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THE QUEST FOR A NO-WASTE ECONOMY

THE RATIONAL AND COMPLEX USE OF NATURAL RESOURCES

Economizing through saving on the costs of production and resource use became a key model underpinning specialist explanations of the direction of Soviet industrial policy.¹ In particular, minimizing material expenses formed one of the key motivations in the workers' rationalization movement that developed from as early as the Stalinist industrialization era of the 1930s. The concept was revived and flourished once again in the mid-1950s, as it would once again do so in the later decades of the Soviet epoch. In industry, rationalizers were workers and engineers who came up with useful professional ideas as well as proposed savings on the costs of production through partial mechanization and small improvements in technological processes invented on-site. Economizing became part of industrial rhetoric and a crucial measurement for industrial productivity. In forestry, it had two connected implications. On the one hand, the industrialist approach developed methods to save resources at enterprises against the backdrop of the shortage economy. The main method entailed saving on material resources for

producing and reducing wastage, thus overcoming frequent stoppages that arose because of material shortages. On the other hand, economizing had an environmental dimension: for many forestry specialists, it seemed to offer a way to prevent the rapid depletion of wood resources.

Economizing justified the use of alternative raw materials as substitutes for wood to make production cheaper. Using alternative resources, such as various types of industrial and consumer waste, promised to help save costs related to extracting new materials and therefore increase the effectiveness of the planned production. First, the approach emphasized the role of wastepaper (i.e., the by-products of consumption). Second, it pushed specialists to reconsider the role of industrial waste materials left by wood harvesting and sawmilling (i.e., materials extracted from wood and left as waste in forests and at industrial enterprises). Third, it enabled specialists to propose various projects for using annual plants (such as reed) and agricultural by-products (like straw) as alternatives to wood. Specialists explained that economizing could be reached with the implementation of the so-called complex use of natural resources—a concept rooted in the pre-Second World War Soviet economy that emerged out of the economizing imperative stressed in Soviet industrialization, which faced numerous shortages of supply and at the same time the pressure of the plan.² Thus a 1932 brochure issued by the Scientific-Technical Council of Paper Industry on raw materials argued that the increased demand for softwood meant that *all the parts* of cut trees should be used instead of only the most valuable portions of wood.³ This brochure highlighted the unique ability of the socialist regime to pursue techniques of economizing and

complex use, insisting that the Soviet planned economy, industrialization, and collectivization helped save materials, while by contrast, capitalism was inherently and irredeemably wasteful. Many enterprises practiced economizing, prescribing that workers save resources, including raw wood, chemicals, and electricity. In Soviet industrial discourse, the invocation of complex use was explained by the drive for exploiting natural resources while avoiding the wastage of resources, understood as industrial value that could be salvaged through new technological possibilities. All parts of the tree were to be used, “from the roots to the top of the tree,” along with all the waste received after processing wood through sawmilling and other industrial operations. These salvaged materials could be used for manufacturing ready-to-consume products. Complexity, then, was a method for achieving cost savings. As early as the immediate postwar years, Soviet forestry specialists aimed to work out no-waste technologies that originally derived from an industrial discourse, proposing that the industry find new sources of raw materials to satisfy the expected rise in consumption levels.

Reviving earlier professional discussions of complexity, engineers and industrial scientists in the 1950s insisted that it was important to use wood effectively, connecting the complex use of resources to rationality (*ratsional'nost'*) and both to modernity. Leaving potentially useful industrial material as waste was now explained as an irrational, wasteful, and backward practice. Rational decision-making was, by contrast, to be achieved through precise calculation, which in turn emphasized a no-waste approach—because all waste could potentially be transformed into economic value in modern technological production. Environmental

rationality was framed as a form of socialist modernity; the actions of the modern (*sovremennyi*) individual should be guided by calculations of practical value and the need to consume natural resources in a more sustainable form. Late Soviet rationality as a modernist practice appealed to finding tools to increase the level of the sustainable consumption of resources. Rationality was an antidote to resource depletion; as one specialist put it, “If we have the *right attitude* toward forests and locate main logging capacities properly, our forests will never be depleted.”⁴ Science, technology, and a “proper attitude” were thus important prerequisites for sustainable wood supply and preventing the wastage of forests as valuable industrial resources. *Struggling*—the term often used by Soviet specialists in the spirit of the epoch—to economize each cubic meter of wood was a crucial task, the effective means by which costs of raw materials would be reduced.⁵

The intertwined discourses of complexity and rationality used by forestry specialists emerged as a response to the expected wood crisis. First, specialists suggested that modern technology could transform waste from rubbish into used value if guided by expert knowledge and skills, and employing technological infrastructures. Second, these discourses grew out of the chronic shortage of raw materials and evolved as a solution for deficiencies in resource supplies. Third, their purchase grew against the backdrop of escalating disappointment in Siberia and the Far East discussed in chapter 2. While deriving from the internal evolution of Soviet industrial ecology, new thinking about the relations between industry and nature among specialists echoed a growing environmentalism in Western countries. Rising

voices against the use of some chemicals in agriculture along with the application of atomic science and radiation did not find many supporters in the USSR, but some Soviet specialists shared a general vision of the need to move toward a greener economy to reach economic effectiveness. The anticipated depletion of industrial natural resources due to the rapid deforestation of available forests, combined with the problems of exploring the distant and difficult-to-access forests of the Soviet eastern regions, presented significant motivation for introducing complexity and rationality of resource use there too. Overall, this led to the adoption of a paradigm that combined the discourses of the complex and rational use of natural resources as the main approach to industrial production. While the twentieth meeting of the Communist Party held in 1956 was renowned for the launch of the de-Stalinization program, it was also here that the leadership declared the imperative to develop the rational use of raw materials, fuel, electricity, and other resources. Speakers at the meeting maintained that the complex use of resources, diversifying the range of products made from waste, and decreasing waste losses were all required for economic development. Many criticized Soviet producers, asserting that they had not worked to save national riches and the struggle to economize material resources had to become the subject of everyday concern for every worker, engineer and producer alike.⁶ As ministