasm from zapovednik workers.\textsuperscript{188} Both projects represented departures from the original concept of inviolable protection.

Kreps’s understanding of reindeer ecology and proper restoration efforts became fodder for a campaign against him. In contrast to his initial claims about the benefit of preserving wild reindeer for the domestic reindeer economy, his scientific research on herd interaction led him in the opposite direction. Based on his own observations and information from local Sami, he moved toward seeing little economic benefit in keeping wild and domestic herds in proximity to each other. Though he maintained an emphasis on the potential to hunt wild reindeer in the future, Kreps’s supposed reluctance to promote the economy evoked criticism from the head of the Apatit trust, Vasilii Kondrikov, in September 1933.\textsuperscript{189} Kondrikov commented, “wild reindeer are a good thing, but I should say that comrade Kreps with his wild reindeer should still be more

\textsuperscript{186} Weiner, \textit{Models of Nature}, 171-173.
concerned with practical issues.” An exposé in the newspaper *Kirovsk Worker* about the Lapland nature reserve shortly after Kreps was fired in early 1937 emphasized the divergent understandings about the purpose of wild reindeer conservation. The author assailed the Lapland nature reserve’s research program for not prioritizing the study of lichen restoration in an area where there had been a forest fire in 1936 and accused Kreps of issuing “a call to exterminate wild reindeer.” He based this attack on Kreps’s observations that wild reindeer contribute “to domestic reindeer going wild,” “can disturb the work of rescuing domestic reindeer from gadflies and therefore are harmful in reindeer-herding regions,” and are not genetically unique from domestic reindeer.

These troubles did not prevent the staff of the Lapland nature reserve from pursuing their agenda effectively. The wild reindeer population on the western half of the Kola Peninsula quickly recovered; Kreps wrote to Charnoluskii in 1931 that it had already increased one and a half times. During the 1930s, conservation scientists employed a method to estimate populations that involved ascertaining the herds’ locations at different times of the year, finding the animals in tundra and forest zones, surveying track marks, and distinguishing domestic reindeer that had mixed with a wild herd. Their results pointed to a steady rise in the number of wild reindeer, reaching over 900 by the end of the decade. The Lapland nature reserve also became part of the state system of *zapovedniki* of the Russian Republic in February 1935 and had its budget considerably increased. This move allowed the reserve to hire more researchers, including three female scientists (M. I. Vladimirskaia, N. M. Pushkina, and T. P.

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191 GARF, f. A-358, op. 2, d. 32, l. 30. Kreps was forced to leave the Kola Peninsula after being fired, but found another position at the Altai *zapovednik*. During the Second World War he worked making air deliveries to the front and got injured. Shortly after being appointed as the director of the Central Forest Nature Reserve in 1944, Kreps passed away. He was later buried on the territory of the Lapland Nature Reserve. Berlin, *Grazhdanin laplandii*, 110-121.
193 S. A. Diuzhilov, “‘Arkhipelag Svobody’ na Murmane (vторая половина 1920-x—1930-e g.g.),” in P. V. Fedorov, et al., eds., *Zhivushchie na Severe: Obrazy i real’nosti* (Murmansk: MGPU, 2006), 95.
195 GARF, f. A-358, op. 2, d. 231, l. 32.
Nekrasova), and to expand its research and cultural enlightenment programs to better meet state demands.\footnote{GARF, f. A-358, op. 2, d. 19, l. 170; GARF, f. A-358, op. 2, d. 111, ll. 1-18, 20-24, 34; and GARF, f. A-358, op. 2, d. 231, ll. 28-36, 45.} 

Additionally, the behavior of wild reindeer themselves helped reserve scientists to expand the borders of the zapovednik in 1941. In 1939 the staff claimed to have discovered that the territory of the Lapland reserve was only 138,000 hectares instead of the officially sanctioned 200,000 hectares.\footnote{GARF, f. A-358, op. 2, d. 32, ll. 2-7, 18-28; GARF, f. A-358, op. 2, d. 19, l. 170; and GARF, f. A-358, op. 2, d. 231, l. 28. This very year the reserve faced a threat from the Severonikel’ combine, which sought to contract with the Leningrad Geological Administration to survey the Chuna tundra on the Lapland reserve for new nickel deposits. KF GAMO, f. 52, op. 1, d. 4, ll. 3ob-4.} On top of this miscalculation, the wild reindeer of the reserve began to roam in areas outside of the reserve’s borders.\footnote{GARF, f. A-358, op. 4, d. 1521, l. 19.} Semenov-Tian-Shanskii and other reserve staff used this information to campaign for an enlargement away from the new industrial center of Monchegorsk throughout 1940.\footnote{A. Nasimovich, “V laplandskom zapovednike,” Poliarniaia pravda (January 8, 1940), 4 and GARF, f. A-358, op. 4, d. 1521, l. 19.} The official decisions to expand the zapovednik mentioned these reasons, stating “in connection with the increased numbers of wild reindeer and elk in the Lapland nature reserve, the insufficiency of foraging resources led to the displacement of these animals beyond the border of the nature reserve into the regions of the Monche tundra, where they are deprived of effective protection from poaching” and that the new boundaries are necessary for “promoting the propagation and preservation of wild animals that are valuable in economic and scientific terms.”\footnote{GARF, f. A-358, op. 2, d. 32, ll. 9-11 and GARF, f. A-358, op. 2, d. 231, l. 37.}

**Postwar Troubles for Soviet Nature Protection**

Located near the Soviet border and sites of military activity during World War II, the Lapland nature reserve lost a significant portion of its wildlife during the conflict. In 1951 the reserve faced liquidation as part of a nation-wide attack on zapovednik conservation. The effect of closing the Lapland zapovednik for most of the 1950s on wild reindeer remained minimal, however, as the population of the species again recovered from wartime devastation. The operations of the reserve changed after it re-opened in 1957 to rely less heavily on the first-hand observations of Sami hunters. Semenov-Tian-Shanskii was the functional if not nominal leader of the reserve from Kreps’s departure in
1937 until his death in 1991. His thoughts and concerns during these tumultuous events of the postwar era reveal some of the moral motivations for this scientific conservation.

During the Second World War, state-sanctioned hunting of reindeer occurred on the territory of the Lapland reserve.\footnote{Berlin, “Khraniteli prirodnogo naslediia,” Zhivaia Arktika, no. 1 (2004): 6-7.} These attempts to supply venison to the front led to sharp declines in both domestic and wild reindeer in the western part of the Kola Peninsula.\footnote{Makarova, “Dikii severnyi olen’ Kol’ skogo poluostrova v kontse XX—nachale XXI vekov,” Nauka i biznes na Murmance, no. 4 (August 2003): 43 and GARF, f. A-358, op. 4, d. 1521, l. 25.} The shift from protection to aggressive hunting apparently also affected the psychology of the animals. A Sami security guard named Artamon Sergin, who had worked at the reserve since its formation, described “the extremely alarmed behavior of wild reindeer” in his diary during the war. In February 1942 he wrote, “Wild reindeer now began to move very quickly. If you frighten them away, they will go thirty kilometers and not eat but go straight. If one or two reindeer stay on the path, then they go in pursuit of them and scare away the herd.”\footnote{GARF, f. A-358, op. 4, d. 1521, ll. 20-21. Born in 1905, Sergin came from a reindeer-herding family of the Babin pogost. His father, Semen Illarionovich, owned approximately 100 reindeer and also suffered arrest and execution in 1937-1938. Wheelersburg and Gutsol, “Babinski and Ekostrovski,” Arctic Anthropology 45, no. 1 (2008): 90-91.} Years later Semenov-Tian-Shanskii remained upset with how this wartime hunting was conducted: “In the first year of the war the shooting began under the flag of supplying the Soviet army. With time this initial goal was forgotten; only the urge ‘to warm one’s hands’ did not disappear, to plunder that which the nature reserve should have protected.”\footnote{GARF, f. A-358, op. 2, d. 788, l. 7 and Berlin, “Khraniteli prirodnogo naslediia,” Zhivaia Arktika, no. 1 (2004): 7.} In June 1951 one worker at the reserve wrote a denunciation about the scientific staff, including Semenov-
Tian-Shanskii and Vladimirskiaia (who were now married). The disgruntled employee complained that the scientists exploited the wildlife of the reserve to feed themselves and refused to share the fish they caught. Semenov-Tian-Shanskii accounted for all of the wildlife they consumed and justified the ecological sensibility of such predation. The official response sided with the scientists and pointed out that all reserve workers were entitled to fish for subsistence.

The closing of the Lapland nature reserve was part of a new law that reduced the amount of territory under zapovednik protection in the Soviet Union from 12,600,000 hectares to 1,384,000 hectares and eliminated 88 of 128 reserves. This new policy broadly reflected a renewed ascendance of overtly instrumentalist methods of Soviet nature use that characterized the heightened influence of Lysenko. Weiner recounts how the leaders of the Lapland reserve heard rumors that their zapovednik was going to be liquidated while on a trip to Murmansk in August 1951. They sent a panicked telegram to the head of the system, Aleksandr Malinovskii, about the issue and received assurances that the Lapland reserve was not threatened. Only a few weeks later, the reserve was shut down. In part because of this seemingly deliberate deception, the Lapland reserve became one of the first former zapovedniki to benefit from a surge in scientific activism in the immediate post-Stalin years. In 1954 Malinovskii had joined a petition of reserve scientists to restore the Lapland zapovednik. A government decree from November 1957 included the Lapland nature reserve the first round of zapovedniki to be re-established. The revived Lapland nature reserve kept wild reindeer preservation as a key component of its mission.

206 Douglas Weiner, A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev (Berkeley: University of California Press, 1999), 125 and Valerii Berlin, “Suprugi-uchenye,” Zhivaia Arktika, no. 1 (2004): 153. Weiner interprets this event as reflecting a “class antagonism” toward the scientists. Indeed, in 1951 Semenov-Tian-Shanskii and zapovednik director Ivan Chernenko earned more than double what security guards made (though Vladimirskiaia’s salary was only 1835.49 rubles, less than two of the guards). GARF, f. A-358, op. 2, d. 853, l. 36.

207 Weiner, A Little Corner of Freedom, 125-126, 467. A 1940 resolution defining the protection regime of the reserve specifically sanctioned otherwise prohibited activities, such as hunting, fishing, mushroom and berry collecting, setting up campfires, and mowing, to satisfy the needs of the reserve staff. GARF, f. A-358, op. 2, d. 32, ll. 3-4.

208 Weiner, A Little Corner of Freedom, 88-93, 128-129.

209 Semenov-Tian-Shanskii, Laplandskii gosudarstvennyi zapovednik, 7-8 and Weiner, A Little Corner of Freedom, 232, 258.

Liquidation had an ambiguous influence on the environment of the Lapland nature reserve. Timber collection began in the region and supposedly an additional third of the forests in the area burned down, which destroyed significant portions of lichen pastures. Despite these ecological degradations and the claims of conservation scientists that wild reindeer now faced new threats, the population of the animal actually doubled or quadrupled during the period of liquidation.\footnote{Semenov-Tian-Shanskii, *Laplandskii gosudarstvennyi zapovednik*, 60; Weiner, *A Little Corner of Freedom*, 224; and O. I. Semenov-Tyan-Shanskii, “Wild Reindeer of Kola Peninsula,” in E. E. Syroechkovskii, ed., *Wild Reindeer of the Soviet Union (Proceedings of the First Interdepartmental Conference on the Preservation and Rational Utilization of Wild Reindeer Resources)* (New Delhi: Oxonian Press, [1975] 1984), 165.} The State Hunting Inspection also used a new method for counting reindeer that involved taking photographs of herds from helicopters.\footnote{GARF, f. A-358, op. 3, d. 1375, ll. 1-29; GARF, f. A-358, op. 3, d. 1011, ll. 1-3; and Semenov-Tian-Shanskii, *Laplandskii gosudarstvennyi zapovednik*, 62.} This technique replaced the earlier practice of relying on the practical skills and knowledge of reindeer herders to count the animals after the Lapland reserve re-opened. Without the help of herders and the ability to get close to the herds it was nearly impossible to distinguish between wild reindeer and the domestic ones that had joined the group.\footnote{GARF, f. A-358, op. 4, d. 1521, l. 55 and Semenov-Tian-Shanskii, *Laplandskii gosudarstvennyi zapovednik*, 62-77.} The State Hunting Inspection also used a new method for counting reindeer that involved taking photographs of herds from helicopters.\footnote{GARF, f. A-358, op. 4, d. 1521, l. 55 and Semenov-Tian-Shanskii, *Laplandskii gosudarstvennyi zapovednik*, 62-77.}

**Hunting, Herding, or Protecting**

In the 1960s the staff at the rehabilitated Lapland nature reserve more assertively advocated policies that matched their interests. Conservation scientists led a vocal campaign to reform hunting regulations on the Kola Peninsula and contributed to the closing down of the *Krasnoe Pulozero* collective farm during the agglomeration process. During this decade the wild reindeer population in the area boomed dramatically, reaching an unsustainable 12,640 in 1967.\footnote{Makarova, “Dikii severnyi olen’ Kol’skogo poluostrova v kontse XX—nachale XXI vekov,” *Nauka i biznes na Murmane*, no. 4 (August 2003): 43.}
debasement of an indigenous group’s methods of nature use, but had a basis in incompatible environmental prerogatives.

The willingness of reserve scientists to engage in political and economic debates manifested itself in a critique of hunting regulations. At a conference in Moscow in November 1960, Semenov-Tian-Shanskii lambasted an array of practices he found antithetical to a “rational” hunting economy, such as propagandizing a campaign to “exterminate ravines” in regions where these birds posed no threat and using helicopters to pursue large animals that could not be transported back from where they were shot.215 His approach to reindeer predators seemed intent on limiting human interference in fauna ecosystems. Wolves, “the most dreadful enemy of reindeer,” did not require eradication because they only occasionally preyed on the western population of wild reindeer and had mostly disappeared from the region in the postwar years.216 The wolverine, insisted Semenov-Tian-Shanskii, “is a useful predator up to a certain extent: exterminating sick animals and being an instrument of natural selection, it is conducive to the maintenance of a viable population.”217 Since overall “only man controls the number of wild reindeer” and their population had grown considerably, Semenov-Tian-Shanskii proposed a set of “rational” and “planned” hunting guidelines for them.218 He claimed that up to 1000 animals of a population of 5400 could be killed a year. Many of his proposed regulations reflected a defensive disposition toward this species. He argued for the need to shoot from one hundred meters away in order to not disturb the herd, the inclusion of domestic reindeer that joined wild herds within hunting quotas, the use of air counts to adjust the amount of hunting permitted each year, and a prohibition on hunting during certain times of the year. As he passionately explained this final point, it would be “barbarism” to shoot calves during their third trimester of pregnancy.219

The Lapland nature reserve also became embroiled in a quarrel with reindeer herders. Semenov-Tian-Shanskii reported an incident in 1960 during which a group of

215 GARF, f. A-358, op. 5, d. 101, ll. 8-12.
reindeer herders from the *Krasnoe Pulozero* collective farm received permission to check the *zapovednik* for some of their animals from the reserve’s acting leadership while he and the director were away on a business trip. The collective farm claimed that 400 of their domestic reindeer had escaped to the reserve. A group of herders entered the *zapovednik* with a reserve security guard and shot fourteen reindeer, but instead of checking their earmarks to verify that they had belonged to *Krasnoe Pulozero* herders, the security guard covered up the matter. An outraged Semenov-Tian-Shanskii declared, “this entire incident must be regarded as poaching with the connivance of the very workers of the nature reserve.” At this point he already saw the Sami “reindeer herders of the Pulozero collective farm” as “the main poachers on the territory of the nature reserve in the postwar years.” The *Krasnoe Pulozero* collective farm had recently lost a large portion of its reindeer in the late 1950s and did not seem to take these accusations very seriously. On the contrary, its members continued to insist that their animals had escaped to the *zapovednik*. After losing more reindeer during 1961, the Pulozero village council sought “to take all measures to retrieve the reindeer that had broken away and to fire in the regions of the Lapland nature reserve.” These desperate measures of the herders came to naught. After several years of planning, the *Krasnoe Pulozero* was officially liquidated in 1964 and their reindeer were transferred to the Murmansk Experimental Reindeer-Herding Station.

Episodes like this one often get interpreted as conflicts between elitist conservationists who hold romantic views of untouched wilderness devoid of human influence and native communities who long had depended on that local ecosystem for their livelihoods. The frequent dislocation of native groups from protected territories reveals the hierarchical power relations embedded in certain strands of

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221 GARF, f. A-358, op. 4, d. 1521, l. 73.
223 GARF, f. A-358, op. 4, d. 1521, ll. 72-73.
224 GAMO, f. R-955, op. 1, d. 2, ll. 75-76.
225 GARF, f. A-358, op. 4, d. 1521, l. 81 and GAMO, f. R-955, op. 1, d. 2, l. 23.
226 GAMO, f. R-955, op. 1, d. 2, l. 24.
227 Murmanskaja olenevodcheskaja opytnaja stantsiiia, vol. 1, 3; Luk’ianchenko, *Material'naia kul'tura saamov (loparej) Kol'skogo poluostrrova v kontse XIX-XX v.*, 23; and GAMO, f. R-955, op. 1, d. 2, ll. 21-24, 75-76.
environmentalism.\textsuperscript{228} This dynamic was certainly at play in the conflict between the Sami herders from Pulozero and the scientists of the Lapland nature reserve, who became complicit in supporting the Soviet state’s forced relocations. The placement of the domestic reindeer under the auspices of another scientific organization that was more inclined to keep these animals separate from the wild population of the zapovednik appeared to satisfy the conservationists at the Lapland reserve.

But there was validity to the concerns of zapovednik scientists about the potential for separate herds of wild and domestic reindeer to thrive in close proximity to each other. Wild reindeer and domestic reindeer do indeed compete for foraging resources, limiting the possibility for a large-scale herding economy and a vibrant wild reindeer population to exist in the same area. Semenov-Tian-Shanskii attributed the ballooning of the wild reindeer population after World War II to the decline in reindeer herding in the western part of the Kola Peninsula. During this period, competition for lichen supplies became more intense and the animals grew dependent on pastures outside the Lapland nature reserve.\textsuperscript{229} In a large report on the interaction of wild and domestic reindeer from 1963, Semenov-Tian-Shanskii expressed his views on the issue. He outlined four divergent hypotheses about wild reindeer: they were going extinct and required special preservation measures; they were a valuable resource that should be reasonably exploited; they threatened reindeer herding and should be exterminated along with wolves; and they did not exist but instead were domestic animals that went wild and have no particular value.\textsuperscript{230} By setting up a contradiction between the potential harm that wild reindeer could have on reindeer herding and positions valuing their preservation, he argued for favoring the needs of wild reindeer over the herding economy.

\textit{Reindeer Conservation through the Soviet Collapse}

The efforts to protect wild reindeer on the Kola Peninsula in the final decades of the Soviet Union and the post-Soviet era overlapped with the rise of environmentalism as a global political movement. Scientists at the Lapland nature reserve first took advantage of newfound space in the Soviet public sphere to insist on the significance of

\begin{footnotesize}
\begin{enumerate}
\item GARF, f. A-358, op. 4, d. 1521, ll. 75-80.
\item GARF, f. A-358, op. 4, d. 1521, l. 4.
\end{enumerate}
\end{footnotesize}
environmental issues in the late 1970s and 1980s. The increased involvement of international organizations and the turn toward a new form of political economy began in the mid-1980s and took over in the 1990s. In this new situation the Lapland nature reserve sought to reform its conservation strategies and ended up moving closer to industries it had opposed in the late Soviet era. In pushing a conservationist agenda in opposition to the nearby Severonikel’ combine during the late Soviet era, Semenov-Tian-Shanskii and his colleagues combined scientific and aesthetic appeals. Beginning in the 1990s, cooperation with a multinational corporation enabled conservation scientists to more effectively protect and restore the ecosystem near the zapovednik, including the wild reindeer population. The price for this industry support was a diminished role in political activism.

Table 6. Reported Population of Wild Reindeer in the Western Part of the Murmansk Region

<table>
<thead>
<tr>
<th>Year</th>
<th>Wild reindeer population</th>
<th>Year</th>
<th>Wild reindeer population</th>
<th>Year</th>
<th>Wild reindeer population</th>
</tr>
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<tbody>
<tr>
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<td>1968</td>
<td>2280</td>
<td>1983</td>
<td>180</td>
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<tr>
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<td>150</td>
<td>1969</td>
<td>9692</td>
<td>1984</td>
<td>250</td>
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<tr>
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<td>415</td>
<td>1970</td>
<td>5506</td>
<td>1985</td>
<td>270</td>
</tr>
<tr>
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<td>7250</td>
<td>1988</td>
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<td>600</td>
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<td>1977</td>
<td>1234</td>
<td>1996</td>
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<td>1978</td>
<td>545</td>
<td>1997</td>
<td>1100-1150</td>
</tr>
<tr>
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<td>5793</td>
<td>1979</td>
<td>101</td>
<td>1998</td>
<td>1270</td>
</tr>
<tr>
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<td>12640</td>
<td>1982</td>
<td>180</td>
<td>2001</td>
<td>200-300</td>
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</tbody>
</table>

The boom in the wild reindeer population lasted until the middle of the 1970s and then the number of animals in the territory in and around the Lapland nature reserve fell

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The primary causes of this decline were that the quantity of lichen pastures degraded down to a quarter or a fifth of what they had been in the 1930s and 1940s and the increased hunting of wild reindeer. Though Semenov-Tian-Shanski had hoped to turn human predation into a technique of reindeer conservation, the population bust required at least a decade of lichen restoration before a recovery of reindeer.\textsuperscript{232} The situation reached its nadir in 1981 when the wild reindeer count came up with a population estimate of 100 animals, almost exactly the same as it had been when Kreps first made his desperate pleas for creating the zapovednik.\textsuperscript{233} In response reserve staff helped re-ban wild reindeer hunting in the area.\textsuperscript{234} Much of the population fluctuations after the 1950s that appear in Table 6 can be attributed to non-human factors of Kola political ecology. However, without the protection efforts of the zapovednik it is quite possible that wild reindeer would have ceased to exist in this area.

Reserve scientists used the decline in reindeer to launch a public attack on the Severonikel' combine in Monchegorsk, a nickel smelter to the northwest of the Lapland zapovednik. Severonikel' released massive amounts of sulfuric dioxide emissions and other pollutants that visibly destroyed sections of local flora. Reserve scientists had long monitored the influence of this atmospheric pollution on the forest cover in the zapovednik and in the 1970s demonstrated that emissions from Severonikel' were destroying lichen and mosses. They feared that this environmental disturbance might threaten the recovery of wild reindeer, which depended on an eventual restoration of overgrazed lichen pastures. In addition, the sulfur dioxide released from Severonikel' had challenged the territorial integrity of the nature reserve by damaging trees on a fourth of the territory of the Lapland nature reserve by 1980.\textsuperscript{235} Semenov-Tian-Shanski and Vasilii


\textsuperscript{234} Syroechkovskii, \textit{Wild Reindeer}, 14.

Kriuchkov, the director of the laboratory of nature protection of the Kola section of the Academy of Science, outlined their concerns in an article in the nationwide newspaper Pravda on October 10, 1980. They wrote, “a sword of smoke from the Severonikel’ combine already hung over the coniferous forests of the eastern part of the nature reserve in the 1950s. Connected to the growth in production in the 1970s the forest withered at such a tempo that the nature reserve is just at the point that it might turn into the same sort of wasteland (pustynia) as the outskirts of Monchegorsk.” Given that the “natural complex of the nature reserve has been ruined,” “it is necessary to increase its territory so that its landscape will fully serve as a model (etalon) of the primitive nature of the region.” As another reserve scientist, A. Bragin, insisted in a follow-up article in Polar Pravda, “a healthy natural environment remains a necessary condition for the normal development of human society. In the harsh conditions of the Far North this truth (istina) is especially apparent.

This conservationist advocacy achieved some notable success. In 1983 the government nearly doubled the total territory of the reserve by adding regions to the northwest, upwind from the Severonikel’ combine, while removing already degraded lands near Monchegorsk from protection. In February 1985, the United Nations Educational, Scientific and Cultural Organization (UNESCO) designated the Lapland zapovednik as a biosphere reserve. Neither of these developments did much to shift the direction of increasing environmental destruction on the Kola Peninsula from industrial pollution during the 1980s. Indeed, transferring territory with destroyed vegetation out of protection speaks of an abiding desire to separate and isolate geographical spaces of conservation and economic activity. However, the wild reindeer population in the western part of the Lapland zapovednik gradually recovered and protests against the

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increasing industrial pollution became a focus in the anti-government social action that appeared during the final years of communism.\textsuperscript{240}

Since the Soviet collapse, the tactics of conservation practiced by the Lapland nature reserve have changed dramatically. Beyond the multifarious factors that transformed Russia in this era, the passing of Semenov-Tian-Shanskii in 1990 affected local efforts as well.\textsuperscript{241} A vocal oppositional stance of environmentalists in the perestroika years dissipated in the 1990s.\textsuperscript{242} Yet, the maintenance of cultural and natural heritage through protected spaces became an officially sanctioned imperative with governmental and international support in many places throughout the former Soviet Union.\textsuperscript{243} Laura Henry’s recent examination of post-Soviet environmental activism distinguishes among three types of organizations: grassroots, professional, and government-affiliated.\textsuperscript{244} The Lapland nature reserve could probably be classified as a corporate-affiliated organization in which similar hierarchical structures and dependencies as government-affiliated organizations exist, but they have been directed toward a multinational corporation. It also has been able to embrace a more international disposition than some of the government affiliates Henry describes.

As an environmental institution the Lapland nature reserve has used its relationship with the Kola Mining and Metallurgy Company (\textit{Kola GMK}), a subsidiary of \textit{Noril’sk Nikel’} and operator of the \textit{Severonikel’} smelter, to address the effects of industrial pollution on the protected territory. However, this cooperation has led to it being less engaged in environmentalist politics than earlier periods. Following the Seville Strategy for Biosphere Reserves that UNESCO adopted in 1995, reserve leaders re-


\textsuperscript{244} Laura A. Henry, \textit{Red to Green: Environmental Activism in Post-Soviet Russia} (Ithaca: Cornell University Press, 2010).
envisioned the purpose of conservation by largely abandoning the principles of territorial isolation and seeking instead to find areas of common interest with societal, governmental, and industrial actors.\textsuperscript{245} In practice this strategy has meant that the Lapland reserve has broadened in its focus on tourism and assisting regional development, while accepting funds from the companies responsible for continued pollution. Under this system industrial enterprises have considerably reduced pollution of sulfur dioxide from their late Soviet peak and have committed to supporting ecosystem restoration. This source of funding has been especially important for the zapovednik because government allocations largely evaporated during the 1990s.\textsuperscript{246} It has allowed the reserve to continue its annual monitoring of the wild reindeer population and adopt new scientific approaches to wildlife management.\textsuperscript{247}

In taking corporate money the Lapland nature reserve has also participated in a public relations effort of Noril’sk Nikel’ to depict itself as a green company. Noril’sk Nikel’ has transformed the reserve by supporting tourist attractions like Grandfather Frost’s workshop and other efforts at educational outreach. The reserve also cooperates with the company’s campaigns to present nature protection as aligned with the interests of industry. For example, a children’s book published in 2006 by Kola GMK depicts two children who search for Grandfather Frost’s missing reindeer on the Lapland reserve. At one point they encounter Salatovyi, an environmental monitor working for Severonikel’. During a conversation, the children apply the appellation “the main Guardian of Nature” to Kola GMK, winning Salatovyi’s approbation. The narrative moves to an explanation of the Severonikel’ combine’s production process and its history of pollution. In apologizing for this unfortunate side effect, Salatovyi affirms the historic and contemporary primacy

\textsuperscript{246} Shestakov, “Benefits Beyond Boundaries” and “Our Partners,” in Laplandsky Zapovednik, no. 5 (2003), 3-4, 50-63.
of industrial interests over environmental ones: “But what could have been done? Did people need nickel? They needed it. And did they need copper? Very much so.”

Conclusion

Over the past century modernization has deeply influenced Kola reindeer and the people who interacted with them. The advent of large-scale pastoralism, the establishment of an industrialized and collectivized reindeer economy, the conservation efforts of scientists, the resettlement of communities and animals to a few urbanized villages, and the market reforms that shifted production toward international buyers all significantly transformed the economic relations between Rangifer tarandas and Homo sapiens. During this “century of perestroikas,” as Bruce Grant has called it, policy makers and outside commentators shared an abiding conviction that the Kola reindeer economy needed to be brought into the present. Divergent desires and capacities for outside control and distinct political-economic ideologies led the organizational instruments of this modernization to vary. However, indigenous groups throughout the Arctic, in Mark Nuttall’s words, have faced “common experiences” with “how various capitalist and socialist states claimed control over their lands and animals,” especially reindeer. The emergence of a traditionalist discourse through these modern reforms was one significant similarity uniting the Soviet Union and other states.

Variegated forms of knowledge affected power relations among people, reindeer, and environments during this transformative period. Both legible and sentient ecologies shaped the contours of the modernization of the reindeer economy. Thus, while ethnic ordering, expanded production, and conservation clearly operationalized high-modernist tactics of using abstractions, classifications, and simplifications to enable elite rule, the participation of marginal social actors and non-human natural elements in knowledge production also helped define modern environmental politics on the Kola Peninsula. Augmenting legibility with sentience points to the ways that modernization did not allow

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248 Gennadii Leibenzon, Tainy Laplandskogo zapovednika: istoriia odnogo prikliucheniiia (Monchegorsk/Moscow: Kol’skaia GMK, 2006), 31-35.
249 Grant, In the Soviet House of Cultures.
people to ascend over nature but instead radically reconfigured their relationships with the environment.
Chapter 4. Environmental Pollution and the Nickel Industry

Monche is a Lapp word. In Russian translation it means beautiful. This truly is a beautiful region with rugged mountain ranges and an array of beautiful lakes, streams, shores, and valleys that are covered with splendid forestland of pines, spruces, and birches. Here there is a splendid mild climate, remarkable conditions for winter skiing and skating and for sailing and rowing in the summer. Our task is to preserve this exceptional nature of the region, to create good conditions of life and work, and to create the conditions for people to relax.¹

Nikolai Vorontsov, *Polar Pravda*, 1935

“If you’ve ever had the notion to visit Hell, Monchegorsk is pretty close.”²

*Lonely Planet: Russia, Ukraine and Belarus*, 2000

How and why did this happen? Why did a town serving the nickel industry in the far north turn into an environmental tragedy despite the efforts of urban planners and city managers to maintain its beautiful nature? Setting aside the propagandistic intent of Vorontsov and the ironic exoticism of *Lonely Planet*, these sentiments reflect a genuine contrast between the hopes for the project and its long-term results. To an even greater extent than the apatite industry, the mining and smelting of non-ferrous metals on the Kola Peninsula in the twentieth century heavily polluted local water bodies and soil, decimated vegetation over large territories, and damaged human health. Scientists have observed that the high concentrations of nickel, copper, sulfur dioxide, and other chemicals from the Severonikel’ combine in Monchegorsk and the Pechenganikel’ combine in Nikel’ and Zapoliarnyi increased the acidity of nearby freshwater lakes and streams and altered the chemistry of proximate soils.³ These processes caused 39,000 km²

of visible forest damage and 600-1000 km² of full forest death in the areas surrounding the enterprises by the end of the century. In the 1990s a large number of children in Monchegorsk and almost half of the population in Nikel’ suffered from respiratory problems.

But what then explains the trajectory to these inauspicious environmental and social results? Scholars have responded to this question in variety of ways. An influential group sees the decision to industrialize regions such as the Kola Peninsula and the high levels of environmental pollution as pathologies of communist central planning. The efficiencies of capitalist economic systems would have avoided or at least would have been more apt to correct the environmental problems that appeared in communist countries. In direct opposition to this interpretation stand thinkers on the left and environmental historians who instead attribute contemporary environmental problems to the capitalist mode of production. If people in putatively communist countries spoiled places like the Kola Peninsula, it was because their economic systems actually functioned under a similar logic as capitalist ones. Another explanation turns to politics instead of economics. In this analysis the predatory instincts of the authoritarian Russian state shaped a long legacy of reckless resource exploitation.

While incorporating some insights from these three lines of thought, this examination of the Kola nickel industry advances a different argument. The environmental consequences of the development of heavy industry emerged primarily from the pursuit of a form of economic modernization that united various political and

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5 V. Rautio and O. A. Andreev, Sotsial’naia restrukturizatsiia gornodobyvaiushchei promyshlennosti Pechengskogo raiona Murmanskoi oblasti (Murmansk: Murmanskii gumanitarnyi institut / Barents tsentr issledovanii, 2004), 56 and Erik Hansen and Arnfinn Tønnessen, Environment and Living Conditions on the Kola Peninsula (Oslo: Fafo Institute for Applied Social Science, 1998), 121-123. Though Hansen and Tønnessen discuss a study that could not establish a correlation between pollution and these health effects, they also mention clearer results for Monchegorsk. Rautio and Andreev cite evidence for the increased incidence of health ailments in Nikel’, including a claim by a Pechenga regional official, A. Ivanov, that life expectancy in 1998 for workers within the smelting sections was less than 50 years.
economic systems. Modernization here refers both to an impulse to update contemporary conditions in order to overcome or avoid an imagined state of “backwardness” and a politically-chosen embrace of continual economic growth as the desired status quo. Within the context of twentieth-century modernization, autarkic development, militarization, fluctuations in the global economy, and the material influence of the natural world also affected the trajectory of the Kola nickel industry. In order to demonstrate my case, I will first survey the alternative explanations in greater depth and elaborate the conceptual apparatus of this modernization thesis in the next section. The remainder of the chapter will then investigate the development of nickel mining and processing from its beginnings in the 1930s to the end of the twentieth century. In these discussions I will argue for the significance of the continual effort to modernize as an overarching explanation for Soviet pollution, highlight how different facets of the alternative interpretations fail to account for the decisive developments in this industry, and demonstrate the specific conjuncture of global processes and contexts in heightening environmental destruction in the late Soviet era.

Explaining the Soviet Environmental Legacy

Research on environmental policy and performance in the Soviet Union has come to an overall consensus that results were bleak. Pollution became a particularly acute problem in the Soviet Union and human attempts to manage the natural world led to noteworthy disasters such as the Chernobyl catastrophe, the drainage of the Aral Sea, and the disruption of Lake Baikal. Even recent re-assessments of the environmental legacy of communism that seek to temper somewhat this broad assessment acknowledge that destructive environmental practices existed in places like the Soviet Union. In one of the best-known and most evocative renderings of the consensus, Murray Feshbach and

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Alfred Friendly Jr. write, “When historians finally conduct an autopsy on the Soviet Union and Soviet Communism, they may reach the verdict of death by ecocide.” This historian disagrees with these scholars’ conclusion about the collapse, but not with the image of the Soviet Union as environmentally ruinous. Before outlining what I consider to be the most convincing explanation for this outcome, I will explore the persuasive and unpersuasive features of three alternative interpretations, which respectively stress the influence of communism, capitalism, and authoritarianism.

One of the most influential interpretations of the Soviet environmental legacy points to inherent deficiencies of the communist system. These authors offer a powerful critique of the functioning of the economy under state-socialism. This assessment encompasses an array of considerably diverse interpretations, but on the whole highlights tendencies in communist economies to imperil environmental stewardship, such as a focus on production over profits, a lack of efficiency, and inattention to market signals. Two more specific and synthetic schools of thought warrant further attention here.

One line of analysis follows János Kornai’s theories of the shortage economy. Kornai argued that socialist central economic planning suffered from several endemic problems. It created an incentive for enterprise managers to engage in hording, substituting inputs, and hiding capacities from higher authorities in order to assure that production quotas were met. Because resources got tied up in enterprises hedging their production capacities, shortages of needed goods and services brought about long-term instability in communist economies. Applying Kornai’s theories to environmental management, Ann-Mari Sätre Åhlander offers an explanation for the ineffectiveness of Soviet environmental protection measures. Since they were a low priority in a context of hard budget constraints, environmental regulations pertaining to pollution or natural

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resource use affected smaller enterprises more than the larger ones that exerted a greater environmental impact. Additionally, many smaller enterprises did not have technology upgrades available to them and larger ones were likely to use them inefficiently.\footnote{Ann-Mari Sätre Åhlander, \textit{Environmental Problems in the Shortage Economy: The Legacy of Soviet Environmental Policy} (Brookfield: Edward Elgar Publishing Company, 1994), 58-79, 151-157.} Such impediments to environmental protection by economic actors do seem to be part of the puzzle that helps account for why enterprises like Severonikel´ and Pechenganikel´ continued to increase their sulfur dioxide emissions through the 1970s and 1980s despite their professed campaigns at pollution abatement.

Another perspective on this issue takes a more geographic and historical approach to pointing out problems of the communist economic system. In \textit{The Siberian Curse}, Fiona Hill and Clifford Gaddy argue that the skewed economic geography that Russia inherited from communist mistakes presents severe and potentially intractable obstacles for the country’s future development. By ignoring the costs of operating large-scale industries in the cold north and being willing to employ unfree labor, Soviet leaders built huge cities in precisely the wrong places from an economic point of view. Part of the motivation for this type of development came from deep-seated desires to use Siberia as a treasure chest, to populate it as a means of exerting control over the territory, and to meet long-standing military prerogatives as a Great Power nation that went back to the tsarist era. However, the actual industrialization of the north occurred because communist planners ignored market signals that would have made its lack of economic viability apparent.\footnote{Fiona Hill and Clifford Gaddy, \textit{The Siberian Curse: How Communist Economic Planners Left Russia Out in the Cold} (Washington, DC: Brookings Institution Press, 2003).} Hill and Gaddy extend their analysis to the Soviet environmental legacy by noting the striking overlap between the improperly developed regions they highlight and the most polluted cities in the country.\footnote{Hill and Gaddy, \textit{The Siberian Curse}, 194-195.} The proximity of the Murmansk region to European markets and the mollifying effects of the Gulf Stream current made it a more competitive location than other peripheries, but the dynamic discussed by Hill and Gaddy is still seen in this region’s status as the most urbanized and industrialized Arctic territory. Furthermore, in a work informed by \textit{The Siberian Curse}, John Round and Vesa
Rautio note that the lack of concern about energy consumption and pollution levels from the Soviet era still influences Kola enterprises today.\(^{14}\)

These analyses about the workings of communist command economies uncover much about the instabilities of the systems and the mechanisms through which their efforts at pollution abatement failed to achieve their stated aims. However, they severely underestimate the effect that Cold War geopolitics had in straining communist economies and inhibiting their ability to adapt to environmental concerns. This interpretation of Soviet environmental degradation also rests on the untenable assumption that capitalist economies have somehow responded more effectively to environmental concerns. A bird’s eye view of twentieth-century atmospheric pollution by sulfur dioxide, for instance, reveals a general pattern of deterioration until approximately the mid-1980s and then a trend of gradual improvement, regardless of the economic system of the country in question.\(^{15}\) From this perspective, the apparently extreme levels of Soviet pollution were actually quite marginal in the longer term. Moreover, the specific condemnation of communist systems implies that contemporary capitalism has solved or is on the path to solving environmental problems. The ineffectiveness of efforts to mitigate climate change during the past two decades—not to mention the current bout of anthropogenically induced mass species extinctions, large-scale disasters like the 2010 Deepwater Horizon oil spill, and other worsening environmental issues—contradicts that view.

Other scholars take the opposite approach. Instead of highlighting communist ecocide, they point to the hegemony of the capitalist system in the modern world as the root cause of environmental calamities. Simplifying a nuanced field of interpretations, twentieth-century communist governments are usually taken to be too fundamentally similar to capitalism to constitute genuine socialism or are ignored in broad condemnations of contemporary political economy. Many Soviet commentators on the environment shared this conviction in capitalism’s culpability for environmental problems, but unsurprisingly were reluctant to equate their country’s economy with it.

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According to these scholars, capitalism engenders environmental degradation because the logic of continual wealth accumulation by the elite classes requires that all limits on natural resource use must be overcome or circumvented through value producing inputs of labor and technology. Additionally, the assignment of property values to elements of nature and their subsequent privatization—that is, the transformation of nature into marketable commodities—create predictable paths for their exploitation. A wide spectrum of neo-Marxist thinkers and environmental historians has embraced a form of this view.

World-systems theorists, a number of prominent political ecologists, and a group of green Marxist thinkers indict capitalism for environmental problems, including those that plagued communist countries. Drawing on the eclectic influences of the *Annales* school, dependency theory, and traditional Marxist political economy, scholars like Immanuel Wallerstein propose the existence of historically-situated and hegemonic world-systems that structure the political and economic order through class relations and geographic hierarchies. Following this logic, Wallerstein places the Soviet Union as part of an omnipresent, though temporally limited, capitalist world-system. In his later writings he specifically attributes global environmental deterioration to this system.¹⁶ Neo-Marxist political ecology from the classic scholarship of Eric Wolf to the recently prolific works of David Harvey points to the variability of the capitalist mode of production and the contradictions that emerged as “nature” becomes a resource in the process of accumulation.¹⁷ These scholars tend to have little to say on the experience of twentieth-century state-socialism. Finally, a group of philosophers have struggled to gain

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new insights from the critiques of environmentalists and to revise and adapt Marxism to respond to ecological crises. They share the conviction that capitalism has brought about recent environmental degradation, but more readily acknowledge the challenge that the Soviet experience poses for the viability of orthodox strands of Marxism in the contemporary world and urge new socialist movements to learn from the past.\textsuperscript{18}

A number of environmental historians without avowed ties to Marxism echo the conviction that capitalism led to ecosystem degradation. Foremost among them is Donald Worster, a pioneer of the field, who initially proposed that a culture of capitalism in the Great Plains of the United States during the 1930s caused the natural disaster known as the Dust Bowl.\textsuperscript{19} Elsewhere he speaks more broadly that since the mid-nineteenth century “the combined forces of human population increase and industrial capitalism have spread that vulnerability into the remotest corners, into thousands of ecosystems.”\textsuperscript{20} Claiming that capitalism was the “decisive factor” in the United States’ “use of nature,” he extends the impact of this factor on agricultural development further. The American “willingness to take risks for increased production has set a pace that other nations, such as the Soviet Union, feel constrained to follow—just as less aggressive plains farmers have been led to emulate their more affluent entrepreneurial neighbors.”\textsuperscript{21} Though Worster takes caution not to efface local nuance, he sees capitalism’s influence as worldwide.

The explicit treatments of Soviet environmental history by scholars who attribute environmental degradation primarily to capitalism bring us to the unsatisfactory elements of this explanation. In an attempt to address the unimpressive environmental record of state-socialism, green Marxist philosopher James O’Conner insists, “really existing socialism and capitalism were formed in interaction—often violent interaction—within


\textsuperscript{21} Worster, \textit{Dust Bowl}, 5, 7.
and between each other during the 20th century.” Yet, his logic here applies equally to capitalism. For the sake of historical analysis we only have “really existing” capitalism and socialism and not their ideal types. Arran Gare more specifically contends that the Soviet “command economy continues the domineering orientation to people and to nature of capitalism in a more extreme form.” Though similarities between the central command economy and capitalist industry explain a good deal about the Soviet environmental record, state-socialist economies functioned in significantly different ways than market-based ones. Really existing communism cannot be reduced to an aberrant manifestation of global capitalism.

Another series of explanations eschew a focus on economic systems and instead turn to politics. In this case the presence of authoritarian rule in Russian and Soviet history accounts for the lack of awareness of environmental issues in society and the ineffectiveness of constituencies concerned about environmental protection in exerting an influence on the central government. Two of the most prominent environmental historians of Russia, Douglas Weiner and Paul Josephson, embrace a form of this thesis, though they both also see Soviet environmental degradation as ultimately a multi-causal phenomenon. In his comparative work, *Resources under Regimes*, Josephson turns to the predilection of authoritarian regimes such as the Soviet Union, Nazi Germany, communist China, and military-led Brazil for “large-scale geo-engineering projects to alter the face of the earth and its rivers” as means of explaining their “great impact on the environment.” Weiner, for his part, points to deep continuities in Russian history relating to a pattern of authoritarian rule to account for the “treacherous patchwork quilt of poisoned lands, poisoned air and poisoned water we encounter today.” He posits that the country’s relationship to its natural resources has long suffered from the predatory

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22 O’Connor, *Natural Causes*, 257.
practices of a militarized tribute-taking state that first appeared with the Muscovite tsar declaring all land his patrimony and continued into the Soviet and post-Soviet eras. These political approaches only account for part of the problem. Josephson’s comparisons help draw out some of the distinct environmental practices of authoritarian regimes. However, large-scale projects only constitute one sphere, albeit a prominent one, of environmental disruption. States with ostensibly democratic political systems have had at best only marginally better success with addressing environmental problems. Indeed, the Nazis may have possessed a better environmental record than non-authoritarian polities. Weiner appropriately highlights continuities that extend from tsarist Russia to the Soviet and post-Soviet periods. But seeking the answers in notions of patrimony and exploitative tribute-taking of natural resources diminishes the significance of the fact that the “poisoned” landscape was a product of twentieth-century economic transformation and not simply the result of a centuries-long process of environmental degradation.

Instead of narrowing in on the putative uniqueness of Russia (like the communism and authoritarianism explanations do) or eliding the distinctions of the Soviet economy (like the capitalism one does), we should turn to another basic process—modernization—to understand pollution in the Soviet Union. As I use it in this dissertation, modernization means both a process of economic, social, and technological changes that first emerged with nineteenth-century industrialization and a broad ideology of progress that motivated such transformations and appealed to actors of varying political stripes. James Scott sums up the high-modernist ideology as “a supreme self-confidence about continued linear progress, the development of scientific and technical knowledge, the expansion of production, the rational design of social order, the growing satisfaction of human needs, and, not least, an increasing control over nature (including human nature) commensurate with scientific understanding of natural laws.”

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authoritarians, and democrats shared this ideology and struggled to remake the world according to its precepts. This cultural element rests at the base of modernization and in an important way renders the entire process illusionary. But we also need to be attuned to the material changes brought about by the pursuit of it if we want to understand how it affected human-environment relationships. Timothy Mitchell touches on a tendency in scholarship that interrogates the relationship between knowledge and power to bracket off materially relevant subjects: “Demonstrating that everything social is cultural left aside the existence of other spheres, the remainder or excess that the work of social construction works upon—the real, the natural, the non-human.”\(^{29}\)

Sharing Mitchell’s concern but not accepting all of his solutions in this case, I argue that we need to begin our understanding of modernization in a quite traditional way. Modernization entailed industrialization and a transition from gradual and intermittent economic development to rapid and continual growth. This global process produced variegated results. It benefited many humans by raising levels of consumption and enabling previously unimaginable lifestyles, while creating the conditions for a greater number of people to live in abject poverty than at points in the past. It reassembled human relations with nature in ways that could be neutral or even positive for the environment, but very often had a destructive impact. A major lesson from environmental history scholarship is that humans have only imagined nature to be pristine and untouched, but in actuality we have modified the environment extensively throughout our existence as a species. It is also the case that on a geologic timescale of millions of years anthropogenic influence on the earth may seem less significant. However, none of these facts should obscure the unprecedented changes to the land brought about by twentieth-century industrialization, economic growth, urbanization, technological change, and the more than quadrupling of the human population since 1900. These developments occurred in various political and economic systems in many countries. The case of

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\(^{29}\) Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 2. Mitchell proceeds to attempt a further theoretical dislodging of the real. I depart from him here in that I see the problem with constructed knowledge of the sciences and social sciences to rest solely on the unacknowledged ways they affect power dynamics in a given society. I remain convinced that the forms of analysis that Mitchell dismisses as “hypothetico-deductive logic” still are some of our best tools for understanding the realm of the real.
environmental degradation on the Kola Peninsula, therefore, belongs to a much larger story of economic modernization.

The word “modernization” also indicates the political side of the process better than other terms such as development, industrialization, and economic transformation. The social, economic, and environmental changes that occurred under the rubric of modernization consciously aimed at creating an avowedly “modern” world that would escape the “backwardness” of the past. I put these terms in quotations here to underscore that they depended on cultural perceptions and historically produced forms of knowledge that were infused with power. Modernization was a political project that united technocrats in late tsarist Russia, communists in the Soviet Union, and reformers in the 1990s who saw the contemporary conditions of the country as somehow behind the times. As Niobe Thompson put this aspect of the definition of “modernization” in his ethnography of post-Soviet reform efforts in Chukotka:

Unexamined, the term “modernization” operates as lexical shorthand for the diverse and numerous projects outsiders have imported into northern Russia’s local contexts, whether in the Soviet era or more recently. Under scrutiny, however, “modernization” pulls us toward its origins in an evolutionary paradigm, one that attaches to the imported manager a modern status and situates the local way of life further down on a single continuum of progress. The evolutionary thinking of groups promoting modernization marginalizes local human ways of life by positing progress as the transformation of these livelihoods; it doubly does so with the plants, animals, and landscapes that might occupy a territory. The need for updating repeats itself continually. So, for instance, even the industrialized landscapes of Monchegorsk and Nikel, created as means of achieving Soviet modernity, also fall prey to the evolutionist logic and become part of a “backward” terrain requiring post-socialist modernization.

By turning to modernization to explain Soviet pollution, I therefore embrace quite conventional interpretations of environmental deterioration, but seek to bring together elements of these paradigms less typically interwoven. The classic declensionist narrative

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31 Niobe Thompson, Settlers on the Edge: Identity and Modernization on Russia’s Arctic Frontier (Vancouver: University of British Columbia Press, 2008), 21.
of industrialization harming the environment still has analytic salience and the nuances of
the process should not distract us from recognizing this trend. Nor should the promises of
sustainable development mask the contradictions between economic growth and
ecosystem health. Many scholars who follow the cultural critique of modernization as
ideology resist accepting this appraisal of the material consequences for the natural
world. In part they are reacting against the neo-Malthusianism of some of the original
advocates of such a stance and the quasi-authoritarian political solutions sometimes
proposed. Furthermore, since they tend to question the existence of universal knowledge
and seek to dislodge the nature-society dualism, these thinkers occasionally distrust the
scientific discourse behind claims that industrial economies cause environmental
disturbance.\footnote{This paragraph refers to more scholarship than I can cite in a comprehensive footnote. Paul
Robbins’ synthesis of debates about these issues in the field of political ecology helped me think through
my agreements and disagreements with other scholars who have addressed similar problems. See Robbins,
Political Ecology.}

I rely on science as the best means we have for comprehending the natural
world, but am equally convinced that we must turn to critical theory about modernization
and the environment to understand power dynamics and thus the causal forces behind
anthropogenic change. This approach, finally, helps us appreciate the ways that the
natural world itself can be involved in the generation of pollution.

The remainder of this chapter examines the Soviet environmental record through
a case study of the metal industry on the Kola Peninsula. I will frame the discussions of
various developments around how they fit or do not fit into the different explanatory
paradigms just reviewed. I will show that this modernization thesis best accounts for the
environmental results of industrialization in the far north and leaves adequate room for
both the uniqueness and commonalities of the Soviet developmental trajectory. In
particular, the attempt to combine autarkic development and use of the region as an
extraction periphery during the 1930s, the decisive role of military prerogatives in
industrialization, the futile attempts to continue economic growth through expanded
production in the 1970s and 1980s, and the variegated effectiveness of communist and
capitalist pollution abatement strategies all speak to the centrality of modernization in the
environmental consequences of the Kola nickel sector.
Soviet Autarky and Nickel in the 1930s

Stalinist political economy, as I argued earlier in this dissertation, combined a hasty and militaristic approach to development with an unrealized desire to create harmonious natural habitats for humans. The mutual pursuit of these contradictory goals continued to shape the establishment of the nickel industry on the Kola Peninsula during the 1930s. Economic planners and enterprise leaders sought to subdue the natural world, put it under their control, and extract value from it, but they also viewed the entire project of large-scale regional development as part of a holistic venture that would produce environmental harmony. This discussion of the rise of non-ferrous metallurgy on the Kola Peninsula highlights the contours of this autarkic modernization from the discovery of nickel deposits in the Monche tundra in 1929 to the commencement of production in 1939. I examine the particular manifestations of familiar elements of the industrial experience already elaborated in this dissertation: the environmental ideologies and motivations for development behind the project; the multifaceted ways that interactions with the real environment did not occur entirely on Soviet planners’ terms; and the exacerbation of human-produced vulnerability to natural calamities for the forced laborers sent to build the nickel works. I also demonstrate that the effects of pollution on the physical landscape remained moderate compared to what came later. Responsibility for post-Stalinist pollution cannot be exclusively attributed to regionally and nationally constituted modes of autarkic development.

An impulse to combine regional modernization with the extraction of natural resources was at the heart of industrialization of the 1930s. The development model, while itself rooted in a deep history of technocratic statist thinking and planning in the pre-Soviet era, afforded the state political legitimacy as ostensibly distinct from the tsarist era. As one newspaper article in the midst of the construction of Monchegorsk and the Severonikel’ plant put it: “On par with other so-called backward regions of the eastern part of Russia, the Kola Peninsula existed for autocracy only as an object of predatory exploitation of natural resources—forests, furs, and fish—and not as a region for the development of productive forces.”33 This modernist imperative to overcome backwardness lies at the foundation of the introduction of non-ferrous metallurgy into

this region. The desire to convert nature not into exploited resources but transformative production indicates a significant feature of environmental thinking in the Stalinist era.

In a sense, this longing for the harvesting of local productive forces also reflected one of the major insights noted by Gaddy and Hill: Soviet economic development attempted to create the equal geographic distribution of industry irrespective of costs and markets.\(^3\) The motivation for Soviet autarky and a modicum of evenness in the geography of development explains a good deal about the scale of industrialization on the Kola Peninsula. The focus on productive forces instead of marketable commodities speaks to the limit of the capitalist process of the commodification of nature in explaining Soviet economic development. However, the urge to extract metals from the ground was common among countries with far northern regions. The expansion of Canadian mining activities in the Subarctic paralleled Soviet development and an international consortium of firms sought to begin working the nickel in the Pechenga region (Petsamo) while it was under Finnish control in the 1930s.\(^4\) Furthermore, Hill and Gaddy mistakenly attribute this strategy of attempting to develop industrial self-sufficiency to Marxist ideology and the government’s hostility to markets. But as Karl Polanyi noted in the 1940s, the Soviet state was responding to an altered global economy: “Socialism in one country was brought about by the incapacity of market economy to provide a link between all countries; what appeared as Russian autarchy was merely the passing of capitalist internationalism.”\(^5\)

The Soviet Union did not acquire a nickel industry until the 1930s. As in all mining and processing activities, the first step in the creation of a national industry was the discovery of deposits. Nickel exists in comparative abundance among elements in the earth, however areas with high enough concentrations of the substance for efficient extraction are relatively rare. These deposits come in two types: silicates that appear at central latitudes near the surface and sulfides mixed with copper and cobalt that primarily occur deeper underground in northern regions. The tsarist government first established

\(^3\) Hill and Gaddy, *The Siberian Curse*.
nickel mining and processing in the 1870s at silicate deposits near Ufal in the Urals, but ceased this venture and relied exclusively on importation after French colonialists began marketing nickel from New Caledonia. With the industrialization push of the first five-year plan, the Soviet Union returned to processing the nickel in Ufal, beginning production in the fall of 1934, and intensified the search for new deposits within the country. Nickel possessed a variety of economic uses predominately as a substance in the metallic alloys needed for heavy industry and defensive armor. The move to establish a nickel sector within the country fit with some of the main prerogatives of Stalinist industrialization: the reduction of imports and creation of economic self-sufficiency.

These goals also promoted a favorable atmosphere for the exploration of new nickel sources within the country. Soviet geologists only discovered the sulfide nickel deposits on the Kola Peninsula as Stalinist industrialization of the region commenced. On a small expedition with German Kreps to the Monche tundra to the west of Lake Imandra in the summer of 1929, which was partially intended to establish the borders of the new Lapland nature reserve, geographer Gavriil Rikhter took a sample of rock that caught his attention by making the arrow on his compass move. Chemical analysis showed that this magnetic ore indicated the presence of nickel in the area and inspired further systematic study of the territory. By this point the enormity of the sulfide nickel deposits in the considerably more remote Noril’sk region became clear. The surveying of the Monche tundra over the next few years, in contrast, raised doubts about the levels of nickel and copper there and delayed any development project. The confident chief of the Leningrad Communist Party, Sergei Kirov, remained interested in the substantial iron deposits also being discovered in the Monche region and ordered additional research. He

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38 V. Ia. Pozniakov, Severonikel’ (Stranitsy istorii kombinata “Severonikel’”) (Moscow: GUP Izdatel’skii dom “Ruda i metally,” 1999), 19.
reportedly attempted to encourage an uncertain Aleksandr Fersman, who supervised much of the geological exploration in the region, with the hubristic words, “there is no land under Soviet power that cannot be changed by skillful hands for the benefit of humankind.” This impulse to use all elements of the mineral ores influenced industrial projects in the 1930s quite considerably with contradictory environmental consequences.

The move to build a nickel smelter and a new socialist city in the Monche tundra reflected the approach to autarkic development taken by the industrializing Stalininst state. Though regional representatives consistently requested greater allocations and attention to their territories, state economic planners sought to coordinate the extraction and processing of different regional resources to serve the centrally planned economy. An arena of compromise and conflict existed between central planners, who focused on shifting the trade balance to minimize imports and maximize exports and growing the economy aggregate, and regional leaders, who desired local development. These spheres of interest within the industrializing state shaped debates over natural resources and the geography of economic development.

Changes in the global economy and the expansion of confirmed nickel reserves in the Soviet Union affected the decision to invest in the industry. In the case of the Kola Peninsula, surveying work sponsored by the Apatit trust and central agencies helped lead to a drastic increase in confirmed quantities in three of the deposits (Niuduaivench, Sopchuaivench, and Kumuzh´ia) of the Monche region during 1934. The total amount of confirmed metallurgic nickel there rose from 10,000 tons to 50,000 tons during that year. Shortly after, technicians in Leningrad figured out a method for enriching the ore from Niuduaivench and Sopchuaivench, which had relatively low concentrations of nickel, into an intermediary matte that required additional processing. The simultaneous decision to manufacture nickel at three new plants in Orsk, Noril´sk, and Monche in the spring of 1935 indicated that central authorities came to view the industrial development

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42 Fersman, Vospominaniiia o kamne, 59.
44 GAMO, f. 773, op. 1, d. 33, ll. 130-135 and GAMO, f. 773, op. 1, d. 44, ll. 11-17.
of this sector to be a national priority irrespective of regional lobbying. Soviet officials chose this time for development partially in response to an upsurge in the global nickel market, which was growing rapidly after a steep decline in the 1920s.\(^{46}\) They also responded to the move of the International Nickel Company (INCO) of Canada, which owned 90% of the known nickel reserves worldwide in the early 1930s and held monopoly power, to expand its international operations. This extension abroad by INCO included beginning to set up nickel mining and smelting operations on a comparable scale in the Petsamo region of northern Finland in 1934, a territory that became Soviet Pechenga after World War II.\(^{47}\) The creation of new Soviet nickel plants also connoted an intended, though poorly implemented, effort to coordinate the industry so that it could benefit from the cost advantages of economies of scale. For instance, the lower transportation costs of a smelter on the Kola Peninsula compared to Noril’sk influenced the decision to build a large one there despite less significant nickel deposits in the region.\(^{48}\) Far from being a manifestation of the obliviousness of communist economies to market forces, the enlargement of the Soviet nickel industry at this stage responded to developments in the capitalist world.

Regional input still informed the process significantly, at least on the Kola Peninsula. Vasilii Kondrikov, the head of Apatit and Severonikel’ at the time, wrote a letter with V. A. Iazykov to the boss of the NKTP, Sergo Ordzhonikidze, on March 26, 1935 that proposed the initial timetable and budget for the project.\(^{49}\) Ordzhonikidze’s order to commence the nickel works on April 29, 1935 closely resembled this proposal with only a slight budget cut and the appointment of another administrator from Apatit, Nikolai Vorontsov, to head the construction of the plant.\(^{50}\) This directive stipulated that the enterprise should produce 3000 tons of nickel and 3000 tons of copper by the end of


\(^{48}\) GAMO, f. 773, op. 1, d. 34, ll. 157-174, 201-206.

\(^{49}\) GAMO, f. 773, op. 1, d. 51, l. 195.

\(^{50}\) GAMO, f. 773, op. 1, d. 51, ll. 194, 523.
In this instance the center listened to the regional representatives’ assessment of their capacities to modify nature into economic products.

As the project proceeded, the individuals involved in planning once again espoused the idealistic visions of a new socialist city in which workers would live in harmony with their natural surroundings and attempted to implement this scheme. Though such thinking was routinely posited as having communist credentials, this technocratic holism also fit into a broader trend surrounding large-scale modernization projects. For instance, German author Emil Ludwig described the function of the Aswan Dam on the Nile River around this time: “A mighty element had been tamed by human ingenuity so that the desert should bring forth fruit, an achievement which the centenarian Faust had attempted as the highest attainable to man in the service of his fellow-men.”

These environmentally colonialist ways of thinking envisioned nature as serving humans peacefully and passively, but often eschewed outright antagonism. In the case of the Kola nickel industry, project leaders decided to call the new city Monchegorsk and frequently pointed out that “Monche” meant “beautiful” in the Sami language. One newspaper article in November 1936 evoked the notion of humans completing imperfect nature:

It was wild uninhabited tundra. For centuries no one came here. High mountains surrounded the tundra and no one knew what resources they stored. But the Bolsheviks came and figured out the secrets of the mountains. And now the Monche tundra is unrecognizable. It became actually beautiful. So far this beauty consists not in constructed factory buildings and not even in avenues and squares. This beauty is in the great creative work that the Bolsheviks began and persistently undertake.

In this rendering, human activity, and not untouched nature, engendered a beautiful landscape.

While there was less fanfare surrounding the construction of Monchegorsk as a socialist city than there had been for Khibinogorsk (a reflection of national trends and the

51 Ordzhonikidze’s order is reprinted in Pozniakov, Severonikel’, 22.
53 N. Vorontsov, “Nikel’ na krainem severe,” Poliarnaiia pravda (May 9, 1935), 4; Poliarnaiia pravda (March 14, 1936), 2; Poliarnaiia pravda (November 7, 1936), 2; Poliarnaiia pravda (November 18, 1936), 2; Poliarnaiia pravda (May 12, 1938), 2; Pozniakov, Severonikel’, 23; and Fersman, Vospominaniia o kamne, 54.
54 Poliarnaiia pravda (November 18, 1936), 2.
move away from the cultural revolution of 1928-1931), project leaders took more practical measures to implement this holistic vision of nature in an urban environment. Claiming to have learned a lesson from his experience in the Khibiny, Kondrikov ordered that the old growth forest within the city itself be preserved and turned into a park. The main architect of Monchegorsk, Sergei Brovtsev, sought to design the city in this direction by including green belts along the main boulevard and maximizing the views of the mountain relief. Applauding these efforts, the local Monchegorsk newspaper, *In the Fight for Nickel*, exclaimed, “In the summer the city will be engrossed in the greenery of forests. It will be a garden-city.” Urban planners also took into account an additional element when choosing the location for the city besides the typical considerations of the optimal arrangement for industrial and municipal structures, the means of supplying water and sewer service, and transportation issues. They decided to place the city upwind from the smelter facility so that the smoke, dust, and sulfur dioxide emissions would blow away from the residential areas. This move succeeded in helping preserve the green spaces within Monchegorsk in later years even as pollution decimated vegetation to the south of the factory.

These relatively minor, though noteworthy, achievements in generating harmony with the local environment during industrialization contrast with the situation at the worksite. The massive reliance on forced labor, chaotic planning, and the intractability of nature once again produced abysmal conditions for those unfortunate enough to live near the site of the new socialist city. Even the freely recruited laborers first moved into crowded and unsanitary tent settlements. Local Murmansk historian Aleksei Kiselev

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57 *Boi za nikel’* (May 1, 1937).

58 GAMO, f. 773, op. 1, d. 34, ll. 157-174; GAMO, f. 773, op. 1, d. 55, ll. 18-19, 65-66, 126-127, 275-276; and GAMO, f. 773, op. 1, d. 62, l. 186.

59 GAMO, f. 773, op. 1, d. 34, ll. 167-169; GAMO, f. 773, op. 1, d. 53, l. 229; Pozniakov, *Severonikel’*, 44; and Eremeeva, “Formirovanie gorodskoi sredy i prostranstvennogo obrazara Monchegorska,” in Petrov and Razumova, eds., *Severiane*, 87-95.
recalled how an epidemic struck his family upon their arrival in Monchegorsk in 1935.\footnote{Kiselev, Monchegorsk, 5. Also see “Boi za nikel’: Vospominaniia I. L. Kondrikovoi-Tartakovskoi,” Monchegorskii rabochii (September 23, 1986), 3-4.} In part due to the destructive influence of blizzards, snowdrifts, and flooding during spring thaws, housing construction for Monchegorsk and the mining settlements at Sopcha and Niud languished behind schedule.\footnote{GAMO, f. 773, op. 1, d. 64, ll. 207-213, 228-248 and GAMO, f. 773, op. 1, d. 53, ll. 15-16.} During the following summer a party inspector grimly detailed the situation: “It is clear from this that in the barracks and tents 75\% of all workers live cluttered in filth with children. The inflow of workers and their distribution increases on account of the consolidation of the barracks and tents. In rare cases workers sleep in the forest under trees because there is no place in the tents.”\footnote{GAMO, f. 773, op. 1, d. 64, ll. 238-239.} The failure of state and enterprise planners to create the harmonious habitat they envisioned led to a quick exodus of recruited workers and resulted in reports of widespread drunkenness, disorder, and impending epidemics at the new worksites.\footnote{GAMO, f. 773, op. 1, d. 55, ll. 17, 696-700; GAMO, f. 773, op. 1, d. 62, l. 369; GAMO, f. 773, op. 1, d. 64, ll. 200, 238-239, 244; and GAMO, f. 773, op. 1, d. 63, l. 21.} Memos cited illegal de-forestation and arson as a common offence. One also claimed that approximately 900 hectares of forest in the area had been burned during the previous month because of the lack of a fire-fighting service.\footnote{GAMO, f. 773, op. 1, d. 64, ll. 244-245.} The anthropogenic impact of such arson and felling in this moment, however, paled in comparison to nature’s influence on the humans living there.

The recruited laborers and their families only made up a portion of the new inhabitants of the Monche tundra in the mid-1930s. Many more came there as prisoners through various branches of the Gulag system, including special settlers transferred from Kirovsk and other locations, the eighth department of the White-Sea Baltic Combine at Monchegorsk, and its fourteenth department, which built the railroad line connecting the new town to the Murmansk railroad.\footnote{Eremeeva, “Stroitel’stvo kombinata “Severonikel’,” in Petrov and Razumova, eds., Etnokul’turnye protsessy na Kol’skom Sever, 90-92; V. Ia. Shashkov, Spetsperselelentsy v istorii Murmanskoi oblasti (Murmansk: “Maksimum,” 2004), 121-125; and “GULAG na Kol’skom severe,” in G. Bodrova, ed., Murman, Khibiny do i posle… (Apatity: Sever, 2002), 36-37.} From the very beginning of the project, plans to use temporary prison colonies to build the settlement coincided with intentions for a
holistic socialist city. By the end of 1935, approximately 6,000 of 10,000 workers at Severonikel’ were in the Gulag system and the livelihoods of these prisoners in northern nature fared no better than those of the recruited laborers. The inadequate provisioning of basic services and the use of the Gulag in Monchegorsk followed a deeply entrenched pattern of hasty and coercive modernization, which extended back to the construction of the Murmansk railroad during World War I and became part of the modus operandi of the Stalinist system during the first five-year plan. Given the closer correspondence of these features with eras of industrialization than with the totality of communist rule, it makes more sense to understand them as by-products of a particularly brutal strategy of militaristic modernization than as the logical outcome of communist economic practice.

Soviet efforts to create self-sufficiency in nickel production with rapid industrialization in the second half of the 1930s staggered because of infrastructural and environmental limitations. The dreadful political reverberations of these delays represent a unique feature of the Stalinist state, as failures in economic performance became a pretext for arresting and shooting enterprise leaders. The chaos that gripped the Severonikel’ project accelerated in the autumn of 1935 and culminated with the arrest of Kondrikov and other enterprise leaders in March 1937. The original head of Severonikel’, Vorontseov, suffered from a heart attack and was fortuitously transferred to Leningrad in November 1935. Afterward I. M. Epshtein became the nominal head of the enterprise, while Kondrikov maintained much of the authority over it and Apatit. Construction of the railroad line between Monchegorsk and Olen’ia, the building of industrial objects for the mines and smelter, research on the extraction process, and the surveying work to find new deposits all encountered significant setbacks throughout 1936. A major issue here was that the mountains of the Monche tundra did not contain as much nickel and copper

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66 GAMO, f. 773, op. 1, d. 53, ll. 15-16 and GAMO, f. 773, op. 1, d. 55, l. 68.
68 GAMO, f. 773, op. 1, d. 55, ll. 223, 296 and Pozniakov, Severonikel’, 24-25.
as geologists and economic planners had hoped.⁷¹ This fact posed considerable difficulties because the poorly impregnated ore required greater quantities of materials to be mined and expensive and energy intensive processing and smelting to produce the matte.⁷² This inability to manipulate nature under a dictated timeframe elicited a variety of responses, including accusations against economic managers by the local Communist Party and the further allocation of resources by the enterprise to research the problem instead of prioritizing the delivery of provisions and payment of wages.⁷³ The discovery of new reserves of sulfide ore with over 5% nickel concentration on Nittis-Kumuzhia in 1937 resulted in a hasty shift in the production plan toward extracting and processing material from this deposit.⁷⁴ It also played into the dynamics of the Stalinist terror as the failure to foresee the existence of this geological formation offered further grounds for denunciations against Kondrikov and others.⁷⁵

As the secret police arrested, imprisoned, and killed a number of leaders of the Severonikel’ project in 1937, a tense atmosphere and increased militarization of the production process pervaded the Monche tundra.⁷⁶ Fear of violent reprisal infiltrated the decision-making process and the Gulag administration sent more prisoners to aid construction.⁷⁷ Within a maelstrom of terror and forced labor, Stalinist industrialization was transitioning from revolutionary projects to create socialist modernity to an outright war economy. The discovery of the rich ore in Nittis allowed the plant to mine sufficient

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⁷¹ GAMO, f. 773, op. 1, d. 59, ll. 186-193; GAMO, f. 773, op. 1, d. 62, ll. 212-216, 223-224; GAMO, f. 773, op. 1, d. 64, ll. 212-213, 235-236; and ARAN, f. 544, op. 1, d. 186, ll. 1-7.

⁷² For instance, an assessment of the verified reserves estimated that to meet the initial plan of 3000 tons of nickel by the end of 1937, the enterprise would have needed 3,600,000 tons of ore from Sopchuaivench with a 0.41% nickel concentration, 1,500,000 tons of ore from Niuduaivench with a 0.3-0.4% nickel concentration, and 29,000 of rich ore from Kumuz’ia with a 2.15% nickel concentration. Pozniakov, Severonikel’, 39.

⁷³ GAMO, f. 773, op. 1, d. 64, ll. 187-188, 200, 212-213, 228-248, 252, 256-258, 343; GAMO, f. 773, op. 1, d. 65, ll. 383, 548; “Nenakazannye prestuplenii,” Poliarinaia pravda (February 27, 1937), 3; and Poliarinaia pravda (March 30, 1937), 2;

⁷⁴ RGAE, f. 7793, op. 1, d. 301, ll. 2-3, 72-82; KF GAMO, f. 52, op. 1, d. 4, ll. 3-6; KF GAMO, f. 52, op. 1, d. 1, ll. 63-72; and Eremeeva, “Stroitel’svo kombinata “Severonikel”,” in Petrov and Razumova, eds., Etnokul’turnye protsessy na Kol’skom Sever, 93-95.

⁷⁵ Pozniakov, Severonikel’, 52-53.


⁷⁷ RGAE, f. 7793, op. 1, d. 301, ll. 1-3, 10-27, 35-43, 72-82; RGAE, f. 7793, op. 3, d. 33, ll. 28-31; RGAE, f. 7793, op. 3, d. 66, ll. 10-22, 34-35; RGAE, f. 7793, op. 3, d. 79, ll. 4-41; and Pozniakov, Severonikel’, 54-70.
material throughout 1937 and 1938 and to devise a less complex smelting scheme to begin producing nickel-copper matte in February 1939.\textsuperscript{78} Though some of this material was used to manufacture statues of Lenin and Stalin and an engraved piece of it was displayed in a local museum, the press at the time celebrated this achievement with much less gusto than earlier Soviet propaganda.\textsuperscript{79} Decreased public visibility of strategic industries like nickel became standard during World War II and the rise of the Cold War.

Taking stock of the influence of the development of the nickel industry on the Kola environment in the 1930s, the scale and pace of the transformation of the Monche tundra was unprecedented at the time, yet minor in comparison to what occurred in later decades. In its first year of production, 1939, Severonikel\textsuperscript{'} manufactured 1597 tons of nickel and 571 tons of copper and extracted 94,032 tons of ore. Not only did these amounts fail to meet the plan, they were marginal in terms of the production rates of the Kola nickel industry in the Brezhnev era.\textsuperscript{80} Even with inefficiencies in the smelting and mining operations and chaos in the construction of the new plant and city, industrial pollution remained low.\textsuperscript{81} This snapshot result does not speak of an environmentalist accomplishment of the Stalinist state, but rather points to the inability of planners to introduce industrial operations at the desired pace. Its significance for this analysis, nevertheless, lies in the fact that of all the ills that can rightly be pinned on the Stalinist strategy of autarkic modernization, disproportional environmental disturbance is not one of them. Instead, the anthropogenic impact on the Kola Peninsula in these years was typical of this level of industrialization.\textsuperscript{82}

**Nickel as a Military Metal**

“Although interests identified with nickel production object to the classification of their industry as one of the munitions group,” prefaced *The Wall Street Journal* in 1935,
“there is little question that war would greatly increase the demand for the metal.”

83 This prescient assessment, shared by some Soviet planners as well, explains much about the developments of the nickel industry in the years surrounding World War II. 84 Beginning in 1939 the Soviet war economy on the Kola Peninsula grew even more forceful, but also somewhat more effective in producing materials. Threats of invasion at the start of the Second World War led to a halt in industrial activities in Monchegorsk. Throughout the war, each side of the polar front made steadfast attempts to maintain, renew, and gain control over nickel production on their territory. These disputes reflected some essential features of militaristic modernization during the construction of the Murmansk railroad during World War I, including even greater reliance on forced labor than during the 1930s, increased surveillance, and the use of industrialization for primarily martial purposes. However, this development strategy for the Kola nickel industry during World War II also entailed a distinct approach to natural resource use.

The environmental impact of war globally has vacillated between an extreme exacerbation of the devastating destruction of landscapes and much more rare reprieves for ecosystems from anthropogenic manipulation. 85 Both forms of influence appeared on the Kola Peninsula during the Second World War—bombing and invasions wrecked the land but the aggregate interruption of industrial activities stalled the effects of atmospheric emissions on local flora. On the whole, the impact of pollution in the region during World War II remained minor, unlike the unprecedented changes to the Kola environment that occurred during the First World War. The geopolitical and military prerogatives that shaped the Kola nickel industry from 1939 and into the postwar world took non-ferrous metals as a material means of promoting state power. The objects of production in this model—nickel, copper, and cobalt—functioned neither as unleashed productive forces that could facilitate autarkic development, nor as wealth accruing commodities to be produced and sold. Instead, the utility of this transformed nature resided primarily in its defensive significance. During the war, Soviet leaders approached Kola resources in terms outside of communist or capitalist economic logics and instead

84 GAMO, f. 773, op. 1, d. 59, ll. 127-128 and P. F. Lomako, Tsvenaia metallurgiia v gody Velikoi Otechestvennoi voiny (Moscow: Metallurgiia, 1985).
focused on building military strength. This wartime economic strategy relied, of course, on growth and mobilization whenever possible and thus represented a manifestation of not only power politics but modernization as well.

The era of war began in 1939, the year Severonikel’ commenced production. The rise of the Nazi party to power in 1933 had kept tensions high between the Soviet Union and Germany in the intervening years. In 1938 the Soviet government started using the prospect of a war with Germany to attempt to coax the Finnish authorities into military agreements and warned about the possibility of a preemptive strike in the case of a conflict. The geopolitical calculus changed significantly after the signing of the Soviet-German non-aggression pact in late August 1939 and the outbreak of the Second World War in Europe a few weeks later. Though the pact temporarily removed the pretext of a Nazi invasion of the Soviet Union, it also included secret provisions that placed Finland, along with the Baltics and parts of Poland and Romania, under Soviet spheres of influence. The Soviet government wasted little time in exerting its newly secured power, invading Poland with Germany in September 1939 and demanding considerable territorial concessions from Finland in October. After the refusal of the Finnish government to comply, the Soviet-Finnish Winter War broke out at the end of November 1939 and lasted until mid-March 1940. The Soviet Union gained considerable territory near Lake Ladoga and the Salla region of Karelia from Finland, but failed to conquer the entire country during the conflict. It also received the remaining portion of the Rybachi Peninsula on the Kola Peninsula, but chose not to acquire the Petsamo region and its nickel deposits.86

These military developments clearly affected heavy industry on the Kola Peninsula. During the Winter War, Stalin and Molotov authorized the transfer of the Severonikel’ combine from the NKTP to the NKVD.87 With this switch the enterprise gained control over a greatly expanded Gulag camp, Monchelag, which grew from 3120

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87 RGAE, f. 9037, op. 1, d. 41, l. 11-114 and KF GAMO, f. 52, op. 1, d. 11, ll. 8-12.
prisoners to 14,735 during 1940. The nickel works in Noril’sk had been under NKVD authority since their creation in 1935 and thus, in a sense, this move with Severonikel’ mirrored a Soviet strategy of placing industrial objects in difficult natural environments under secret police authority. However, security concerns on a borderland near a war zone and economic considerations stemming from a decision of British companies in South Africa to cease supplying the Soviet Union with cobalt after the Molotov-Ribbentrop Pact played a role here.

The commensurate boost in available resources and implementation of an even more hierarchical administrative structure allowed the plant to raise production under Gulag purview, but chaos at the worksite remained. Upon acquiring Severonikel’, the NKVD increased its production quotas for nickel and copper and added electrolytic metals manufactured from expected supplies of nickel-copper mattes from Noril’sk to the plan for 1940. Then that autumn central authorities, including NKVD head Lavrentii Beria, demanded another shift in operations to prioritize supplying the military with cobalt. Under the written warning of five to eight years in prison for not following new quality standards and the personal threat of execution from Beria for delaying cobalt production, the heads of Severonikel’, Mikhail Tsarevskii and I. S. Beresnev, managed to satisfy their bosses sufficiently by the June 1941 evacuation of the worksite to escape these fates. In line with Tsarevskii’s declaration that the industrial activities of the combine constituted part of “crucial state tasks for the defense of the country,” public information about production at Severonikel’ stopped appearing in this period, making it difficult to evaluate the extent of the increased output. Nevertheless, much of the situation on the ground in the Monche tundra remained disorganized under NKVD auspices. Severonikel’ continued to under-fulfill its plans and Gulag prisoners,

89 Ertz, “Building Norilsk,” in Gregory and Lazarev, eds., The Economics of Forced Labor, 131-133.
90 KF GAMO, f. 52, op. 1, d. 12, l. 1; Pozniakov, Severonikel’, 77; and Poliarnaia pravda (March 4, 1940), 2-4.
91 KF GAMO, f. 52, op. 1, d. 11, l. 9.
92 KF GAMO, f. 52, op. 1, d. 1, ll. 27-32; KF GAMO, f. 52, op. 1, d. 44, ll. 1-2, 8-9; KF GAMO, f. 52, op. 1, d. 63, ll. 20-31; and Pozniakov, Severonikel’, 78-79.
93 KF GAMO, f. 52, op. 1, d. 11, l. 4; KF GAMO, f. 52, op. 1, d. 101, ll.11-13; and Pozniakov, Severonikel’, 78-79.
94 KF GAMO, f. 52, op. 1, d. 12, l. 1.
unsurprisingly, put in minimal effort—causing numerous work stoppages—and made escape attempts. The NKVD bureaucracy, furthermore, proved no more apt at controlling the environmental conditions that affected prisoner livelihoods. Large vacillations in the fulfillment of food and housing norms and the neglect of sanitary issues resulted in prisoners’ dwellings being filthy, cockroach-infested, and disease-producing.\(^5\)

In addition to martial tactics being introduced into the industrial regulation of the Monche tundra, militarization, in a more literal sense, also occurred over the nickel deposits in Pechenga (Petsamo in Finnish) in the era of the Winter War. The Russian empire had possessed this land before the revolution; the Bolshevik government agreed to grant it to the newly independent Finland in 1920 in return for land in Karelia. Pechenga comprised a strategic asset for Finland because it gave the state access to an ice-free port on the Arctic Ocean.\(^6\) The contract the Finnish government made with INCO required the company to work the deposits if they were deemed profitable and to return the mine and industrial objects to Finland in the event of a war in the region. The Red Army’s invasion of Pechenga during the Winter War opened the door for reconfiguring the ownership structure over the mines. Additionally, INCO’s subsidiary, the Mond Nickel Company, had not yet commenced mining the Pechenga deposits, despite geological discoveries, significant industrial construction, and demand from European countries.\(^7\)

Military strategy influenced the behavior of the various actors toward Pechenga. The Soviet Union returned most of Pechenga to Finland in March 1940 to avoid conflict with British and Canadian stakeholders. Germany, which desired more nickel for munitions, sat out the Winter War and then quietly arranged trade agreements with Finland to take control of the nickel deposits from the Allies. The Soviet government belatedly attempted to counter this move by demanding the nickel from the Pechenga deposits in late June 1940, but failed to stop the German acquisition and the initial shipments of ore through

\(^{95}\) KF GAMO, f. 52, op. 1, d. 101, ll. 4, 23-26; KF GAMO, f. 52, op. 1, d. 12, ll. 5-9, 42-44; KF GAMO, f. 52, op. 1, d. 59, ll. 1-4, 5-81; and KF GAMO, f. 52, op. 1, d. 41, ll. 2-15.

\(^{96}\) Krosby, *Finland, Germany, and the Soviet Union, 1940-1941*, 3-4.

Kirkenes at the end of the year.\textsuperscript{98} These developments allowed nickel from Pechenga to serve the Nazi war economy for the next several years of fighting.

German troops invaded the Soviet Union on June 22, 1941 and by late July much of the machinery and the vast majority of the population had been moved out of the Monche region and other parts of the Kola Peninsula. The government evacuated approximately 28,000 individuals of Monchegorsk’s prewar population of 33,000. Many men were enlisted into the Red Army, but a significant portion of workers and technical specialists and industrial equipment were transferred to other mining and metallurgical enterprises, including 13,438 Gulag prisoners who were sent to Noril’sk.\textsuperscript{99} During operation “Silver Fox” in the summer of 1941, German and Finnish troops attempted to take Murmansk and bombed several cities on the Kola Peninsula before being halted at the Zapadnaia Lista River in autumn.\textsuperscript{100} The stoppage in the mining and smelting of metals and the relatively quick stabilization of the front resulted in a decrease in industrial environmental transformation, which likely would have occurred without the attempted invasion, and minimal landscape destruction from war, which could have happened on a significantly greater scale had the conflict in the region been more protracted or intense. Despite these contingencies of the war on the Kola Peninsula that led to reduced environmental interference, individuals remaining in the region, mostly army troops, resorted to the desperate and rapacious hunting of wildlife for sustenance.\textsuperscript{101} Furthermore, spillover effects certainly occurred as places like Orsk, Ufal, and Noril’sk increased their productive capacity to compensate for the loss of Severonikel’.\textsuperscript{102}

The desire for nickel for armor and other military uses shaped decisions on both sides of the polar front. The Soviet government ordered an early reconstruction of Severonikel’ in May 1942 and a Finno-German outfit accelerated nickel mining and smelting in the Pechenga region. With large numbers of women and children working the mines and factory under the threat of Nazi bombings, Severonikel’ managed to

\textsuperscript{98} Krosby, Finland, Germany, and the Soviet Union, 1940-1941.
\textsuperscript{99} Pozniakov, Severonikel’, 84-85; Kiselev, Monchegorsk, 55-59; and KF GAMO, f. 52, op. 1, d. 101, ll. 11-13.
\textsuperscript{100} Chris Mann and Christer Jörgensen, Hitler’s Arctic War: The German Campaign in Norway, Finland, and the USSR, 1940-1945 (New York: Thomas Dunne Books, 2003).
\textsuperscript{101} GARF, f. A-358, op. 4, d. 1521, l. 25.
manufacture moderate amounts of nickel for the Red Army during the remaining years of the war.\textsuperscript{103} With the outbreak of World War II the Finnish government officially broke its contract with the \textit{Mond Nickel Company} and took over \textit{Petsamo Nickel}, which cooperated with the German company \textit{I. G. Farbenindustrie} to supply the Nazi Army with nickel until the Soviet invasion in autumn of 1944. During this period industrial operators removed 387,615 tons of nickel-copper ore, smelted 289,520 tons of ore at the settlement of Kolosioki in Pechenga, and shipped the vast majority, 15,661 tons, of the processed nickel-copper matte to Germany.\textsuperscript{104} There it served, above all, as a government-controlled material for manufacturing munitions instead of as a marketed commodity.

The nickel works in Pechenga played a central role in the conclusion of World War II in the far north. As the tide of the conflict turned against Germany, Finnish authorities started longing for a separate peace agreement with the Soviet Union. The armistice they signed in September 1944 returned much of the territory that the Soviet Union had won during the Winter War, but also included the Pechenga region. With ample warning of an impending agreement, the German army evacuated the territory, hauled off some of the equipment from the mines and factories, and destroyed whatever remained. Specialists abroad believed that these actions would cost the Soviet Union at least ten years of reconstruction work.\textsuperscript{105} The Soviet press unsurprisingly narrated these events in a different fashion. Newspapers celebrated the occupation of Pechenga by Red Army troops in October as the “liberation” of an ancient Russian territory. They also highlighted its strategic significance, noting “the Germans also needed Petsamo nickel” and “polar nickel is also fighting the war by being transformed into powerful weapons for the Red Army.”\textsuperscript{106} The heroic significance of this metal in the wartime context

\textsuperscript{103} Pozniakov, \textit{Severonikel’}, 86-94; Kiselev, \textit{Monchegorsk}, 62-69; and RGAE, f. 9037, op. 1, d. 149, ll. 142-148, 204-210.
\textsuperscript{104} Krosby, \textit{Finland, Germany, and the Soviet Union, 1940-1941}, 186-202.
\textsuperscript{106} “Pechenskim diviziami—slava,” \textit{Poliarnaia pravda} (October 17, 1944), 1; “V osvobozhdennoi Pechenge,” \textit{Poliarnaia pravda} (October 18, 1944), 1; “Razgrom nemtsev na Krainem Severe,” \textit{Poliarnaia pravda} (November 3, 1944), 1; “Bol’ she metalla Rodine!” \textit{Poliarnaia pravda} (November 5, 1944), 2; “Nikel’ voitet,” \textit{Poliarnaia pravda} (November 7, 1944), 3; F. M. Ternovskii,
manifested itself in the renaming of the town of Kolosioki as Nikel’.

The State Committee for the Defense of the USSR also ordered the nickel works rebuilt in December and workers at one of the mines managed to extract enough ore to produce nickel before the end of the war in May 1945.

The view of nickel as a vital military material continued into peacetime and informed the decisions to reconstruct and further develop the operations in Monchegorsk and Pechenga. The war experience fortified strategic thinking about natural resources as potential sources of state power. This legacy and the subsequent postwar prioritization of the nickel sector caused significantly more impact on the Kola environment than the activities of the non-ferrous metal industry in the 1930s and early 1940s. Though fewer data on pollution and environmental change existed during these years than later eras, one analysis cites that vegetation within a six-kilometer radius of Severonikel’ had been damaged by 1946. This estimate indicates substantial changes to the industrialized local environment, but nothing on the scale of the 1970s and 1980s. The rebuilding of the nickel plants quickly took on different military significance with the emergence of the Cold War. The resultant transformation of the Soviet economy—increased isolation from capitalist countries but new trade opportunities in Eastern Europe—shaped the postwar geography of industrialization and contributed to the perceived value of the nickel deposits in the north. Additionally, mining activities overall fell into the realm of military significance as the government ordered the comprehensive evaluation of radioactivity in the ore at places like Pechenga with the goal of finding nuclear fuel. The militarization and modernization of the Kola Peninsula mutually reinforced each other.

The Postwar Growth Economy and Environmental Pollution

Over the half century between the conclusion of the Second World War and the collapse of the Soviet Union, industrial activity and urbanized settlement on the Kola

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107 Matsak, ed., Pechenga, 397.

108 Kombinat Pechenganikel’ OAO “Kol’skaiia GMK” (Zapoliarnyi: Kol’skaiia GMK, 2005), 4-5.


Peninsula grew consistently and, compared with the preceding decades, stably. The region simultaneously became the most industrialized and populated Arctic region in the world and one of the most militarized places on the globe as well. This industrial transformation rested on a method of economic expansion that had been commonplace since the early nineteenth century: increasing production outputs to stimulate economic growth. As Kornai insisted, state-socialist centralized planning ultimately proved effective in directing economies toward this end.\footnote{Kornai, *The Socialist System*, 33-379.} The broad trajectory of communist economies from World War II to the 1970s roughly mirrored industrial capitalist ones with increasing production and social welfare benefits bolstering continued growth. First World economies adapted to reduced growth rates through an embrace of different means of economic modernization. The turn to new technologies, an orientation toward the service industry, and neoliberal policies starkly changed the global political economy and ecology.\footnote{Scholars of varying perspectives have stressed the significance of this transition. See Harvey, *A Brief History of Neoliberalism*; Barry Eichengreen, “Economy,” in Mary Fulbrook, ed., *Europe since 1945* (Oxford: Oxford University Press, 2001), 95-145; and Stephen Kotkin and Jan T. Gross, *Uncivil Society: 1989 and the Implosion of the Communist Establishment* (New York: The Modern Library, 2009).}

The effect of this reorientation on the Soviet Union was the phenomenon known as stagnation. The country responded to a staggering economy by attempting to accelerate a previously successful means of spawning growth: the expansion of production. It was precisely the continuation of this strategy of economic modernization in circumstances that rendered it less effective that led to levels of pollution by the Kola nickel industry in the 1970s and 1980s considered excessive. Neither Stalinism, nor inherent problems in the specifically communist approach to nature, can be blamed for the rapid environmental deterioration in these years. The poor environmental record of the plants reveals that processes beyond the commodification of natural resources and profit motive—staples of industrial capitalism—contributed decisively to economically generated pollution. The logic of continual industrial development inspired policies that kept increased production as a top priority, despite growing environmental awareness and the exhaustion of much of the local nickel reserves. Accordingly, the broad impulse to modernize belongs at the center of our explanation.
World War II devastated the Soviet Union, its people, and economy. While the Kola Peninsula compared favorably to the areas most ravaged by wartime destruction, the regional nickel industry had to repeat much of the construction of the 1930s. Recently historians have argued that we should treat 1943 as the beginning of the reconstruction period, and this certainly makes sense in the case of Monchegorsk. Repair work on Severonikel benefited from wartime alliances with the United States and Britain and the supporting technology transfers. By 1946 the combine mined and smelted metals at levels comparable to before the war. Soviet work in Pechenga did not begin until late 1944, but the initial reconstruction of the plant and mines there likewise incorporated foreign assistance in the immediate aftermath of the war. It also proceeded much more quickly than initial construction: Pechenganikel began mining the Kaula deposit in March 1945 and smelting some of its own ore in November 1946.

The grandiose designs for the Pechenganikel combine included a number of familiar features of previous socialist industrialization, but they emerged much more gradually without the revolutionary haste of many of the projects of the 1930s. Enterprise leaders paid considerable attention to geological surveying in the first few years. They already knew that the Kaula deposit contained drastically more metals than the ones in the Monchegorsk tundra and estimated in 1946 that, combined with the less significant Kammikivi deposit, the factory could produce 11,650 tons of nickel a year for the next 200-255 years. Nevertheless, successful exploration in the nearby Pil’guyavr valley the following year revealed that the capacity of the deposit was 100 times greater than previous research had indicated. The steady moves to mine this deposit in the 1950s...
and 1960s played an essential role in decisions to expand and maintain the Kola nickel industry. Regional party leaders during reconstruction also invested substantial energy into propaganda work in part designed to promote a holistic vision of industrial assimilation as improving nature. Newspaper articles spoke of “the treasure chest of the beautiful tundra” and lauded how “the natural resources of Pechenga and the enormous scale of the planned socialist economy will provide for the quick economic development of the region. On the basis of the natural resources the full-blooded life of the Soviet population will flourish all around.” Unsurprisingly, conditions on the ground were often much more difficult than these portrayals suggested.

As Pechenganikel’ drastically increased its confirmed reserves in the late 1940s and early 1950s, Severonikel’ encountered natural limitations on the growth of its mining sections. By 1950 geologists had failed to find new sources of nickel and copper in the surrounding mountains and the concentration of metals in the ore being processed was dropping precipitously. At this time the country was undergoing what historian Ethan Pollock has deemed the “Soviet Science Wars.” During this period ideological fervor affected professional knowledge production and government policy at heightened levels. Agronomist Trofim Lysenko came to the apex of his influence in 1948, for instance, and not only succeeded in suppressing genetics further, but radicalized an afforestation program into the Promethean Stalin Plan for the Transformation of Nature.

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119 GAMO, f. P-359, op. 1, d. 16, l. 10; GAMO, f. P-359, op. 1, d. 13, l. 55; GAMO, f. P-359, op. 1, d. 8, ll. 1-9; GAMO, f. R-459, op. 6, d. 3, ll. 103-111, 130-131, 142-146; GAMO, f. R-459, op. 6, d. 6, ll. 68-69; and GAMO, f. R-459, op. 6, d. 7, l. 16.


121 GAMO, f. P-359, op. 1, d. 17, ll. 38-40; GAMO, f. R-459, op. 6, d. 3, ll. 88, 124-125; and GAMO, f. R-459, op. 6, d. 6, ll. 3-5.


geology also experienced a comparable period of internal ideological radicalism. At a meeting of the Kola section of the Academy of Sciences in July 1950, Mikhail Tsibul’chik presented an iconoclastic report replete with quotations from Stalin and references to dialectical science. He suggested that the stagnation in discovering new nickel reserves in the Monche tundra resulted from an incorrect theoretical approach to geological formation and proposed a new model.\textsuperscript{125} He specifically criticized “views about the geological structure and genesis of ores (genezis orudenenia) rooted in existing interpretations that conclude that the Monche tundra lacks any prospects.”\textsuperscript{126} The other scientists at the meeting dismissed the ideas of this brazen newcomer to the region—with one attendee angrily exclaiming “This is a hooliganistic report!”—and highlighted the importance of empirical results above any theoretical approach in finding new economical deposits.\textsuperscript{127}

Though the rise of plate tectonics would soon transform the theoretical foundation of the geological sciences, Tsibul’chik’s opponents were correct on the matter of the Monche tundra: no new major discoveries occurred after this point. This natural limitation shaped subsequent industrial development on the Kola Peninsula. Severonikel’ transitioned to concentrating on smelting and began processing more and more ore from the Pechenga deposits.\textsuperscript{128} Furthermore, much of the regional mining economy diversified to other materials besides nickel and copper sulfides. Between the nominal end of reconstruction in 1948 and the early 1960s, two iron mining and processing plants went into operation in Olenegorsk and Kovdor, a rare metals facility opened in Revda near Lovozero, and, after much discussion and planning in the 1930s, an aluminum factory was built in Kandalaksha.\textsuperscript{129} The Apatit combine in the Khibiny began a period of sustained enlargement in these years as well.\textsuperscript{130} For their part, the deposits of the

\begin{itemize}
\item \textsuperscript{125} RGAE, f. 9037, op. 1, d. 404, ll. 2-130
\item \textsuperscript{126} RGAE, f. 9037, op. 1, d. 404, l. 6.
\item \textsuperscript{127} RGAE, f. 9037, op. 1, d. 406, ll. 1-29 [13].
\item \textsuperscript{128} Adams, “Nickel and Platinum in the Soviet Union,” in Jensen, Shabad, and Wright, eds., Soviet Natural Resources in the World Economy, 538-543.
\item \textsuperscript{130} A. V. Barabanov and T. A. Kalinina, “Apatit”: vek iz veka (Apatity: Laplandia Minerals, 2004), 95-128.
\end{itemize}
Pechenga region ensured supplies of raw material that would enable the Kola nickel industry to be included in the postwar boom of extensive economic growth.

The reinforcing processes of modernization, militarization, and urbanization on the Kola Peninsula reached their peak between 1950 and 1970. The Cold War and the rising prominence of submarines in national security strategy provided impetuses for the marked growth of the Northern Fleet of the Soviet Navy on the Murman coast and the accompanying infrastructure to support this military unit.\(^{131}\) Having finally abandoned the use of Gulag labor in the middle of the 1950s, northern regions increasingly relied on appealing incentive packages—including higher wages, longer holidays, early retirement, and, notably, access to scarce goods—to attract settlers to proliferating polar cities.\(^{132}\) This influx of military and voluntary residents resulted in dramatic population growth as the Kola Peninsula increased from 314,700 inhabitants in 1950 to 799,500 in 1970, averaging an enlargement of over 24,000 people a year.\(^{133}\) Economic modernization served as the other main attraction of people to the region and created a fully industrialized landscape along many sections of the Lake Imandra corridor.

This era of modernization also resembled general trends throughout the global north most closely, as countries across the Iron Curtain used unprecedented increases in industrial production to foster record levels of economic growth. From the early 1950s to 1965 the annual production of nickel worldwide was nearly doubling every seven years, inspiring the Soviet Union to invest more in this industry and to begin marketing its nickel to foreign customers.\(^{134}\) The Soviet government achieved parity in growth rates by shifting away from the breakneck tactics of the Stalinist 1930s and toward more cautious

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and effective methods of steady industrial expansion. Thus, enterprise leaders waited until 1956 to start setting up a mine at the deposit at Pil’guyavr (now called Zhdanovsk), despite believing by 1952 that it “is by size and prospects the largest of the copper-nickel deposits of the Pechenga region.” Concern about the dwindling reserves in the Monche region ultimately contributed to the decision to build the new mine and accompanying city of Zapoliarnyi. In the early 1950s Pechenganikel’ was sending about 20% of its mined ore and all of its smelted matte to Severonikel’. By 1965 the amount of shipped material going to Severonikel’ had increased to 80% of Pechenganikel’’s output. Anticipating this trajectory in the mid-1950s, the government concluded that “the supply of raw materials for the Severonikel’ combine and the sharp increase in nickel production in the next several years from Kola raw materials should be resolved by forcing the construction and beginning the exploitation of the largest deposit in the USSR, the Zhdanovsk deposit, by a mining and enrichment enterprise.” At the end of the 1960s the desire to centrally coordinate regional nickel production led to an episode of agglomeration: the Zhdanovsk mining and enrichment combine returned to Pechenganikel’ and the Kola enterprises were grouped into the Nikel’ Association.

The massive enlargement of the nickel industry in the 1950s and 1960s produced mixed environmental results. Urban planners maintained a putative emphasis on creating natural harmony in industrial cities, which resulted in an unrealized proposal to locate Zapoliarnyi in an attractive valley ten kilometers from the mines and in the actual erection of a statue of a moose in the center of Monchegorsk. A more genuine achievement of the more gradual approach to industrial development was the reduction of

135 Barry Eichengreen cites the average annual compound growth rate of gross domestic product for Western and Eastern Europe to each be 4.7% for the period of 1950 to 1973. Eichengreen, “Economy,” in Fulbrook, ed., Europe since 1945, 98.
136 GAMO, f. R-459, op. 1, d. 123, l. 79.
137 RGAE, f. 9037, op. 1, d. 508, ll. 2-3.
138 Potemkin, U severnoi granitsy, 289.
139 GAMO, f. R-459, op. 6, d. 508a, l. 5.
141 Matsak, ed., Pechenga, 139-140; Kiselev, Monchegorsk, 85; and Eremeeva, “Formirovanie gorodskoi sredy i prostranstvennogo obraza Monchegorska,” in Petrov and Razumova, eds., Severiane, 92-93.
the vulnerability of the migrants to these worksites to the natural hazards of the region. Nevertheless, pollution directly correlated with production levels and, accordingly, this industrial development led to more ecosystem disruption from sulfur emissions and toxic substances containing metals. As environmental issues became a greater concern in the Soviet Union in the 1960s, evidence emerged that mining and processing operations had unleashed dust that increased concentrations of heavy metals in surface waters, soils, and plants. Furthermore, forest damage from sulfur emissions extended 17 to 20 kilometers from the Severonikel’ plant by 1969. While their pollution levels continued to increase in the early parts of the decade, Severonikel’ embraced some nature protection measures in the mid-1960s. These efforts managed to stabilize and even reduce sulfur dioxide emissions from Severonikel’ and Pechenganikel’ for a brief period in the late 1960s as production continued to rise. On the whole, up until 1970 pollution from the Kola nickel industry occurred on a comparable scale to metal firms worldwide that operated at similar levels of production.

This situation changed in the 1970s when pollution in industrialized sections of the Soviet Union rose at a greater rate than many capitalist countries, despite a good deal of official public concern about nature protection. Two main catalysts for rapid

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142 The concerns expressed by enterprise leaders about social issues reflect how the situation was nowhere near as bad as the Stalinist years. R. M. Gamberg and V. P. Bindiuov, Nauchnaia organizatsiia truda i upravleniia proizvodstvom na Zhdanovskom gorno-obogatitel’nom kombinate (Moscow, 1969) and V. Ia. Pozniakov, ed., Opity raboty kombinata “Severonikel’” po povysheniu kul’ tury proizvodstva (Moscow: Ministerstvo tsvetnoi metallurgii SSSR, 1971).
143 Kozlov and Barcan, “Environmental Contamination in the Central Part of the Kola Peninsula,” Ambio 29, no. 8 (December 2000): 514.
145 Kiselev, Monchegorsk, 95-103.
147 For information about the heavy metals industry and atmospheric pollution in the twentieth-century world, see McNeill, Something New Under the Sun, 84-108.
environmental deterioration by the Kola nickel industry existed at this time: the exhaustion of local ore with significant nickel concentrations and continual yet failed attempts to use further increases in production to create economic growth. In the Monchegorsk region, Severonikel’ closed the Nittis-Kuzhumia mine in 1969 and finished working a small deposit at Niuduaivench in 1974. The Severonikel’ smelters, which were already receiving large quantities of material from Pechenga, began to import and process ore from Noril’sk, which was in the midst of a massive expansion of its mining operations that outpaced the capacity of its smelters. The Noril’sk ore contained three times the sulfur concentration and resulted in dramatic increases in sulfur dioxide emissions at Severonikel’. Between 1972 and 1973 alone the amount of ore from Noril’sk processed at Severonikel’ and the sulfur dioxide emissions of the plant both nearly

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doubled without comparable growth in sulfuric acid production (Table 7). Though sulfur
dioxide emissions had been below 100,000 tons a year through the 1960s, they rose to
averaging over 200,000 tons a year for most of the 1970s and 1980s (Table 7).\footnote{Pozniakov, “The “Severonikel” Smelter Complex,” in Kozlov, Haukioja, and Yarmishko, eds., \textit{Aerial Pollution in Kola Peninsula}, 16-19; Barcan, “Nature and Origin of Multicomponent Aerial Emissions of the Copper-Nickel Smelter Complex,” \textit{Environmental International} 28, no. 6 (December 2002): 451; RGAE, f. 386, op. 1, d. 5149, ll. 23-44; and GARF, f. A-358, op. 4, d. 1640, ll. 1-86.}

A similar phenomenon occurred in the Pechenga region as the processing units in Nikel’
and Zapoliarnyi increasingly worked ore from the Zhdanovsk deposit with low nickel
centrations and correspondingly higher levels of pollution per unit of nickel
manufactured.\footnote{RGAE, f. 386, op. 1, d. 5147, ll. 44-49; RGAE, f. 386, op. 1, d. 5148, ll. 64-80; RGAE, f. 386, op. 1, d. 5149, ll. 10-11; and Andrew R. Bond and Richard M. Levine, “Noril’sk Nickel and Russian Platinum-Group Metals Production,” \textit{Post-Soviet Geography and Economics} 42, no. 2 (March 2001): 80-82.}

In addition to the important role of the ore content, the decisions to continue
industrial development also bear responsibility for heightened levels of pollution. In
contrast to arguments that communist economies performed without regard for market
fluctuations, the production boom of the Soviet nickel industry in the 1970s overlapped
with a period of significantly rising prices and increased attention to minimizing
operating costs.\footnote{I do not mean to suggest that the Soviet economy was equally sensitive to price signals as capitalist economies. It was not. However, it still serves as a mild riposte to analyses that build on the assumption of communist economic dysfunction that Soviet nickel production in this period appeared more responsive to prices than Canadian output, which dropped considerably. Adams, “Nickel and Platinum in the Soviet Union,” in Jensen, Shabad, and Wright, eds., \textit{Soviet Natural Resources in the World Economy}, 542-544 and Luzin, Pretes, and Vasiliev, “The Kola Peninsula,” \textit{Arctic} 47, no. 1 (March 1994): 13.}

This upswing occurred as part of a sustained strategy to use the
expansion of heavy industry to continue a process of economic modernization. These
increases in output contributed to the Soviet Union acquiring the title of the world’s
largest nickel manufacturer, but did not lead to economic growth rates at the same levels

One of the most obvious local manifestations of stagnation was the
failure of the nickel enterprises to fulfill their annual production plans in the late
1970s.\footnote{S. I. Osipov, ed., “Severonikel’”: \textit{uroki rekonstruktsii} (Murmansk: Murmanskoe knizhnoe izdatel’stvo, 1984); Pozniakov, \textit{Severonikel’}, 261-276; \textit{Monchegorskii rabochii} (July 8, 1980), 1;}

\footnote{A similar phenomenon occurred in the Pechenga region as the processing units in Nikel’ and Zapoliarnyi increasingly worked ore from the Zhdanovsk deposit with low nickel concentrations and correspondingly higher levels of pollution per unit of nickel manufactured. In addition to the important role of the ore content, the decisions to continue industrial development also bear responsibility for heightened levels of pollution. In contrast to arguments that communist economies performed without regard for market fluctuations, the production boom of the Soviet nickel industry in the 1970s overlapped with a period of significantly rising prices and increased attention to minimizing operating costs. This upswing occurred as part of a sustained strategy to use the expansion of heavy industry to continue a process of economic modernization. These increases in output contributed to the Soviet Union acquiring the title of the world’s largest nickel manufacturer, but did not lead to economic growth rates at the same levels as earlier decades. One of the most obvious local manifestations of stagnation was the failure of the nickel enterprises to fulfill their annual production plans in the late 1970s.}

Under these conditions, tasks such as environmental protection measures and
technological upgrades fell even further down on the list of priorities.\textsuperscript{156} Thus, despite public pressure on the combines and their nominal efforts to curb pollution in the 1970s and 1980s, the privileging of production as the main ingredient in modernization caused the most environmental destruction in the industry’s history thus far.

The global economy struggled in the 1970s, but countries that responded to the slump by shifting from extensive to intensive growth strategies tended to fare better. The Soviet Union, like many but not all state-socialist countries, continued to use the capitalization of industrial development as its primary means of attempting to spawn economic growth. Many first-world capitalist countries instead now generated wealth through new innovations, a shift to the service and financial sectors, and increased trade.\textsuperscript{157} In the middle term the comparative success of these countries helped fund certain forms of pollution abatement, though the environmental impact of a similar reliance on continual modernization seems very likely to be less fortuitous in the long run. The decision of the Soviet Union to remain focused on increasing industrial production, on the one hand, demonstrates a comparative weakness of communist systems in addressing environmental issues. Evoking Cold War economic competition, and thus the specter of the capitalist world-system, does not explain why the Soviet Union and other state-socialist countries chose environmentally destructive economic policies. It would also be disingenuous, on the other hand, to take the results of intensive growth policies as evidence of an inherent advantage of capitalism over communism in environmental stewardship. The Soviet Union pursued strategies of modernization akin to the Keynesian models of the capitalist welfare state. Only in this period, they ceased to work and an episode of economic and environmental crisis resulted. As elsewhere in the world, such as post-colonial Zambia, which enacted policies of extensive industrial development of the copper sector in these years that failed to remedy the country’s poverty, the Soviet “expectations of modernity” ceased to come to fruition.\textsuperscript{158}

\textit{Monchegorskii rabochii} (September 23, 1980), 3; \textit{Poliarnaia pravda} (November 12, 1980), 1; and \textit{Poliarnaia pravda} (November 22, 1980), 1.
\textsuperscript{156} RGAE, f. 386, op. 1, d. 5145, ll. 51, 64-65; KF GAMO, f. 52, op. 4, d. 657, ll. 31-41; and A. Bragin, “Nash vozdukh,” \textit{Monchegorskii rabochii} (July 28, 1980), 3.
\textsuperscript{157} Eichengreen, “Economy,” in Fulbrook, ed., \textit{Europe since 1945}, 95-145.
Industrial pollution on the Kola Peninsula during the culmination of the Soviet experiment and into the 1990s vastly transformed the local ecosystem and brought about significant social ramifications. Sulfur emissions, metallic dust from mining, and industrial wastewater containing an assortment of toxic substances from metallurgical processing harmed or destroyed large areas of vegetation, altered the chemistry of soil and waterways, and killed aquatic fauna. Nickel and copper entered human food pathways through accumulating in high concentrations in locally grown vegetables.\footnote{Kozlov and Barcan, “Environmental Contamination in the Central Part of the Kola Peninsula,” \textit{Ambio} 29, no. 8 (December 2000): 512-517; Barcan, “Nature and Origin of Multicomponent Aerial Emissions of the Copper-Nickel Smelter Complex,” \textit{Environmental International} 28, no. 6 (December 2002): 451-456; Kryuchkov, “Extreme Anthropogenic Loads and the Northern Ecosystem Condition,” \textit{Ecological Applications} 3, no. 4 (November 1993): 622-630; and A. P. Kapitsa and W. Rees, eds., \textit{Ekologiia Severa: Distantsionnye metody izucheniia narushennykh ekosistem (na primere Kol’skogo poluostrova)} (Moscow: Nauchnyi mir, 2003).} Taken together, this air and water pollution also caused negative health effects among the populations of Monchegorsk, Nikel’, and Zapoliarnyi.\footnote{Rautio and Andreev, \textit{Sotsial’naiia restrukturuatsiia gornodobyvaushchei promyshlennosti Pechengskogo raiona Murmanskoi oblasti}, 56 and Hansen and Tønnessen, \textit{Environment and Living Conditions on the Kola Peninsula}, 121-123.} In these decades the levels of environmental damage on the Kola Peninsula accelerated to such extremes that the region became considered one of the most polluted places in the Soviet Union. The large zones of decimated vegetation in the vicinity of Severonikel’ and Pechenganikel’ elicited protests from Soviet conservationists and, especially in the aftermath of Chernobyl, the public in Nordic countries.\footnote{O. Semenov-Tian-Shanskii and V. Kriuchkov, “Visit dym nad zapovednikom,” \textit{Pravda} (October 10, 1980) and Robert G. Darst, \textit{Smokestack Diplomacy: Cooperation and Conflict in East-West Environmental Politics} (Cambridge, MA: The MIT Press, 2001), 91-134.}

During this moment of heightened international attention to environmental issues in the Soviet Union, the state’s attempt to shift the country’s economy gradually toward a greater market orientation with perestroika reforms failed to save the ruling elite or the state-socialist system. One measure in these reforms was the Soviet state’s decision to unite officially the Kola enterprises—Pechenganikel’, Severonikel’, and the Olenegorsk Mechanical Factory—with the larger Noril’ sk combine into a new entity, Noril’ sk Nikel’, in 1989. The political collapse of the Soviet Union opened the floodgates for the implementation of neoliberal economic reform in the guise of shock-therapy privatization policies. In the early 1990s the economic decline in Russia, rapid inflation, and
plummeting global nickel prices created much more significant social hardships on the Kola Peninsula than Soviet-era pollution had. In 1995 wealthy banker Vladimir Potanin convinced the Russian government to implement the infamous “Loans for Shares” program of privatization as an emergency measure to generate needed state revenue. The subsequent auction organized by Potanin’s bank allowed that very bank, Interros, to gain a controlling stake of Noril’sk Nikel’ with a bid representing a fraction of the actual value of the company. Noril’sk Nikel’ established the subsidiary Kola GMK to control Severonikel’ and Pechenganikel’ in 1998 and became extremely profitable in the 2000s. Severonikel’ maintained the largest nickel refinery in Russia and Pechenganikel’ continued to work its mines in the 2000s. The Kola nickel industry has benefited from decisions of Noril’sk Nikel’ to globalize its assets and become a multinational corporation, though the impending exhaustion of deposits in Pechenga leaves its future up in the air.

As the world’s largest nickel producer, Noril’sk Nikel’ managed to reduce its anthropogenic loads on the environment in the post-Soviet period, first through steep declines in its industrial output in the early 1990s and then with technological upgrades to better control pollution levels. Though these reductions in pollution are often taken as evidence of the superiority of capitalism in environmental stewardship, a longer-term chronological perspective brings us to a different conclusion. Sulfur dioxide emissions from the Severonikel’ plant, for instance, remained above the levels of the 1960s until 1998, which reflects the comparative uniqueness of the late Soviet era (Table 7). Furthermore, the two decades of post-Soviet operation of the Kola plants has most certainly generated more pollution than the Stalinist era did, which highlights the obvious

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163 Goldman, The Piratization of Russia, 1-11, 120.


but frequently downplayed point that the scale of industrial activities most closely correlates with environmental disturbance.

**Communist and Capitalist Environmental Solutions**

An assessment of the nature protection measures pursued by the Kola nickel industry in communist and capitalist systems reveals common and contrasting features of conservation policies during an overarching process of modernization. These longitudinal comparisons of a single industry and region cannot control for considerable chronological variation—the fact that, for instance, global concern about sulfur dioxide emissions was minimal in the 1930s and perhaps at its peak in the 1980s—or account for major differences related to economic sectors and natural surroundings—the distinct issues faced by agriculturalists in temperate climates and nickel smelters in the Arctic. However, they can illustrate some of the basic contours of the efforts to solve environmental problems in different political-economic systems.

Scholarship on waste in state-socialism addresses the different means of attempting to manage industrial pollution. In a work that elaborates a sociological theory of waste as a hybrid entity, Zsuzsa Gille proposes three waste regimes for socialist and post-socialist Hungary. In the “metallic regime” from 1948 to 1974, state and society emphasized the need to maximally reuse and recycle produced wastes in order to obtain value from them. The imperative of extracting all possible economic value out of industrial materials influenced public discourse and planning, while the issue of waste generation and distribution remained taboo. The “efficiency regime” focused, instead, on minimizing the levels of waste per unit of production through technological upgrades and reducing aggregate costs through the introduction of new economic models from 1975 to 1984. And, finally, policy during the “chemical regime” from 1985 to 2004 began to treat wastes as useless and toxic by-products, which needed to be disposed of and contained. The state allocated authority to private enterprises for managing their wastes and relinquished much of its role in regulating their production.\(^\text{166}\)

A modified version of this periodization schema can be adapted to this evaluation of the politics of pollution abatement in the Kola nickel industry. I would add a “deferral regime” to describe Stalinist waste politics until the postwar era. In it the combination of

\(^{166}\) Gille, *From the Cult of Waste to the Trash Heap of History.*
holistic thinking and extreme urgency led to a disposition that putatively favored the ultimate elimination of all waste, but accepted a low prioritization of this task because of a conviction that it could be solved in the future. World War II served as a bridge from hastiness to a period of stressing the more gradual reuse of industrial by-products, while waste distribution remained de-politicized. The incorporation of overt conservation measures into enterprise plans and an increased focus on cost reduction beginning in the 1970s failed in the stated goals of reducing pollution because it contradicted the greater imperative of increasing production. Perestroika saw a major change in views about industrial wastes toward them being seen as harmful substances to be controlled instead of reused and the ascent of international involvement in environmental politics on the Kola Peninsula. However, we should separate the protracted and minimally effective period of market reforms lasting until the late 1990s from the more successful era of the recent past during which Noril’sk Nickel’ has been able to reduce certain forms of pollution. During this “multinational corporate waste regime,” environmental decision-making has been largely allocated to a powerful private enterprise, which has the avowed agenda of acting only in its economic and political interest.

Initially inspiring the project leaders of the apatite works in the Khibiny Mountains, a waste management scheme known as the complex utilization of natural resources continued to shape pollution control by the nickel industry in the 1930s. As Fersman elaborated this idea, it would have entailed the reuse of industrial by-products to the extent that the enterprises would eliminate all emissions. As one manifestation of this thinking, newspapers and journals in the early 1930s expressed excitement about the idea of using sulfur from the nickel ore in the Monche tundra to produce sulfuric acid for the apatite industry. During the period of NKVD management of Severonikel’ just before the Soviet Union’s entrance into World War II, the combine initiated efforts to convert sulfur dioxide emissions from the smelter into sulfuric acid and considered the

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issue of increasing the amount of metals recovered from ore during processing. After a chaotic and bloody decade of rapid Stalinist industrialization, Fersman repeated his insistence about the need to recycle industrial wastes. In a discussion of “wastes and refuse of Monche,” he acknowledged, “the problem of protecting the mineral substances and nature of the surrounding area of the Monche region is especially acute.” He defined the issue as above all “a struggle with the loss of useful materials—nickel in lateral rock, cobalt in slag, selenium in silt and slag—but the utmost attention should be paid to the neutralization and utilization of emitted sulfur gases and the conversion of them into sulfuric acid.” In addition to touching on the abiding optimism of Stalinist pollution controls, Fersman’s report also exposed a more pervasive truth: the low prioritization of such issues during this conflict-ridden episode of industrial development meant that little action was taken to implement such ambitious ideas.

The enterprises of the postwar Kola nickel industry made consistent and gradual efforts to transform all metals and sulfur removed from the earth into economic products. This Soviet manifestation of the “metallic waste regime” entailed a similar relation to the recycling of industrial by-products and the generation of pollution. On the one hand, repeated exhortations that all available natural resources should be made to serve the socialist state infused party and enterprise discourse from the end of World War II into the 1970s. Numerous specific campaigns emerged in response to this desire for the maximal extraction of value from natural materials. The Kola smelters improved their processing technologies and the reprocessing of slag to the point where they reduced the concentrations of nickel, copper, and cobalt in the solid wastes they produced by half. Throughout these decades specialists additionally developed systems for collecting and

169 V. Afanas’ev, “Proizvodstvo sernoi kisloty na Kol’skom poluostrove.” Poliarnaia pravda (February 3, 1940), 3; Eremeeva, “Stroitel’stvo kombinata “Severonikel’,” in Petrov and Razumova, eds., Emokul’turnye protsessy na Kol’skom Severe, 97; and KF GAMO, f. 52, op. 1, d. 59, l. 36.

170 ARAN, f. 544, op. 1, d. 207, l. 2.


extracting metals from mining dust, which was a task explicitly connected to the installation of better ventilation systems in the mines.\textsuperscript{173} Repeated crusades to collect scrap metal also occurred during these decades along with portrayals of this type of recycling as a moral and patriotic duty.\textsuperscript{174} Finally, discussion about the conversion of sulfur dioxide into sulfuric acid consistently appeared until the actual opening of a unit for it at Severonikel’ in 1967.\textsuperscript{175} At the end of the 1950s the main engineer of Severonikel’ wrote that “the reduction of wastes to their minimum allows for an increased output of metals, a substantial lowering of costs of production, and simultaneously the elimination of dustiness from the sections,” revealing that enterprise leaders were not entirely oblivious to the connections among the economic, social, and environmental dimensions of these efforts.\textsuperscript{176} The author of a popular book about Monchegorsk predicted in 1961 that in a matter of years technologies of industrial reuse would manage to eradicate air pollution and improve air quality, all while the Severonikel’ combine increased its output of metals.\textsuperscript{177}

On the other hand, as the proceeding example demonstrates, the production processes that generated these agents of pollution were not subject to official scrutiny in these years. Also inherent in the idea of extracting all possible value from natural resources, which inspired certain forms of conservation, was the inclination toward the rapacious transformation of the entire material world into a means of serving human interests. This impulse represented a clear continuation of the “colonization of nature” described in the first chapter of this dissertation and as such characterized an impetus of economic modernization that has been common to communism and capitalism.


\textsuperscript{177} Gladkov, \textit{Monchegorsk}, 77-78.
Reflecting the attachment to ever-increasing nature use, state enterprises on the Kola Peninsula ultimately maintained the prerogative of disposing industrial wastes as they saw fit. They could come under public criticism and face sanctions for violating sanitary and environmental laws, but authorities would not force these disposals to stop. For instance, *Severonikel* continued to dump large quantities of untreated waste into local waterways in the early 1960s, despite major fines and public censure.\(^{178}\)

Though the 1970s inaugurated a period of extreme pollution by the Kola smelters, it also witnessed considerable concern about environmental protection in the Soviet Union. In an article in *Polar Pravda* in 1973 that held specific industrial enterprises responsible for improving the air quality of the Murmansk region, the head of the Murmansk Hydrometric Service, Fedor Terziev, warned, “environmental pollution has become one of the most complicated and urgent problems of our time—the problem of the century.”\(^{179}\) The Soviet equivalent to the Hungarian “efficiency regime” did not embrace the same limited use of market mechanisms as environmental solutions, but entailed a comparable—though often unimplemented—focus on technological modernization and increased cost reduction. More importantly, perhaps, the reduction of waste and pollution became fully integrated into the repertoire of tasks that society and the Soviet state were to accomplish together. The goal of environmental protection measures expanded to explicitly include the creation of superior air and water quality under state-socialism.

While the primary materialization of this new approach to pollution was increased public attention and press coverage, the nickel smelters also invested more resources in these tasks.\(^{180}\) *Pechenganikel* opened its own sulfuric acid section in 1979 and almost all Kola enterprises involved in mining attempted to improve their processing and reuse of

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wastewater in the 1970s and 1980s.\textsuperscript{181} The enterprises defined these upgrades as part of a process of modernization and rationalization and returned to highlighting the “complex utilization of nature” as an overtly environmental solution.\textsuperscript{182} Despite the overall ineffectiveness of this approach in curbing pollution, environmental measures taken by the nickel enterprises often received praise for demonstrating the superiority of communist political economy over capitalism. Leonid Potemkin, a geologist who had helped open the Zhdanovsk deposit in the aftermath of World War II and went on to have a successful career as an official in the Ministry of Geology, put it with particular conviction. In a 1977 book on environmental protection and mining in the Soviet Union, he repeatedly contrasted the exploitative and destructive treatment of nature in capitalism with “communist society,” which “will be able to ensure the genuine harmony of technical progress and nature and the optimal combination of the development of the mining industry with the tasks of improving the environment.”\textsuperscript{183}

Perestroika marked a transition to a different period of pollution politics in which the state gradually retreated from claiming responsibility and international actors came to play a defining role. An increasing orientation toward global markets, which began during Gorbachev’s rule but became dominant with privatization of the 1990s, overlaid and, in many ways, drove this process. In the aftermath of the Chernobyl accident in 1986 and the growth in knowledge about the extent of Soviet environmental pollution, two major changes occurred beyond the introduction of a new round of environmental

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technologies. Members of Soviet society began to join with professional conservation scientists and official environmental groups to lodge active protests against industrial enterprises, including those on the Kola Peninsula, for harming the ecosystem. Additionally, foreign countries turned pollution from the Soviet Union into a major diplomatic issue. This latter development was especially important in the case of the Kola Peninsula because of its large environmental loads, proximity to Finland and Norway, and the particular strength of environmentalism in the Nordic countries. As political scientist Robert Darst describes, Finland first offered to help fund and manage a drastic technological upgrade, commonly referred to as “modernization,” of the Pechenganikel’ plant in the late 1980s that would improve the smelter’s performance and reduce its emissions. In the 1990s Norway made a similar proposal to invest in this environmental solution, but just as with the Finnish offer, the plan languished. The Russian government possessed limited resources to contribute its portion of the funds in the early 1990s and environmental policy makers in Moscow increasingly saw the eventual closing of the plants as a more viable option.

Since the late 1990s the management of pollution by the Kola nickel industry has primarily been the prerogative of a successful multinational corporation, Noril’sk Nikel’. The tough new environmental protection laws initially enacted by the Russian Federation have subsequently been weakened and lax enforcement of them has remained. In the early 1990s the de-population and de-industrialization of the region, neither of which were conscious policies, contributed most notably to pollution reductions. Under Noril’sk Nikel’’s auspices, on the other hand, the profitability of certain measures to the company, instead of the growth in production, has become the ultimate arbiter of whether

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186 Darst, Smokestack Diplomacy, 119-127.


or not an environmental measure is implemented. Global capitalism in autocratic Russia has still required the company to be attentive to state desires and consider international politics as well, but Noril’sk Nikel’’s corporate self-interest overwhelmingly determines decisions about industrial pollution. For instance, the privatized company initially rejected the Norwegian offer to upgrade Pechenganikel’ and instead diverted some of its smelting operations to regions farther from an international border. After opting for an expansion of mining operations in Pechenga in the early 2000s, it went ahead with investments in environmental technologies that had economic rationales and accepted Norwegian contributions to the project. Noril’sk Nikel’ has also sought to garner the favor of local environmentalists by providing finances to nature reserves near the smelters. In 2005 the company summarized its goals, “The adoption of nature conservation technologies is one of the most important directions of the ecological strategy of Kola GMK on the path toward the creation of clean production that exists in harmony with the natural environment.” Such a notion of forging harmony with nature in the midst of industrial development could have been written by Leonid Potemkin several decades earlier. While the transition to capitalism has shifted authority from state enterprises to private corporations, the power to pollute remains in the hands of sovereign actors dedicated to continuing economic modernization.

Conclusion

The Soviet system has often been targeted as being particularly harmful to the natural environment. In a way this criticism was fair when it first emerged in the 1980s during a moment when strains on the command economy did lead to especially poor environmental performance. But it makes little sense to generalize from this particular historical context to overarching claims about the superiority of market economies in dealing with environmental issues. For most of its existence in the Soviet-era the Kola

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191 Kombinat Pechenganikel’ OAO “Kol’skaia GMK”, 15.
nickel industry generated comparable levels of pollution to enterprises under capitalist management. Focus on the uniqueness of Soviet ecocide furthermore obscures the influence of a broader undertaking in leading to much of the environmental destruction.

In the twentieth century states and corporations throughout the world and operating under different political and economic systems chose to pursue processes of industrial and post-industrial development. Despite considerable degrees of popular support for these policies in various places and times, rarely were the basic decisions behind such projects of economic modernization arrived at through democratic processes outside the internal structures of states and corporation. Pollution, on the contrary, exerted indiscriminate effects on ecosystems and societies, which have burdened populations alienated from the choices to modernize. The level and form of input from society did vary widely in different places and times and the Soviet Union clearly stood on the less democratic and inclusive side of the scale. Yet, in both capitalist and communist systems a group of elite actors possessed the power to transform human-nature relations radically for the remainder of society and the environment. Predictable environmental outcomes from this political project of modernization, therefore, rest at the foundation of the explanation of how Monchegorsk went from “exceptional” and “beautiful” to “hell.”

Certain contingencies of the Soviet experience, nevertheless, also help account for this transformation. This chapter has offered the suggestive case of the Kola nickel industry to illuminate these other processes. The isolation faced by the country during its first major industrialization push and the desire to attain maximal economic self-sufficiency undermined the utopian holism espoused by planners. The strategic significance of the metal helped ensure that the military would attempt to secure the deposits during World War II and that the state would prioritize investing in the industry during the Cold War. The continued pursuit of expansions in production during a global economic shift produced especially poor environmental results for the country in the 1970s and 1980s. And, finally, the combination of the economic collapse during the 1990s, which cut production and thus pollution considerably, and the flexibility of a powerful multinational corporation, which can more easily transfer pollution generation
to different locations and use technology to reduce emissions per unit of production, have made the post-Soviet era seem better for the environment.
Chapter 5. Energizing the Landscape

Introducing the plans for the Kola Nuclear Power Plant (Kola AES) to the public on November 12, 1967, Polar Pravda wrote, “Just fifty years ago the entire energy supply consisted of several low capacity generators. And now twelve hydroelectric power stations and the Kirovsk thermal-electric power station operate here, not counting local thermal power plants. But the rapidly growing industry of the Murmansk region requires further development of energy capacity.” The entire project of economic transformation of the Kola Peninsula depended on finding sources of heat, fuel, and electricity to provide enterprises, municipalities, and military installations with increasing amounts of energy. While today the Arctic seems poised to become a new center of oceanic oil exploration, the need to devise ways to maximally utilize Murmansk’s limited energy sources was a pressing concern for industrialists of the twentieth century. The regional history of energy reveals a recurring process in which increased use and newly harvested sources altered human/nature relations in ways seen and unseen.

This chapter turns to a key facilitator of economic transformation to explore the environmental changes caused by modernization and the abiding interconnectedness between humans and the rest of nature in modern conditions. This dissertation began with another such facilitator—railroads, a means of transportation—to establish some of the persistent strategies and ideologies informing the modernization of the Kola Peninsula. Here I take stock of the influences and illusions of modern development by examining the Kola energy sector. As a necessary component in all forms of industrial activity, the energy sector allows us to see connections to the other economic branches evaluated in earlier chapters. I argue that despite the occurrence of radical environmental transformations that seemingly disconnected people from the natural world, processes of continual re-entanglement prevented the transcendence of society over nature.

This discussion begins with a theoretical consideration of the relationship between changes to the physical world and connections of nature to society. It then proceeds to assess the history of different energy sources on the Kola Peninsula in rough chronological order of when they came to prominence. The discussion of organic materials focuses on the shifting canopy of vegetation in the region and the connections

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between local and distant landscapes. The consideration of hydraulic energy from an elaborate network of hydroelectric plants concentrates on surface alterations to the Kola Peninsula, modifications in aquatic ecosystems, and the integration of natural processes in human bodies into energy production. The evaluation of nuclear power stresses its relationship with the militarization of the region and the rise of new forms of modern secrecy and risk.

**Dissociation and Entanglement in Russian and Soviet Modernity**

To assess the scale and character of the changes accompanying the harvesting of energy from the natural world, it is helpful to incorporate some theoretical considerations about the character of modernity. Modernization has led to the dissociation of certain connections between nature and society, while simultaneously reconfiguring an entanglement of them. Dissociation has involved an apparent separation from the natural environment. People have depended on less direct interaction with other species and water for sustenance and have been able to more readily cope with intemperate climatic phenomena. Their livelihoods have relied increasingly on manipulated natural systems and the reproduction of elaborate social-natural networks. They have altered physical landscapes in sweeping and permanent ways. On the other hand, entanglement has entailed the maintenance of the same fundamental interconnections between humans and the environment, albeit in modified and often masked arrangements. Modernization has created new human dependencies on industrially used nature and has embedded human experience in unacknowledged natural processes. Municipal heat, water, and electrical service, for instance, all rely on the integration of unseen natural elements into human lives.²

Political power has appeared in both dissociation and entanglement through the production of knowledge and impacts on the material world. Anthropologist Gísli Pálsson summarizes the relationship between nature and society in modernist thinking as centering on “disembeddedness, dualism, certainty and human mastery” as opposed to

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the postmodern emphasis on “embeddedness, monism, and the absence of certainty and human mastery.”3 For historical actors and later analysts, the nature/society relationship occurred to a significant degree on the level of perception. People have aspired to overcome nature’s limits and felt enmeshed in their environments and seemingly inherent natural proclivities. A good deal of economic and environmental politics has happened on this plane from the Promethean longings of the industrialists to the romantic desires of conservationists for untouched wilderness. The materiality of the phenomena more readily reveals the transformative scope of modernization on the natural world and human society. Environmental change and human displacements contributed to detachment, while the creation of intricate networks and new pervasive risks foster enmeshment.

In his philosophical meditations on modernism and modernization, Marshall Berman explores an evocative phrase from the Communist Manifesto, “all that is solid melts into air.” In Berman’s reading this phrase points to the paradoxical creative destruction and dialectical ambiguity of modernity.4 In Marx and Engels’ original use, the phrase also conjures up a potential break of humankind from previous constraints through the subjugation of nature.5 In The Consequences of Modernity, social theorist Anthony Giddens elaborates this point by discussing a process of “disembedding” during modernization. He writes, “By disembedding I mean the ‘lifting out’ of social relations from local contexts of interaction and their restructuring across indefinite spans of time-space.”6 Extending this feature of modernization to the natural world, Giddens juxtaposes pre-modern lives that “were tied up with nature’s moods and vagaries” and modern ones:

Modern industry, shaped by the alliance of science and technology, transforms the world of nature in ways unimaginable to earlier generations. In industrialised sectors of the globe—and, increasingly, elsewhere—human beings live in a created environment, an environment of action which is, of course, physical but

no longer just natural. Not just the built environment of urban areas but most other landscapes as well become subject to human coordination and control.\textsuperscript{7}

Though I have been arguing that this supposed escape from the natural and placement of landscapes under human control is fundamentally illusionary, such theories of modernity help us see the material manipulation of physical landscapes and social experience. This dissociation operated through several material, social, and cultural techniques. It most basically involved alterations of landscapes, by deforestation and reservoir creation for energy production. Through these intentional landscape changes, humans performed a type of control and dominance over the environment and allowed for socially experienced separation. Supplies of fuel and electricity from transformed landscapes allowed for increased distances between sources of energy and human settlements, enabling urban and industrial life on the Kola Peninsula. Modern industry and city dwelling helped produce experiences of isolation from nature by facilitating lifestyles less obviously in the natural world. Finally, the rhetoric that accompanied the regionally based projects of the Kola energy economy reinforced the notion that they separated nature through its subordination.

In the twentieth century states throughout the world harvested increasing quantities of energy from organic materials, physical forces, and atomic bonds to enable modernization. The physical transformation of these substances and forces into work that created and maintained an industrialized and urbanized world modified human relations with the rest of the local nature. The acceleration of energy consumption in the twentieth century led to an episode of unprecedented environmental change. Along with human population and gross domestic product, global energy use rose with extraordinary rapidity. John McNeill estimates that humans have used more energy in the twentieth century than the entirety of the species’ previous existence. By one metric world energy use consisted of 250 million tons of oil equivalent in 1800, 800 in 1900, and 10,000 in 2000.\textsuperscript{8} A single specific aggregate assessment of twentieth-century energy consumption for the Russian Empire, Soviet Union, and Russian Republic is difficult to obtain, but the

\textsuperscript{7} Giddens, \textit{The Consequences of Modernity}, 60.
broad trend mirrored the global rise with the exception of a relative decrease during the economic collapse of the 1990s.\textsuperscript{9}

The energy economy of Kola Peninsula followed this pattern, relying on the utilization of a variety of sources—wood, peat, hydroelectricity, imported coal and oil, and nuclear power—to fuel industrial development. Wood supplied the earliest industrial endeavors in the region, such as the Murmansk railroad and initial construction in the Khibiny Mountains. Excavated peat and imported coal supplemented forest materials in this period as well. Beginning in the 1930s the region developed an expansive network of hydroelectric power stations that supplied the vast majority of industrial and municipal electricity until the 1970s. Coal-burning thermal power plants grew alongside the hydroelectric network and began to augment the coal with low-grade oil known as \textit{mazut} in the 1960s. Finally, the Kola Peninsula commenced the use of nuclear power in the 1960s and 1970s. Overall, the production of electricity in the region grew consistently since the first five-year plan, going from 290 million kilowatt hours in 1939 to 16,500 million kilowatts hours in 1990.\textsuperscript{10}

The tremendous transformation of environments that resulted from this incredible scale of the energy economy does not mean that humans achieved transcendence over nature in the process. As numerous works of environmental studies and history show,


nature and society remain intimately intertwined in the modern world. For example, Maria Kaika describes such entanglement in her study of the role of water in the modern city. Modernization, she insists, involved “establishing intricate networks and flows of natural elements, social power relations and capital investment cycles, which, in fact, not only did not separate nature from the city, but instead wove them together more closely into a socio-spatial continuum.” Historian Liza Piper similarly points to how twentieth-century industrialization in subarctic Canada “changed the cognitive and material links between our work and nature’s work but did not separate one from the other.” Finally, Bruno Latour insists the distinction between nature and society is a cultural conceit. During a process known as modernization, the things we call nature and society are constantly being separated and re-assembled into new and pervasive hybrid entities. Following the logic of this theory, Latour claims that in fact “we have never been modern.” Humans remain as entwined in their modified environments in ‘modernity’ as they ever have been.

Entanglement, therefore, is as ubiquitous of a facet of economic modernization as dissociation, and occurs regardless of the political-economic system in a given country. The exploitation of organic, hydraulic, imported, and nuclear energy sources on the Kola Peninsula brought about new forms of human dependency on the natural world. While the mechanisms for re-establishing such bonds are numerous and multifaceted, I highlight three particular processes in the energy economy. Entanglement created intricate but inherently vulnerable webs of human-nature interaction, fostered reliance on muscle power in construction and operation, and masked connections to the natural world through secrecy and elusive uncertainty. In the following discussion I explain how importation, the use of bodies, and unacknowledged risk shaped several areas of the Kola energy sector.

**Organic Substances**

Trees and various forms of flora residue provided substantial amounts of heat and energy to the Kola Peninsula. Wood from forests and peat from marshes supplied

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industrial expansion throughout the first half of the twentieth century, intermittently but
sometimes intensively. Coal and oil imported from other areas of the country and the
world have provided a significant proportion of the region’s heat and electricity since the
mid-1930s. The use of these organic energy sources substantially changed the physical
environment of the Kola Peninsula, which simultaneously became home to an increasing
number of people. The discussion here focuses on how the exploitation of local bio-fuels
transformed the regional landscape and how the spillover effects of air pollution from
imported fossil fuels influenced human habitats. These environmental changes detached
humans from nature by demonstrating people’s capacity to manipulate it, by reducing the
areas that could potentially be imagined as unaltered, and by making ecosystem
restoration dependent on human decisions and actions. At the same time the
incorporation of human bodies into the system of energy inputs and the formation of
elaborate networks of extraction and exploitation of some of these organic materials
reveals an abiding environmental entrenchment.

Residents of the Kola Peninsula used firewood for centuries before 1900. While
the contours of the resultant environmental change lie outside the scope of this study,
suffice it to say that we should assume that this human activity shaped the ecosystem in
significant ways and not, of course, that some sort of pristine pre-industrial environment
existed. Several timber companies began operating on the southern coast of the peninsula
in the early twentieth century. Their activities primarily involved the harvesting of wood
for construction and operated by hiring seasonal laborers, the vast majority of whom
worked inside the sawmills instead of outside collecting timber. Though employees
took free wood for heating needs, the small scale and intermittent operation of these
timber companies limited their impact on local vegetation.

The significant deforestation along the Murmansk Railroad occurred as part of an
attempt to make this means of transportation serve the imperatives of militaristic
modernization during World War I and the Russian Civil War. Clear-cutting for the track

\[14\] A. A. Zhilinskii, *Krainii sever: evropeiskoi Rossii* (Petrograd: Tipo-litografiia Severo-
zapadnogo okrua putei soobshchenia, 1919), 232.

\[15\] I. F. Ushakov, *Izbrannye proizvedenia. Tom 1: Kol’skaia zemlia* (Murmansk: Murmanskoe
knizhnio izdatel’stvo, 1997), 415-418, 503-531; D. L., “Ot Arkhangelska do Kandalaksha i obratno,”
_Izvestiia Arkhangelskogo obschestva izuchenii Russkogo Severa_ 8, no. 11 (November 15, 1916): 456;
and K. V. Regel’, “‘Terskii bereg’ (Kratko fiziko-geograficheskoe i estestveno-istoricheskoe opisanie),”
_Izvestiia Arkhangelskogo obschestva izuchenii Russkogo Severa_ 9, no. 3-4 (March-April 1919): 94-95.
and the frantic use of wood for locomotive fuel and warming workers and soldiers during war massively depleted this resource.\(^{16}\) A rough estimate indicates that the region lost over a quarter of its forest cover between 1905 and 1921.\(^ {17}\) Soviet documents from 1920 described “the catastrophic situation with fuel on the northern part of the Murmansk railroad” and urged “applying all strength and energy to the complete elimination (nedopushchenniu) of the fuel crisis” by intensive collection of forest materials.\(^ {18}\) The impact of this fuel crisis was felt in forests throughout the country.\(^ {19}\) The whole purpose of the railroad was to allow for quick access to an unfrozen port in the north. In the context of wartime chaos insufficient supplies of fuel for the trains became one of several weak links in the potential for the road to fulfill its modernist function of compressing space and time.\(^ {20}\)

Officials in charge of the railroad during the wars often relied on the energy produced by groups of coerced humans to gather local organic fuel. As discussed earlier in this dissertation, the pattern of sending unfree laborers to help economically modernize the north began during the construction of the Murmansk railroad. Their labor depended on metabolic conversions within their bodies to extract muscle power capable of fulfilling state directives. This involvement of human biology in landscape transformation occurred with the collection forest materials by POWs to help fuel locomotive engines.\(^ {21}\) An


\(^{17}\) According to a 1905 estimate the Aleksandrovsk district had 3,942,000 desiatin of forest. A later publication claims that this area had approximately 2,900,000 of forest cover circa 1921. See “Protokol,” Izvestiya Arkhangelskogo obshchestva izucheniia Russkogo Severa 2, no. 14 (July 15, 1910): 34 and N. Ia. Ovchinnikov, “Lesa Olonetskogo-Murmanskogo kraia,” in Proizvoditel’nye sily riona Murmanskoi zheleznoi dorogi: Sbornik (Petrozavodsk: Pravlenie Murmanskoi zheleznoi dorogi, 1923), 104-105.

\(^{18}\) GAMO, f. R-483, op. 1, d. 100, ll. 26, 30.


\(^{21}\) Reinhard Nachtigal, Die Murmanbahn 1915 bis 1919: Kriegsnotwendigkeit und Wirtschaftinteressen (Remshalden: BAG-Verlag, 2007); GAMO, f. I-72, op. 1, d. 1b, ll. 64-66; Bentley Historical Library, Russia Route Zone A: Murman Railway and Kola Peninsula, Copy No. 706, (Washington, DC: Government Printing Office, 1918), 25; and Bentley Historical Library, Polar Bear Collection, Harry Duink Papers, 36-39.
American soldier involved in the Allied intervention described another instance of exploitative use of muscle power: “The fuel for the engines is all wood and is brought in to the wood stations by special wood trains. The loading is done by boys and girls. Some not more than twelve years of age.”

After the Bolsheviks gained control of parts of the railroad during the Russian Civil War, the Office of Forest and Peat Development of the Murmansk railroad intensified these efforts to harvest as much wood and peat as possible, using hired workers and again POWs. According to official reports, the difficult natural conditions of the region necessitated that a large portion of railroad workers participate in wood collection simply to keep themselves from freezing.

The use of forest materials as a fuel source further transformed the Kola environment to accommodate a major influx of Homo sapiens in the first decades of the Soviet period. In the NEP era the Murmansk railroad employed a slightly more sustainable approach to timber harvesting, but since its entire business model depended on substituting natural resources on the land for state subsidies, the road still caused considerable depletion of Kola forests.

Soviet industrialization of the 1930s and the reconstruction after World War II again relied on the rapid utilization of available forest material. In 1940 firewood made up approximately 14.3% of the materials used as fuels in the Soviet Union (i.e. not including hydroelectricity). During the preceding decade the Murmansk railroad, the Apatit combine, Severonikel’, a special department of the Kola Production Association of Energy and Electrification (Kolenergo), and small-scale forest collection enterprises in Umba and near Kandalaksha collected and bought wood for regional use as an industrial fuel. As we have seen, this bout of industrialization aimed at ascending socialist civilization over environmental constraints, both rhetorically

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22 Bentley Historical Library, Polar Bear Collection, Harry Duink Papers, 36-39.
26 GAMO, f. R-990, op. 1, d. 1, l. 156; GAMO, f. 773, op. 1, d. 55, ll. 65-66; GAMO, f. 773, op. 1, d. 53, ll. 260-262; RGASPI, f. 17, op. 121, d. 287, ll. 7-9; and E. V. Bunakov, “Ekonomicheskoe obosnovanie razvitiia olenevodstva Murmanskogo okru,” Sovetskoe olenevodstvo 4 (1934): 114.
and through state plans. The resultant de-forestation notably reduced the region’s forest cover from about 26.5% of the Murmansk okrug in 1934 to 22.7% of the Murmansk oblast’, which included the more heavily forested land to the southwest of Kandalaksha, in 1943.  

During this time, the forcefully extracted muscle power of dekulakized peasants greatly contributed to the country’s timber industry. Most of the special settlers on the Kola Peninsula worked in other economic branches, but some were involved in gathering firewood and peat. Additionally, several Gulag camps operating in the region in the early 1950s engaged in wood collection.

Decimation of the Kola forests to fuel industrial activity peaked during the Second World War and the postwar reconstruction and this trend then reversed course. As the use of hydroelectricity and then nuclear power grew in the second half of the twentieth century, the wood harvesting on the Kola Peninsula decreased substantially. By 1971 forest materials only made up about 5% of the fuel sources used in the region, a figure that likely decreased even further after the Kola AES went online. This reduction in timber use led to a significant increase in forest cover, even as sulfur dioxide pollution in the proximity of urban-industrial centers caused visible forest destruction. According to recent statistics, the expansion of forest cover reached 67.5% of the territory of the Murmansk region in 2008. A comparison of this figure to what was almost certainly a considerably low estimate from 1905—the Aleksandrovsk district (uezd) of the Arkhangel’sk province had 29.1% forest cover—suggests that the twentieth century was actually an era of considerable forest growth in the region. Though the uncertainty

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28 Lynne Viola cites a figure that 565,754 of 1,427,539 special settlers (40%) worked in forestry, far more than any other industry. Lynne Viola, The Unknown Gulag: The Lost World of Stalin’s Special Settlements (Oxford: Oxford University Press, 2007), 198.
31 RGASPI, f. 17, op. 121, d. 287, ll. 7-9, 136-137 and RGASPI, f. 17, op. 121, d. 386, ll. 7-8.
33 “Protokol,” Izvestiia Arkhangel’skogo obschestva izucheniiia Russkogo Severa 2, no. 14 (July 15, 1910): 34. Factors limiting the accuracy of this estimate include the following: a considerable area around Kandalaksha and down into northern Karelia that had a comparatively high concentration of forestland was not part of the administrative unit used in 1905; the lack of reliability of the 1905 estimate
around such data demands suspicion in such a conclusion, it points to how changes in types of fuels supplying the energy economy altered landscapes in less obvious ways.

Another endeavor that modified the surface of the region to enable industrial activity was the collection, processing, and burning of peat. Peat is decayed vegetation matter often built up in marshes that can be turned into a moderately efficient fuel through drying and compression. Peat played a prominent role in the energy economy of the country in the early twentieth century and successfully served other regions with more organic material. It made up 5.7% of fuel used in the Soviet Union in 1940, after which it declined sharply.34 Regional boosters in the late imperial and early Soviet era praised the possibilities of peat. For instance, Vladimir Voshchinin, an old colleague of Gennadii Chirkin in the imperial Resettlement Administration, wrote to Polar Pravda in 1939, claiming that the Kola Peninsula was rich enough in peat that up to 40 million air-dried tons of it could be collected near the railroad.35 Beginning with the Murmansk railroad during the Russian Civil War, enterprises in the region had excavated considerable supplies of peat.36 In the 1930s Apatit employed special settlers to gather peat, and the initial plans for the Severonikel’ combine ordered the extraction of up to 200,000 tons of the fuel.37 Furthermore, the comparative proximity of peat sources figured prominently in evaluations of the various proposed locations for an alumina factory in the region.38 As with wood, the expansion of other energy resources diminished the use of this organic material. In contrast to the assessments of Voshchinin, Kolenergo determined that peat collection and processing made little economic sense at

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34 Shabad, Basic Industrial Resources of the USSR, 6.
35 Originally from Poliarnaia pravda (February 11, 1939). Reprinted in S. I. Tiul’panova, ed., Istoriia industrializatsii SSSR. Industrializatsiia Severo-zapadnogo raiona v gody vtoroi i tret‘ei piatiletok (1933-1941 g.g.): Dokumenty i materialy (Leningrad: Isdatel’stvo LGU, 1969), 117-118. For an example of the enthusiasm for peat from the imperial era, see M. Bubnovskii, “Po novomu puti (Iz dnevnika narodnogo uchitelia),” Izvestiia Arkhangel’skogo obshchestva izucheniia Russkogo Severa 9, no. 1 (January 1917): 9.
36 GAMO, f. R-483, op. 1, d. 2, ll. 1-225; GAMO, f. R-483, op. 1, d. 3, ll. 1-226; RGASPI, f. 17, op. 120, d. 26, l. 151; and GAMO, f. 773, op. 1, d. 55, ll. 65-66.
37 RGASPI, f. 17, op. 120, d. 26, l. 151; Kiselev, “GULAG na Murmane: Istoriia tiurem, lagerei, kolonii,” Sovetskii Murman (October 16, 1992), 3; and GAMO, f. 773, op. 1, d. 55, ll. 65-66.
38 GAMO, f. 773, op. 1, d. 6, l. 6.
the end of the 1930s. The supplies of peat on the Kola Peninsula existed in small and isolated marshes, which prevented mechanized extraction and required large amounts of labor, and could only be accessed during the short summer season.\textsuperscript{39} By the 1970s the use of peat as a fuel in the Murmansk region had become negligible.\textsuperscript{40}

Finally, the importation of fossil fuels to produce electricity and heat municipalities connected the Kola Peninsula to distant landscapes and eventually led to pollution that deteriorated remote and local environments. Modern economies have frequently depended on shipments of materials across long distances. With decreasing transportation costs and increasing international trade in the late twentieth century, the complex geographies of production and consumption have given rise to ever more intricate webs connecting people with economically used and disturbed nature. Despite the autarkic and quasi-colonial development models that characterized the regional economy of the Kola Peninsula for most of the Soviet era, the territory required the importation of coal and oil to meet the energy needs of modernization. In one sense, the shipment of these fossil fuels to the region removed people residing on the Kola Peninsula from the natural contexts of their energy sources. However, the increasing reliance on the network for economic modernization maintained or strengthened this form of entwined relations between people and the environment, at least until the advent of nuclear power in the Murmansk region.

From the beginning, modernization schemes for this section of the far north entailed plans to bring in energy sources from elsewhere. Regional boosters in the early twentieth century envisioned shipping coal mined on the Arctic island Spitsbergen of the Svalbard archipelago and in the Pechora basin to the Kola Peninsula.\textsuperscript{41} During parts of World War I and the Russian Civil War, some of the northern sections of the Murmansk railroad ran on coal imported from Britain, but with rapid industrialization of the 1930s

\textsuperscript{39} GAMO, f. R-990, op. 1, d. 4, ll. 2-3.
\textsuperscript{40} Kobzikov, “Toplivnyi balans Murmanskoi oblasti i voprosy ego ratsionalizatsii,” in Zamotkin and Erogova, eds., \textit{Priroda i khoziaistvo Severa}, vol. 2, part 2, 244.
the country became an exporter of this fossil fuel.\textsuperscript{42} During this period the government operated coalmines on Norwegian Spitsbergen and developed the Pechora basin.\textsuperscript{43} A portion of this coal fueled Kola industries.\textsuperscript{44} Between 1930 and 1934 alone the regional demand for coal increased tenfold and this trend of rapidly rising fossil fuel consumption continued for decades.\textsuperscript{45} Domestic coal production in the Soviet Union as a whole more than doubled during the 1950s and then gradually began to be augmented with oil and gas.\textsuperscript{46} The Kola Peninsula imported coal from the Pechora basin throughout the second half of the twentieth century and mazut (unprocessed diesel) from refineries near Kirishi and Iaroslavl’ beginning in the 1960s.\textsuperscript{47}

The reliance on these fuels by residents of the Kola Peninsula, almost all of whom were first or second generation migrants, increased dramatically as the region became highly urbanized in the 1960s and 1970s. As energy became less expensive within the Soviet economy in the Brezhnev era, rising demand for it outstripped regional population growth. One source reported in 1971 that the amount of energy used per person in the Murmansk region between 1965 and 1970 increased almost 1.5 times and the heat demand doubled over this period. The author anticipated both trends continuing in this direction.\textsuperscript{48} Excluding industrial enterprises, 1,600,000 tons of mazut and 700 tons of coal were used annually to heat homes and municipal buildings in the region in the mid-1990s.\textsuperscript{49} In the post-Soviet era residents also began to use gasoline to fuel automobiles at


\textsuperscript{44} GAMO, f. 773, op. 1, d. 34, ll. 170-174; ARAN, f. 544, op. 1, d. 378, ll. 16-17; and G. N. Solov’ianov, \textit{Kol’skii promyshlennyi uzel} (Moscow: Gosudarstvennoe ekonomicheskoe izdatel’stvo, 1932), 96.

\textsuperscript{45} Kiselev, \textit{Kol’skoi atomnoi—}30, 12.


\textsuperscript{47} Kozhikov, “Toplivnyi balans Murmanskoi oblasti i voprosy ego ratsionalizatsii,” in Zamotkin and Erogova, eds., \textit{Priroda i khoziaistvo Severa}, vol. 2, part 2, 244.

\textsuperscript{48} Kozhikov, “Toplivnyi balans Murmanskoi oblasti i voprosy ego ratsionalizatsii,” in Zamotkin and Erogova, eds., \textit{Priroda i khoziaistvo Severa}, vol. 2, part 2, 244.

In the late Soviet period and partially into the 1990s, cheaper energy prices and the support of state subsidies allowed northern regions to avoid the costs of operating large industrial centers in cold environments. Though the Gulf Stream and its European location left the Murmansk region less affected by the unacknowledged expenses of the Soviet development strategy, these features of state-socialist economic policy helped exacerbate the apparent distance between the urbanized north and the environment while keeping them deeply entrenched.

The consumption of imported fossil fuels had a significant environmental impact on the Kola Peninsula and at the sites of extraction. The emissions of smoke, carbon dioxide, and sulfur dioxide into the atmosphere from the thermal-electric power stations in Murmansk and the Kirovsk region caused standard ailments of air pollution: smog, climate change, and acid rain. The coal-powered Murmansk thermal electric station first went into operation in 1934, producing 20 million kilowatt hours of electricity in 1936, and expanded to heat generation at the end of the decade. The construction of a similar station that produced both electrical and thermal energy occurred near Kirovsk beginning in the late 1950s in connection with expansion of the Apatit combine and development of the city of Apatity. In addition, over one hundred boiler stations to heat the numerous concentrated urbanized settlements on the Kola Peninsula appeared during the twentieth century. In the 1970s specific Kola enterprises also consumed considerable amounts of imported fossil fuels. During the final three months of 1973, Severonikel’, Pechenganikel’, and the Lovozero Mining and Enrichment Combine (Lovozero GOK

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54 GAMO, f. R-990, op. 1, d. 617, ll. 1-7 and Kaibysheva, Elektricheskoe siianie severa, 57-68.
were projected to dwindle their combined reserves of coal and *mazut* by about half.\(^{56}\) In 1990 mining operations at the main supplier of Kola coal, the Pechora basin, generated approximately 90,600 tons of harmful material, including 28,000 tons discharged into the atmosphere, and dumped some 33 million cubic meters of contaminated water into surface streams.\(^{57}\) Industrial production and everyday urban life on the modernized Kola Peninsula contributed to this pollution.

In the 1970s heightened environmental concern emerged about industrial pollution from the coal-burning power plants in the Murmansk region. In response, regional officials undertook certain mitigation efforts by switching to other energy sources. One newspaper article from 1973 warned about deteriorating air quality in the region and noted that Murmansk now had sulfur dioxide levels comparable to the much larger city of Leningrad. It included some of the coal-based power plants in a list of enterprises that “emit a considerable amount of toxic and harmful substances into the air everyday.”\(^{58}\) Soon afterwards, the Murmansk Thermal Electric Station converted to primarily using low-grade oil called *mazut*.\(^{59}\) The station also built a new smokestack and environmental monitoring lab in the late 1970s.\(^{60}\) The switch to *mazut* saved 62,400 tons of coal from 1975 to 1984 and considerably reduced forms of air pollution in Murmansk.\(^{61}\) However, the Kirovsk (and now Apatite) Thermal Electric Station, which emitted 19.4 tons of ash and 110.3 tons of sulfur dioxide a day in the mid-1970s, continued to operate as a coal-based plant.\(^{62}\) Though the influence of organic energy sources on the physical environment through pollution and de-forestation was quite stark, the efforts to manipulate flowing water might have transformed the surface of the region more visibly.

### Renewable Resources

From the 1930s through the 1960s, the utilization of the hydroelectric resources on the Kola Peninsula was a catalyst for its shift from an Arctic periphery to a highly urbanized and industrialized zone. Electricity production allowed for extraordinary

\(^{56}\) RGAE, f. 386, op. 1, d. 5145, l. 43.
\(^{58}\) Terziev, “Zabota o prirode,” *Poliarnaia pravda* (June 20, 1973), 2.
\(^{59}\) Kaibysheva, *Elektricheskoie sianie severa*, 34.
\(^{60}\) GAMO, f. R-990, op. 1, d. 1633, l. 176.
\(^{61}\) Kaibysheva, *Elektricheskoie sianie severa*, 34.
\(^{62}\) GAMO, f. R-990, op. 1, d. 1633, l. 94.
expansion of economic activities, which fostered an apparent detachment of human life from nature. The construction of hydroelectric power stations relocated people away from natural places both through forced migration and by enabling urbanization. The production of hydroelectricity, furthermore, altered the region’s hydrology by creating massive reservoirs and regulating the flow of rivers, both of which affected wildlife populations. This source of electrical energy more thoroughly fulfilled the expectations of modernization than the organic substances had. Hydroelectricity allowed Soviet citizens in the north to become separated from environmental contexts seen as natural and integrated into ones understood as modern. It only achieved this status, however, through an even more exhaustive application of the energy from the bodies of forced laborers in the construction of the dams. The transformative scope of hydroelectric modernity was entrenched in the natural processes of a mammalian species.

For the Bolsheviks the project of building Soviet socialism required industrial development, which in turn necessitated using a large amount of energy. When Lenin famously remarked, “communism equals Soviet power plus electrification of the whole country,” he highlighted the dependency of the revolutionary project on the modernization of the energy economy. Communism, like capitalism, required high-energy inputs to enable economic development and fulfill its promise of material abundance. The following State Electrification Plan of 1920 prompted initial research of energy resources throughout the country, including renewable sources such as rivers that could be used to produce hydroelectricity. On the Kola Peninsula investigators found few potential fuels that could adequately supply economic development. However, they did find plenty of electrical potential in “the powerful currents of rivers and waterfalls” or what they called “white coal.”63 A 1923 evaluation proposed that the Niva and Tuloma rivers, combined with a few less powerful waterways, could provide between 600,000 and 700,000 horsepower (approximately 447,420 to 521,990 kilowatts) of electricity.64 In the late 1920s the Soviet state began several gigantic damming projects that carried major

63 D. S. Pashentsev, “Vodnye sily Murmanskogo kraia i vozmozhnost’ ispol’zovaniia ikh v tseliakh razvitiia ekonomicheskoi zhizni,” in Proizvoditel’ nye sily raiona Murmanskoi zheleznoi dorogi, 207-208. This term “white coal” was not confined to Russia, but was used internationally. McNeill, Something New Under the Sun, 175.
64 Pashentsev, “Vodnye sily Murmanskogo kraia i vozmozhnost’ ispol’zovaniia ikh v tseliakh razvitiia ekonomicheskoi zhizni,” in Proizvoditel’ nye sily raiona Murmanskoi zheleznoi dorogi, 208-209.
symbolic significance for the modernizing country such as the Dnepr Hydroelectric Station, which had one of the largest dams in the world at the time. Hydroelectric power increased dramatically during the Stalinist era, climbing from generating 4% of Soviet electricity in 1928 to 8% by 1937 and 15.2% by 1950. It played an even more dominant role in the Kola electricity sector until the 1970s.

The production of hydroelectricity worldwide has had a number of common features. It involves the conversion of the kinetic energy of flowing water and potential energy of dammed upstream reservoirs into electricity. As a renewable energy source that does not require the combustion of fossil fuels or fission of atomic bonds, the use of hydroelectricity depends primarily on construction and maintenance of infrastructure that controls river flow, captures and stores energy from descending water, and transfers it to consumers. Often dams hold high reserves of water and regulate flow; turbines and generators convert passing water into electricity. The formation of this infrastructure alters environments in several general ways. It leads to the flooding of large areas of land, the fragmentation of river ecosystems, the depletion of certain aquatic species, and the disruption of riverbanks. In addition, millions of people were displaced for the sake of hydroelectric dams in the twentieth century. The Soviet development of a network of hydroelectric power stations on the Kola Peninsula fits within this common pattern of economic modernization, despite the region’s low levels of biomass and historically sparse human population.

As we have already seen, the development of the Kola energy economy through the first half of the twentieth century employed an important form of this embroilment by relying en masse on the muscle power of coerced laborers. Metabolic energy conversions within the body have contributed to the survival and expansion of human societies for millions of years. People foraged on plants and animals and stored a percentage of the

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biological and chemical energy of these species in their muscles. Draft animals such as horses, camels, and reindeer undertook similar processes that resulted in greater capacities of muscle power. These biological energy systems in humans epitomized the deeply entrenched connections with nature in earlier historical periods. Human slavery, in particular, functioned in a similar vein with powerful groups oppressing huge populations and using them as an energy source. Industrialization, of course, has largely been a story of finding fossil fuels, mechanical processes, and atomic bonds to do far more work, far more efficiently than humans ever could in the past.\(^{68}\) The other side of energy modernization, however, has been the massive human labor, and thus human muscle power, necessary to build, obtain, and operate these industrial technologies. More people did more work in the twentieth century to get more energy and the continual process of modernization engendered a greater reliance on this muscle power. This new type of dependency kept humans and nature entwined. On a comparative scale, the social and political tactics of regulating people into energy producers was a quite literal form of Foucauldian biopower, in which the internalization of personal discipline contributed to the bodily manifestation of energy to make more energy.\(^{69}\) In the case of the Soviet Union, the state chose to continue the use of slave labor to build hydroelectric dams during Stalinist modernization. It forcefully exploited humans for their muscle power, thereby employing oppression that maintained intimate connections with nature.

The first major hydroelectric project on the Niva River of the Kola Peninsula greatly facilitated the industrial transformation of the environment and coercively utilized humans as energy sources. Economic planners hoped to turn the Niva River into a motor powering urban and industrial growth of the apatite works in the Khibiny Mountains. The river initially descended about 127 meters over approximately 34 kilometers as it flowed from Lake Imandra to the Kandalaksha Bay.\(^{70}\) Despite the disorder that characterized the first years of construction of Apatit, project leaders and initial laborers managed to get a

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\(^{68}\) McNeil, *Something New Under the Sun*, 10-16.
\(^{70}\) GAMO, f. 773, op. 1, d. 1, ll. 66-68.
low capacity generator into operation in the summer of 1930.\textsuperscript{71} This first installation on the Niva River met the expected local energy needs for the next few years as work on a larger hydroelectric station commenced.\textsuperscript{72} The Niva-2 Hydroelectric Station (GES) came online in June 1934 and eventually reached a capacity of 60,000 kilowatts, almost ten times the amount of electricity as the first units.\textsuperscript{73} This unit enabled the partial electrification of the Murmansk railroad on the Kola Peninsula, helping increase \textit{Apatit}'s productive capacities and Kirovsk’s population.\textsuperscript{74} In the mid-1930s, industrial planners also hoped the station would serve the projected chemical combine in Kandalaksha. Overall, this electrical energy supported the economic modernization of the Lake Imandra corridor for decades to come.

The Niva-2 GES, like others built on the Kola Peninsula during the Stalinist era, relied on energy produced in the muscles of forced laborers.\textsuperscript{75} Approximately 7200 special settlers, coming mostly from the middle and lower Volga regions, were forced to work on the installations of the Niva GES in the early 1930s.\textsuperscript{76} The free laborers who worked on the project frequently violated their contracts and left the region early. The head of the dam’s construction seriously pushed for hiring Finnish laborers whom he presumed would not be deterred by the climatic conditions of the Kola Peninsula.\textsuperscript{77} The harsh northern environment taxed these hired and forced laborers’ bodies; significantly more calories needed to be expended on just maintaining body temperature in this cold region and this energy was then unusable for labor.

These hydroelectric stations transformed the surrounding ecosystem. Engineers reduced seasonal variation in river flow and used underground turbines to assure a

\begin{footnotesize}
\begin{itemize}
\item\textsuperscript{71} GAMO, f. 773, op. 1, d. 6, l. 25; A. V. Barabanov and T. A. Kalinina, \textit{“Apatit”: vek iz veka} (Apatity: Laplandia Minerals, 2004), 26; and E. F. Razin, \textit{Kandalaksha} (Murmansk: Murmanskoe knizhnoe izdatel’stvo, 1991), 90-92.
\item\textsuperscript{72} V. I. Kondrikov, “Sostoianie i perspektivy stroitel’stva v raione Khibinskikh razrabotok,” \textit{Karelo-Murmanski krai}, no. 5-6 (1931): 10.
\item\textsuperscript{73} GAMO, f. 773, op. 1, d. 15, l. 225; RGASPI, f. 17, op. 120, d. 26, ll. 195-197; and Kaibysheva, \textit{Elektricheskoe siianie severa}, 17.
\item\textsuperscript{74} GAMO, f. 773, op. 1, d. 52, ll. 168-169 and GAMO, f. R-990, op. 1, d. 3, ll. 75-77.
\item\textsuperscript{75} Important information about these hydroelectric projects involving forced labor appears in Baron, \textit{Soviet Karelia}, 115-119, 150-178.
\item\textsuperscript{76} V. Ia. Shashkov, \textit{Spetspereselentsy na Murmane: Rol’ spetspereselentsev v razvitii proizvoditel’nykh sil na Kol’skom poluostrove (1930-1936 gg.)} (Murmansk: Izdatel’stvo MGPU, 1993), 53 and GAMO, f. 773, op. 1, d. 15, l. 225.
\item\textsuperscript{77} GAMO, f. 773, op. 1, d. 15, l. 225 and RGASPI, f. 17, op. 120, d. 26, ll. 195-197.
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comparatively stable year-round supply of energy. Until the 1930s, a large population of salmon (*semga*) existed in the Niva River but then disappeared because of this group of hydroelectric stations. In the 1920s small communities nearby caught a decent amount of fish from the river, which they traded and consumed themselves. In 1930 one observer described anthropogenic influences of the timber and electricity industries and foresaw the impending collapse of the salmon stock:

> Below Lake Plesozero the whole river was, it is said, strewn with logs that up until then clogged up the river at the spots of several small rapids and rose the level of the water. All this greatly hindered the salmon from freely ascending the river… The installation of a hydroelectric station on the Niva will totally shut off the passage up the river for salmon to their main spawning grounds and evidently will completely terminate their population here.

Unlike some other rivers, the Niva had Lake Imandra and its surrounding water bodies as a natural reservoir. Nevertheless, the gradual establishment of a cascade of the three hydroelectric stations on the river between 1930 and the early 1950s inundated more territory around the reservoirs at Lake Pirenga and Lake Plesozero. In the 1990s the Niva cascade had a 12,800 square kilometer catchment basin (*vodosbor*).

Stalinist-era modernization also inspired different renewable energy projects on the Kola Peninsula. In an enthusiastic report in September 1933, A. F. Gudlevskii noted that the Niva station was not going to provide enough energy to meet *Apatit*’s growing needs and proposed an alternative. We need a new source of energy, he claimed, “it has been found” in “the possibility of maximally using wind power.” This option excited Vasilii Kondrikov and Aleksandr Fersman—with the former calling it “the energy of the future”—and led to some preliminary planning work for a wind-powered electrical station. This project did not come to fruition. In later years Fersman continued to promote the possibility of capturing both wind and tidal energy on the Murman coast. He

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78 Tiul’panova, ed., *Istoriia industrializatsii SSSR. Industrializatsiia Severo-zapadnogo raiona v gody vtoroi i tret’ei piatiletok (1933-1941 g.g.),* 119-120.
79 Kaibysheva, *Elektricheskoe siianie severa,* 104.
84 V. I. Kondrikov, “Sostoianie i zadachi issledovatel’skikh rabot (Vstupitel’noe slovo)” and “Prenia i vyvody po dokladam,” in Fersman, ed., *Khibinskie Apatity,* vol. 6, 17, 237.
included these two sources as examples of “a negative side of polar nature” that could be transformed into “productive forces.”  

In the late 1960s a small-scale tidal power station in the Kislaiia Bay was installed and in the 1990s the option of wind energy found renewed interest.

As the Kola Peninsula industrialized further during the 1930s, state planners looked for additional options to supply electricity to Apatit, the new nickel works in the Monche tundra, the planned chemical combine in Kandalaksha, and the growing city of Murmansk. The main plan entailed turning the Tuloma River into a hydroelectric source and integrating it with the stations on the Niva. Before construction began in the mid-1930s the Tuloma River traveled approximately 76 kilometers from Lake Notozero and then exited into the Kola Bay at the town of Kola. The river ranged from 400 to 900 meters in width and declined about 50 meters over its length. Planners placed the Lower Tuloma GES near Kola at the new settlement of Murmashi. The initial designs included a stationary unit, which consisted of “a strong building with chutes and tail-races and connecting the left and right bank dams” and a “fish-pass.” The dam unit consisted of a “mixed-type non-overflow dam” that was 29 meters high. Official documents evoked the conquest of nature rhetoric and celebrated the Tuloma construction as prevailing over natural constraints. One source noted that it was “the northernmost hydro-station of regional significance in the world and was accomplished in a short period (1934-1936) in the difficult natural conditions of a Polar territory.” However, like much of the industrial construction on the Kola Peninsula, environmental factors created unanticipated difficulties and delayed completion of the Lower Tuloma GES. For

85 ARAN, f. 544, op. 1, d. 207 l. 4.
88 GAMO, f. R-959, op. 1, d. 1a, ll. 4-5.
89 GAMO, f. R-959, op. 1, d. 1a, l. 5.
example, the thawing of solidly frozen land led to structural problems for the dam. Nonetheless, by 1940 it contributed 67,400 kilowatt-hours to the Kola energy economy.

Again the energy of forced laborers facilitated the project. Like the Olen’ia-Monchegorsk railroad line, the White Sea – Baltic Combine built the Lower Tuloma GES with Gulag prisoners. Poor sanitation and difficult work conditions, of course, pervaded here. Numerous prisoners perished because of accidental explosions that occurred while constructing the dam. Though the Soviet state increasingly censored information about forced labor, the Tuloma project still received public praise as an instance of socialist re-forging, in line with propaganda about the White Sea – Baltic Canal. The public discussions of prisoner labor touched on the new relationship between people and the environment, which indicated both the ascendance of humans and the dependence of this change on interaction with nature. “The people sent to solve complex technical tasks and at the same time rehabilitate an army of former criminals will grow at Tuloma in this way,” claimed one article. It continued, “Murmashi became unrecognizable. The rocks are moved aside and the shape of the shores of the mountainous Tuloma changes. But the people are transformed even more than nature.”

The flooding for the Lower Tuloma station physically altered the landscape and displaced people from their homes. Unsurprisingly, state agencies evaluated these disruptions primarily in economic terms: “The submersion and impounding from the head of the Lower Tuloma GES did not bring any sort of noticeable damage to the national economy because of the extremely insignificant population and the complete absence of industry in the high water area,” according to a government commission charged with overseeing the construction. It specified, “the overall area of the flooding of the shores is a region of 2735 hectares, on which 1691 hectares fall in the forested area and 712 in the marshes with undergrowth. In connection with these submisions three

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90 GAMO, f. R-959, op. 1, d. 1a, l. 8 and GAMO, f. R-959, op. 1, d. 5, l. 4. Such problems with the construction of the dam continued after World War II, see GAMO, f. R-959, op. 1, d. 10, l. 4.

91 GAMO, f. R-959, op. 1, d. 3, l. 18. I am fairly confident that this unit was one thousand kilowatt-hours, but it was not specified in the archival document.


collective farms, which include 30 households, were transferred to locations that had not been flooded.\textsuperscript{94} The construction of the Upper Tuloma GES, first planned in the 1930s but actually built in the 1960s by the Finnish company \textit{Imatran Voima}, flooded a much more significant area, raising the level of Lake Notozero by 32 meters for the reservoir.\textsuperscript{95} Both of these stations impacted the aquatic fauna in the river ecosystem negatively, despite efforts to build fish passes. Some fish species, such as whitefish and perch, used the new water bodies in reproduction, but the adjustments in the water levels to assure supplies of hydroelectricity caused the eggs of the fish to freeze. As in the case of the Niva, the Tuloma hydroelectric stations harmed the salmon population.\textsuperscript{96}

The continual effort to harvest more energy in the region to fuel industrial and urban expansion—punctuated significantly by the evacuation of industry during the Second World War—included a move to coordinate the hydroelectric and thermal power plants. The managing firm, \textit{Kolenergo}, was set up in 1936 during the construction of the Lower Tuloma GES. It immediately commenced connecting the Niva and Tuloma stations with high voltage transfer lines and substations. In later decades \textit{Kolenergo} oversaw the expansion and integration of the regional energy network to include seventeen hydroelectric stations on six rivers.\textsuperscript{97} The high levels of electricity needed for nickel smelting provided an early impetus for the growth of this network. \textit{Kolenergo}'s total capacity shot up from 70,000 kilowatts in 1937 to 129,000 kilowatts in 1939, primarily to meet the Severonikel’ combine’s anticipated needs.\textsuperscript{98} By 1970 the entire electrical energy system, including thermal plants, contributed 7.9 billion kilowatt-hours

\begin{itemize}
\item \textsuperscript{94} GAMO, f. R-959, op. 1, d. 1a, ll. 19-19ob.
\item \textsuperscript{95} \textit{Kolenergo, 1936-1996}, 27-28; GAMO, f. R-990, op. 1, d. 840, ll. 32-47; and GAMO, f. R-959, op. 1, d. 3, ll. 38-54. The person in charge of planning the Upper Tuloma station in the 1930s was someone named G. Chirkin who worked for the White Sea–Baltic Combine of the Gulag system. It seems plausible that this individual was the same Chirkin involved with the imperial Resettlement Administration and the Murmansk railroad.
\item \textsuperscript{96} Kaibysheva, \textit{Elektricheskoe siianie severa}, 104-106.
\item \textsuperscript{97} GAMO, f. R-990, op. 1, d. 4, ll. 1-18; GAMO, f. R-990, op. 1, d. 4, ll. 1, 19-20, 38-58, 65-70, 75-77; GAMO, f. R-990, op. 1, d. 290, ll. 1-112; GAMO, f. R-990, op. 1, d. 617, l. 1; GAMO, f. R-990, op. 1, d. 1246, ll. 1-3; GAMO, f. R-990, op. 1, d. 1242, ll. 1-155; GAMO, f. R-990, op. 1, d. 1633, ll. 1-200; GAMO, f. R-990, op. 1, d. 840, ll. 1-130; GAMO, f. R-990, op. 1, d. 1242, ll. 1-146; GAMO, f. R-990, op. 1, d. 2, l. 92; GAMO, f. R-990, op. 1, d. 1, ll. 1-199; GAMO, f. R-990, op. 1, d. 457, ll. 1-94; GAMO, f. R-990, op. 1, d. 706, ll. 1-53; and \textit{Kolenergo, 1936-1996}.
\item \textsuperscript{98} GAMO, f. R-990, op. 1, d. 3, ll. 1, 70 and GAMO, f. 773, op. 1, d. 62, ll. 23-25. Given the delays in the smelting operations at \textit{Severonikel’}, the electricity needs fell short of these expectations. RGAE, f. 9037, op. 1, d. 41, l. 37.
\end{itemize}
to the region. The energy production of the hydroelectric stations peaked in the 1990s at 6.6 billion kilowatt-hours.99

This large expansion of Kolenergo’s network isolated humans from natural contexts in several ways. The growth in energy production allowed for a tremendous increase in the population of the Murmansk region. Nearly all of these new residents lived in urbanized settlements considerable distances from the hydroelectric dams.100 The spatial isolation of modern Soviet citizens in the north from the sources of energy upon which they depended contributed to their detachment from the environment, while of course retaining interconnectedness through electrical networks. Furthermore, harnessing and transferring the ability of local rivers to do work through the Kolenergo network reduced the reliance of heavy industries on immediately proximate energy inputs. The proliferation of hydroelectric stations also led to new displacements of rural communities. Reindeer herding villages on the Vorona and Ponoi rivers faced relocation in the 1960s. The flooding of ancestral homelands of the Sami community for the Serebriansk hydroelectric stations forced residents to move to the urbanized agro-center of Lovozero. The displacement eliminated the community’s access to fishing grounds and separated them from a landscape with deep historical significance.101

Nuclear Power

The capture of the energy released during nuclear fission and the conversion of it into electrical power made the final period of Soviet modernization of the Kola Peninsula possible. Human campaigns to use the energy from atomic bonds have been clouded in suspicions since nuclear power, literally, exploded on to the public scene with the American bombing of Hiroshima and Nagasaki at the end of World War II. Both the fact

that destructive military uses of atomic energy occurred before economic ones and the continued prominence of nuclear arms in global security politics have shaped this sector of the energy economy since its inception. It is therefore unsurprising that the development of nuclear energy in the Soviet Union occurred under military auspices and with the great secrecy surrounding it. The scientific and popular elusiveness of the knowledge about the impact of radiation on human health additionally contributed to a widespread wariness about nuclear power. Thus, while nuclear power satisfied energy needs for continued industrialization and the maintenance and spread of urbanized forms of Soviet life, the secrecy and uncertain risks around it embroiled humans with nature in new ways.

Nuclear energy has possessed key economic functions in the post-Stalinist Soviet Union and post-communist Russian Federation. The Soviet atomic energy program started with the experimental Obninsk reactor in 1954—the first plant in the world to use nuclear fission for energy production—and proliferated dramatically throughout the Cold War.¹⁰² Beginning with development of a fleet of nuclear powered submarines in the 1950s and 1960s, the Kola Peninsula came to have the highest concentration of nuclear reactors of anywhere in the world.¹⁰³ By the Brezhnev era few waterways in the region that could be converted into high capacity electric motors remained unused. The government responded to this new energy dearth by establishing the Kola Nuclear Power Plant on the southern shores of Lake Imandra in the new town of Poliarnye Zori in 1973. The first VVER-230 block of the Kola AES immediately contributed an additional 440 megawatts to the region’s energy capacity. The plant added three more blocks (one VVER-230 and two updated VVER-213s) of equal capacity in 1974, 1981 and 1984, respectively, which wound up producing significantly more than the entire network of hydroelectric stations.¹⁰⁴ This facility solved the civilian energy deficit in the region and fueled a renewed episode of expanding industrial production, which altered the environment in some of the ways discussed in the previous chapter. Fully meeting the

demand of local industry, the Kola AES also exported electricity to northern Finland, particularly in the 1990s. In the last decade the state nuclear energy corporation, Rosatom, has planned an additional expansion of the plant’s capacity. The desire to increase energy production has abided in communist and capitalist political systems.

Press representations of the Kola AES in the 1970s highlighted the theme of modern control over the natural environment. An article in Polar Pravda celebrating the opening of the first block of the Kola plant in 1973 referenced the significance of the energy economy as an enabler of production by calling it the “bread of industry.” It also evoked routinized tropes about the modern ascendance of people over nature, referring to the event as “a triumph of people over nature.” It explained, “after all, this huge station arose from scratch in about five years, through the conquest of the harsh northern nature of the place.” The press also stressed nuclear energy as a technological solution to the environmental maladies of fossil fuels such as coal. It billed the Kola plant as part of the further transcendence over environmental limitations and a means of improving nature. Reporters posited nuclear power as “a ‘clean’ source of energy, which has not increased environmental pollution.”

“The contrary, atomic stations,” another pair of journalists assured readers, “stimulate nature.” They explained that the Kola station would increase the temperature of Lake Imandra and improve the fishing stock in this body of water.

The secrecy around nuclear power resulted largely because of its attachment to the security concerns of the Soviet military. The development of nuclear-powered ships overlapped with the large-scale militarization of the Kola Peninsula. Though the Northern Fleet of the Soviet Navy had been based out of the Murman coast since the mid-1930s, the massive Cold War era expansion of their activities was tied to the replacement of diesel engine submarines with nuclear ones that could travel faster and go up to a year without re-fueling. Given the similar technology involved in powering naval submarines

and civilian icebreakers, all these early uses of nuclear energy on the Kola Peninsula in the late 1950s and early 1960s fell under the restricted confines of military security. Many of the leading scientists, such as Igor Kurchatov and Anatolii Aleksandrov, participated in all facets of nuclear energy from atomic weapons to electrical power stations and civilian vessels, a fact that further contributed to the often classified activities of this industry. The initial plans for the Kola AES in the 1960s reflected the atmosphere of high security by referring to the project vaguely as the Kola State Regional Electrical Station.

The growth of the atomic powered fleets of sea-faring vessels highly influenced the direction of development on the Kola Peninsula since that time. The military operations proliferated to include numerous air bases and naval facilities in the region, many specifically designed for the harboring and maintenance of nuclear submarines. The advent of nuclear power directly led to the Northern Fleet growing from the smallest sections of the Soviet Navy to the largest and most significant. In the forty-one years between the launch of the first nuclear submarine, Leninskii Komsomol, in 1959 and the end of the century, the fleet grew to include 228 military vessels; two thirds of these operated out of bases on the Kola Peninsula. An entire economic and municipal infrastructure developed around the military sector of the region, including an array of closed cities connected to the naval bases.

The Murmansk region housed more closed cities than any other region in the country; their total population exceeded 150,000 inhabitants near the end of the twentieth century. These closed cites are concentrated along the western part of the Murman coast from the Zapadnaia Lista base (just east of the Rybachi Peninsula) to the Kola Bay. They include the headquarters of the Northern Fleet at Severomorsk, Polaryni in the former

111 Josephson, Red Atom.
112 Kiselev, Kol’skoi atomnoi—30, 21.
114 Bohmer, et. al., The Arctic Nuclear Challenge, vi, 2 and Josephson, Red Atom, 144-145.
Ekaterina Harbor (where the port town of Aleksandrovsk was established at the end of the nineteenth century), and Ostovnoi (where the Iokanga naval base was built by the Murmansk railroad during World War I). Closed cities emerged out of the Soviet military-industrial complex and often were connected to the nuclear sphere, but have continued to exist in this secretive status into the post-Soviet era. They housed military personnel, their families, and individuals employed in industries that directly served the Navy’s needs. Not only could outsiders not enter these highly urbanized spaces, but the residents of closed cities in the Soviet era also had limited connections with the outside world, including restricted access to telephones and newspapers and prohibitions on travel.115 This shadow modernization, comparable in terms of population growth to Stalinist industrialization of the 1930s, was enabled by the proliferation of nuclear energy in the region. It hid and isolated the new uses of the Kola landscape from the rest of the people living there. For inhabitants of the closed nuclear cities this development also increased the extent to which their lives relied on forces beyond their control.

Confidentiality also affected purely civilian uses of nuclear energy. As Paul Josephson has demonstrated, applications of nuclear power ranging from irradiating meat as a preservative to portable atomic energy stations, fell outside the purview of the public.116 The lack of public oversight and knowledge about this industry exacerbated safety issues. Most closely connected to the military sector, the Murmansk Shipping Company operated a small fleet of nuclear-powered icebreakers and service ships from their Atomflot base just north of Murmansk. Many of these ships experienced repeated accidents, including the much celebrated Lenin nuclear icebreaker that had a reactor meltdown in 1966.117 At Apatit engineering specialists arranged for underground nuclear explosions to pulverize huge chunks of ore in the Khibiny Mountains in 1974 and 1984 and in the process released harmful levels of radiation.118 Finally, the reactors at the Kola AES suffered from technical design flaws that rendered them below international safety standards. Although the VVER reactors at the Kola plant were superior to the graphite

115 Hønneland and Jørgensen, Integration vs. Autonomy, 91-98, 137-153.
118 V. V. Gushchin, Podzemnaia razrabotka apatitovykh mestorozhdenni ot minnykh do iadernykh vzryvov (Apatity: Kol’skii nauchnyi tsentr Rossiiiskoi Akademii nauk, 2007); Bøhmer, et. al., The Arctic Nuclear Challenge, 54; and Josephson, Red Atom, 247.
moderated RBKM model used at Chernobyl and other facilities, these units, especially the older VVER-230 models, lacked adequate safety containment around the reactor core and had insufficient cooling systems. Until the mid-1980s none of these deficiencies were acknowledged publicly. A lax safety culture at this reactor, as within the Soviet nuclear industry generally, exacerbated these technical flaws.\textsuperscript{119}

The clandestine administration of the use of nuclear energy on the Kola Peninsula contributed most starkly to the re-entanglement of humans and nature through the handling of radioactive waste. Beginning in the late 1950s, the Northern Fleet and the \textit{Murmansk Shipping Company} dumped massive amounts of radioactive waste and spent nuclear fuel into the Arctic Ocean (and the Barents Sea in particular), totaling about 38,450 terabecquerel (38,450 trillion nuclei decaying per second).\textsuperscript{120} In addition to liquid waste, this dumping included sixteen retired nuclear reactors, several with spent nuclear fuel still in them. This practice remained hidden from the public until the early 1990s and even increased in the immediate post-Chernobyl years.\textsuperscript{121} Of the waste not poured into the ocean, authorities stored much of it in leaky facilities in the Murmansk region itself. These storage sites included a number of retired ships that remained docked in the Kola Bay, such as the refueling vessel \textit{Lepse} that had about 30\% of the amount of long-living isotopes released during Chernobyl on board, and land containers near the closed military cities, such as the dilapidated Andreeva Bay storage unit that had a radioactivity of over 27 million curies (close to one billion terabecquerel) in the early 2000s.\textsuperscript{122} Finally, the Kola Nuclear Power Station kept much of its low and intermediate level wastes on site; it shipped some to the Mayak reprocessing facility in the South Urals. One estimate cited


\textsuperscript{120} Bohmer, et. al., \textit{The Arctic Nuclear Challenge}, 48.

\textsuperscript{121} Darst, \textit{Smokestack Diplomacy}, 184.

that the plant would have on-site waste totaling 47,700 terabecquerel of radioactivity in 2010.\textsuperscript{123}

The Chernobyl accident in April 1986 and the Soviet collapse shifted the practice of nuclear secrecy significantly, but not permanently. After the state unsuccessfully tried to keep the Chernobyl disaster quiet for a few weeks, the scale became known internationally. The reformist government of Mikhail Gorbachev invited cooperation of external agencies such as the International Atomic Energy Agency, which gave the clean up effort diplomatic legitimacy and fit with the character of the Soviet leader’s glasnost’ policy.\textsuperscript{124} Nevertheless, residents of the Kola Peninsula, like people living elsewhere in the country, reacted with heightened suspicion toward nuclear power.\textsuperscript{125} An article in the local press that appeared about two full years after the accident reported that people thought of the Kola AES as a dangerous neighbor. The author excoriated the previous public silence about the plant’s operations and tried to reassure readers of its safety.\textsuperscript{126} This concern about radioactive pollution from Chernobyl apparently did not affect the reindeer herders in the region in the same way as it did in Scandinavia. Anxiety about fallout entering the food chain through lichen absorption, reindeer forging, and human venison consumption in those countries had political ramifications for the Sami. According to anthropologist Hugh Beach, both the authorities and herders on the Kola Peninsula seemed unconcerned with this issue.\textsuperscript{127}

Gorbachev, for his part, seized the opportunity presented by Chernobyl to try to end the arms race. Speaking in Murmansk in October 1987, he outlined an idea for a demilitarized Arctic free of nuclear weapons and united in international cooperation on

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\textsuperscript{123} Bøhmer, et. al., \textit{The Arctic Nuclear Challenge}, 43-45.
\textsuperscript{125} On anti-nuclear activism in the aftermath of Chernobyl, see Jane Dawson, \textit{Eco-nationalism: Anti-Nuclear Activism and National Identity in Russia, Lithuania, and Ukraine} (Durham: Duke University Press, 1996).
\end{flushright}
development, science, and environmental protection.\textsuperscript{128} Many of these military initiatives failed to materialize, though the end of the Cold War altered the situation so radically that it is difficult to analyze any perestroika-era proposal concerning security for its long-term impact. The policy shift toward greater international cooperation on economic and environmental issues in northwest Russia, especially with Nordic countries, however, continued into the post-Soviet era. A final straw in Soviet-era nuclear secrecy on the Kola Peninsula broke in the early 1990s when presidential advisor and leading Russian environmentalist Aleksei Iablokov released a report detailing dumping and unsafe storage of radioactive wastes in the Arctic.\textsuperscript{129}

Entwined connections of humans and nature have also existed because of the uncertainty and risk surrounding nuclear radiation. In the social scientific literature on science and technology there are two main approaches for making sense of nuclear risk. Spencer Weart, a historian of science, takes the alleged irrationality of nuclear fear as a point of departure in an examination of how popular imagination has produced such anxieties. His explanation stresses the role of deep-seated and atavistic tendencies toward apocalyptic thinking instead of the complex configuration of geopolitics and social change in the second half of the twentieth century. He maintains that in a world of accelerating economic modernization and technologies the risks associated with the nuclear industry deserve no special attention.\textsuperscript{130} In an exploration of the lives of individuals affected by the Chernobyl accident, medical anthropologist Adriana Petryna embraces an agnostic stance about physical impact of radiation and instead analyzes “the concrete understandings of particular worlds of knowledge, reason, and suffering, and the way they are mediated and shaped by local histories and political economies.”\textsuperscript{131}

\begin{itemize}
\item \textsuperscript{128} Kristian Åtland, “Mikhail Gorbachev, the Murmansk Initiative, and the Desecuritization of Interstate Relations in the Arctic,” \textit{Cooperation and Conflict} 43, no. 3 (September 2008): 289-311.
\item \textsuperscript{131} Petryna, \textit{Life Exposed}, 33.
\end{itemize}
ethnography of radiation risk in a context of actual exposure helps reveal the social impact of uncertainty. Petryna explains:

Given the array of scientific and medical uncertainties, old measures of suffering lose their meaning and validity. Into that void come new biological definitions, some by chance, others by design. Some individuals with certain symptoms are said to be sick, while others, with different symptoms, are said not to be sick. Statistics and the use of medical diagnostics become contested. As these governments grapple with creating zones of predictability and intelligibility where they can operate and increase welfare, citizens are faced with what seem like random instantiations of scientific measures, biomedical categories, and compensation criteria.132

The social and cultural effects of radiation changed how people understood the relationship between their bodies and the natural world after Chernobyl. By influencing the experience of exposed individuals, uncertainty made many feel more embedded in contaminated environments.

Especially in the aftermath of a Chernobyl-scale nuclear accident at the Fukushima plant in Japan in March 2011, Petryna’s approach to examining nuclear risk seems more appropriate than Weart’s. Beyond the history of particularly dangerous storage practices on the Kola Peninsula, atomic energy production everywhere creates highly radioactive wastes, some with significantly long half-lives. An unsolved issue for the use of nuclear energy remains the intractability of undertaking waste storage plans that require multi-century and even multi-millennia time scales. Through helping create “spaces of nonknowledge” about health and environmental risks, radioactive waste itself has already influenced society.133 Another way to put it is that radioactive waste reveals its status as a hybrid entity with particular potency. Zsuzsa Gille defines this hybridity of waste as a combination of its social features and “relatively independent material aspect,” which not only “resist[s] purely human or social intention,” but also “impacts what those intentions may be.”134 Soviet modernization produced materials that not only changed the natural but also shaped the social.

Thus, while the total radioactivity of the Kola Peninsula at the end of the twentieth century did not exceed what would have been expected from the long-term

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132 Petryna, Life Exposed, 13.
133 Petryna, Life Exposed, 13.
effects of atmospheric nuclear testing in the 1950s and 1960s and the release during Chernobyl, radiation still affected the connection of humans to their environment.\textsuperscript{135} Leaks from the storage facilities at the Andreeva Bay increased the levels of the highly toxic cesium-137 and long lasting plutonium-239 in the surrounding land.\textsuperscript{136} However, human-nature entanglement has occurred more through uncertainty than a direct impact of the environment on people. This uncertainty has two forms: the risk of a radiological emergency occurring and the untraceable character of most of the health effects of radiation exposure. The emergency risk was heightened by the sheer number of operating reactors in the region (one fifth of the world total in the 1990s), structural vulnerabilities produced by the Arctic conditions, and the economic ruin of the 1990s. In one instance in 1995, Kolenergo cut off electricity to naval bases with nuclear submarines because of unpaid bills and only turned it back on in response to armed soldiers being sent to the power plant. The cooling systems for the reactors on these decommissioned submarines could not be powered without this electricity. The possibility that a disaster may occur was something that Kola residents had to live with and about which they claimed to worry.\textsuperscript{137}

In the case of a radiological emergency on the Kola Peninsula the health effects would be elusive. Only those in extremely close proximity to the nuclear installation may experience deterministic effects in which a causal linear relationship exists between doses of radiation and impact on one’s health. Many more people may experience stochastic effects, which can only be assessed in terms of aggregate probabilities of harmful outcomes. Stochastic effects would be neither directly proportional nor clearly assignable in individual cases. After a nuclear accident, radioactive materials would migrate into food chains and water and enter human bodies through these means. Medical experts in the 1990s did not agree on the question of whether or not a lower threshold existed, beneath which this form of radiation exposure was harmless, or even on the precise character of the relationship between greater doses and increased probability. In such

\textsuperscript{135} Bøhmer, et. al., \textit{The Arctic Nuclear Challenge}, 56.


circumstances no single individual would be able to clearly determine that radiation exposure caused a particular ailment such as thyroid cancer. Human bodies would become enmeshed with natural processes that on a certain level would be not just unknown but unknowable. Even in absence of a disaster the omnipresent potential for one to occur and the possibility that any such event would be hidden connected people with their surroundings in intricate ways.

A situation where this type of risk and uncertainty could exist was a product of twentieth-century economic modernization that emerged under communist auspices but continued during capitalism. During the 1990s, the Kola energy sector suffered like the rest of the country’s economy as the government imposed rapid privatization and the release of price controls on the citizens of the new Russian Federation. The Murmansk Shipping Company, Kolenergo, and the Kola AES all became part of open joint stock companies. The Russian navy, of course, remained in charge of its nuclear vessels. Privatization overlapped with an era of unprecedented openness about the operations of the nuclear facilities, but the diminished capacity of these installations to function with stability exacerbated the risks. In February 1993, for instance, the Kola AES had a near meltdown and in August 2000 one of the Navy’s nuclear submarines, the Kursk, tragically sank after an explosion during a practice exercise, killing the entire crew. In the meantime the Russian government attempted to use the need to improve nuclear safety as a bargaining chip for more international aid. Despite the mixed record of these efforts and considerable tensions, this process has led to the decommissioning of a large portion of the Northern Fleet’s nuclear submarines and a number of safety upgrades at the Kola AES. Nevertheless, by the mid-1990s the government began again to ramp up nuclear secrecy over the military’s waste storage sites on the Kola Peninsula. The trumped up, and eventually dismissed, prosecution of environmental activist Aleksandr

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141 Darst, *Smokestack Diplomacy*. 
Nikitin was one noteworthy episode in this return to secrecy.\textsuperscript{142} The gradual expansion of the closed status of towns in the region despite the end of the Cold War also reflected this shift.\textsuperscript{143} Finally, in contrast to promises throughout the 1990s that the Kola AES would be shut down by 2004, its oldest and least safe reactors received fifteen-year operating extensions.\textsuperscript{144}

**Conclusion**

Modernization on the Kola Peninsula drastically transformed people’s lives and the physical environment, but maintained wide-ranging interconnections between society and nature. If part of the promise of modernity is an escape from traditional bonds to the natural world, this supposed transcendence has proven fictive in tsarism, Soviet communism, and Russian capitalism. Throughout the twentieth century, the state and enterprises searched for new sources of power and energy to fuel the creation and expansion of an industrialized, urbanized, and militarized world north of the polar circle. The repetitive harvesting of various organic, hydraulic, and atomic sources reshaped the physical world and human connections to it. In all of these instances, however, new assemblages of the natural and the social remained, whether in the form of incorporated human bodies, networked ties to distant environments, the social life of uncertainty about the natural world, or some other mechanism of entanglement.

This final chapter of my dissertation has treated a pervasive component of various forms of economic transformation (energy) in order to offer an overview of the influential and imaginary facets that emerge in an environmental history of Soviet modernization. Through an examination of both modernist knowledge production and the economic practices that go under the heading of modernization, I have argued that both disembeddedness and embeddedness arose simultaneously. I, therefore, have emphasized modernization’s materiality as a key facet for understanding its effect on power relations.


\textsuperscript{143} Honneland and Jørgensen, *Integration vs. Autonomy*, 150-152, 181-183. These authors emphasize the importance of interregional economic politics instead of military concerns in shaping this expansion. Whether or not increased secrecy was the intention of this change, it has been an effect.

The efforts to develop the Kola energy sector transformed actual trees, rivers, and human organisms; it is important to try to understand these changes in material and not just discursive terms. As a political project that united communist and capitalist systems, modernization gained much of its environmental and social impact from the manipulation of physical entities. Illusions of a world with fewer constraints on the human species, nevertheless, helped inspire a consensus about the desirability of modernization among the powerful actors in many societies.
Conclusion: Communism and the Environment

The economic remaking of the natural world during the twentieth century created profound changes in human livelihoods across the globe. This study has asked what characterized the relationship of Soviet communism with the environment during this rapidly unfolding process of economic modernization. Speaking to a reporter in 1967, the aging Nikolai Vorontsov, a former captain of industry in the Khibiny Mountains and the Monche tundra, expressed an abiding conservationist sentiment that he had first articulated at the beginning of Kola industrialization in the 1930s. “Monchegorsk is beautiful,” he told the journalist and later continued, “I am very happy that the tradition of our construction pioneers—to preserve the green resources of Monchegorsk—lives on.”¹ Around this time Vorontsov’s son, also Nikolai, was furthering his own career in the environmental sciences. His advancement eventually led him to become the Minister of the Environment for the collapsing Soviet state and, indeed, one of the earliest writers of Russian environmental history.² The elder Vorontsov’s desire to leave sections of the local environment without manipulation and his praise of the ostensible success of the Soviet Union in this area contrast sharply with later analyses of the ecocidal legacy of communism. At the end of the first decade of the twenty-first century, what strikes me most about the father’s combined dedication to industrialization and conservation is not how out of touch this old Soviet dreamer was. It is instead how similar his desires and sentiments were to mainstream environmental policy today.

This study investigated several industries in a region in the far north. There are five main conclusions that have hitherto weaved in and out of the various discussions of railroads, apatite, reindeer, nickel, and energy. First and foremost, I have shown that a general and deeply political process of economic modernization accounts for much of the trajectory of changing human/environment relations. This campaign to industrially transform the natural world in order to accrue greater economic value began with technocratic schemes devised in late imperial Russia, continued to define essential elements of the Soviet project of building socialism, and later shaped the sweeping

market reforms of the 1990s. The basic dynamics of ecosystem change, human life in shifting environments, and cultural representations of nature followed global patterns, including the rise of heavy industry and the forms of pollution it engendered, a shift from agrarian livelihoods to urban ones, and the coexistence of ideas of dominating nature and preserving it. The nuances of tsarist state capitalism, Soviet communism, and post-Soviet neoliberalism did not cause major deviations from these general patterns in the environmental history of economic modernization.

Additionally, more chronologically bounded continuities united the different forms of capitalism with Soviet communism. The reliance on forced labor in brutal conditions as a means of industrialization, for instance, was innovated in the tsarist war economy and picked up with unfortunate vigor by the Stalinist state. Furthermore, environmental ideologies that emphasized maximally unleashing the productive forces harbored in natural resources for the benefit of the state became fully articulated in the late imperial era; attempts to enact them on the Kola Peninsula matured during Soviet industrialization. The drastic economic decline of the 1990s might risk obscuring connections between the late Soviet era and neoliberalism, since the first decade of postsocialism was one of economic reform but not growth. However, as we have seen, a similar preference for technical fixes for environmental problems, a celebration of the alleged traditionalism of certain forms of nature use, and a continued orientation toward the natural world as primarily a potential economic asset united these two eras. Finally, throughout the entire century, the power to make decisions that affected the treatment of the environment belonged primarily to parties that desired its economic transformation.

Second, during this process of economic modernization the physical world responded to manipulation and contributed to ideas and policies that shaped the treatment of it. The natural environment was not simply an abiding or immutable structure, a stage upon which human action occurred. Instead, it operated as an active and responsive participant in this history. As we saw, it functioned this way in a number of places in this dissertation. The recalcitrance of the environment to the hasty construction of the
Murmansk railroad helped inspire the rhetoric of conquering nature. The nepheline tailings from apatite production in the Khibiny Mountains failed to behave according to the schemes experts had devised for it and instead degraded the local ecosystem. The conscious behavior of domestic and wild reindeer led a variety of people interacting with these animals to rely on forms of knowledge outside of rationalist frameworks. The high levels of sulfur present in the nickel-copper ore that was shipped from Noril’sk to the smelters on the Kola Peninsula beginning in the 1970s increased the amount of atmospheric pollution emitted by these plants. One does not need to accept all of the claims advanced in theories that insist on the agency of nature in hybrid networks in order to see that the role of the environment in this history was more than just an object upon which people acted and less than a determinant structure that decisively shaped human experience. The interactions between nature and society during Soviet modernization occurred as a negotiated process of reciprocal influence.

The next main conclusion involves the attitudes of the leaders of the Soviet state toward the natural environment. In contrast to scholarship that has emphasized a deep-seated antagonism toward nature in Soviet ideology, I discovered that economic planners were concerned with creating harmony with nature even in the throes of Stalinism. This holistic inclination was invariably anthropocentric, but it did not embrace willful environmental destruction or curtail the pursuit of conservation. Not only did the Lapland nature reserve open at the same time as the industrialization of the Khibiny Mountains began, but urban planners, enterprise leaders, and scientists working for the Apatit trust sought to construct a city and plant in which socialist citizens would live peacefully in, and indeed enjoy, northern nature. Perhaps the most elaborate expression of this disposition toward the environment can be seen in Fersman’s concept of the complex utilization of natural resources. For the industrialists inspired by this model, the most exhaustive transformation of nature into items for human use would also lead to the minimization, if not the elimination, of pollution. This interest in harmony with nature abided throughout the Soviet era, but always remained subordinate to the prerogatives of production. Crucially, in the Stalinist period these aspirations for a stable and happy life in previously ominous natural conditions did not materialize. The abject failures of this holism were manifested in the reckless and hasty patterns of nature use during the
Stalinist revolution and the brutal and incoherent deprivations inflicted on the people sent to construct these new industrial sites. Nevertheless, the aggregate environmental legacy of Stalinism needs to be separated from the comparatively high levels of pollution that occurred in the late Soviet era. The former was typical of the level of industrial activity in any polity, whereas the later was indeed acute for the time.

Fourth, the objectives of the military decisively shaped nature use on the Kola Peninsula throughout the twentieth century. The strategic significance of a warm water port on the Arctic Ocean attracted state attention to the region at least as much as the desire to make economic use of its natural resources. During Sergei Witte’s initial proposals for a port in the Kola Bay and an accompanying railroad connection at the end of the nineteenth century, military concerns for establishing a naval base that would be accessible year-round and resistant to blockades became enmeshed with schemes for economic modernization. These connections obviously grew tighter during the wartime construction of the Murmansk railroad in 1915 and 1916. The rapid industrialization of the 1930s coincided with the creation of the Northern Fleet of the Soviet Navy and the beginning of the expansion of military installations along the Murman coast and in the interior of the Kola Peninsula. The thirst for nickel to produce munitions oriented the battles of the Second World War in the region toward acquiring the deposits and factories of the Pechenga territory. During the Cold War, the Northern Fleet developed into the largest and best-funded branch of the navy that was supported by its own set of municipal infrastructure and closed cities. The presence of the navy on the Kola Peninsula not only contributed to increasing energy demands in the region, but also facilitated the proliferation of nuclear reactors to power atomic submarines and the resultant nuclear wastes. This militarization of the Kola Peninsula clearly affected the trajectory and scale of modernization and patterns of regional nature use in ways outside of the specific logics of communist or capitalist economic systems.

Finally, as radical as the transformation of human relations with nature was during this period, modernization did not lead to a genuine transcendence of people from the environment. Instead, the process reconfigured interconnections and dependencies between humans and nature, which kept people embedded in natural contexts and attached environmental understandings to social experience. We saw this lack of
transcendence in the continual role of the material world in shaping thinking about the environment and in raising new problems and dilemmas for further development. Moreover, sentient forms of ecological knowledge influenced reformers of the reindeer economy who were committed to modernization. The entanglement of human bodies with energy production, the intricate networks joining distant landscapes and livelihoods, and the ways that life in the nuclear age became entrenched in new uncertainties about the behavior of natural elements reveal how Soviet modernization brought about new connections between nature and society instead of ascending the latter over the former. The significance of this point comes from its function as a counter-balance to the claims that modernization leads to increased human control over the world and to lasting solutions that overcome previous environmental limitations on society. Modernization changed environments and peoples, but modernity remained illusionary.

This work has largely focused on exposing commonalities between the Soviet Union and other forms of political economy, but it is worth also addressing synthetically what this study tells us about what was unique about the environmental history of Soviet communism. For one thing, the revolutionary impulse of Stalinism brought the environmental and social effects of total war into peacetime. The application of forced labor and policies that, sometimes intentionally and sometime inadvertently, created extreme vulnerabilities to the natural hazards of the far north began in the imperial era when military exigency coalesced with industrial imperatives. The Stalinist state did not face a comparable situation when it chose to send former kulaks and Gulag prisoners to industrialize the Kola Peninsula. The historical context of initial industrialization, the distribution of natural resources within the country, a desire to solidify control over borderlands, and a conviction in the desirability of colonizing and developing peripheries also inspired a distinct geography of Soviet modernization. The scale of industrialization and city building in forbidding natural environments was indeed greater in the communist era, though much of Siberia remained undeveloped and Cold War geopolitics would likely have led any powerful government to build-up the Kola Peninsula.

Central planning and the command economy did not adapt well to a shift in global economic conditions in the 1970s that caused service and finance to play a larger role in generating growth than production. The combination of accelerated production and
economic stagnation brought about even higher levels of unaddressed environmental pollution than capitalist industry at the same scale. Finally, on the ideological plane Soviet communism included an extreme confidence about the possibility that public policy could surmount any contradiction that emerged between economic activity and pollution generation. Similar convictions have existed in capitalist thinking, but they have often been subordinate to another fanciful belief that the market itself will optimally distribute environmental goods and bads.

Ultimately, the lessons of the communist environmental experience for the twenty-first century rest less in a negative example of what went wrong than in a general warning about the difficulty of finding sustainable modes of land use in the context of continual economic growth. The Soviet experience helps us see how market capitalism is neither the exclusive cause of, nor a panacea for, modern environmental problems. Something beyond the distinctions of the political-economic systems has led to similar environmental trajectories: the impulse to modernize society and the natural world. As mass species extinction and global climate change promise to further remake our world in tumultuous ways, we may need to rethink the status of economic expansion as a non-negotiable criterion in policy decisions.
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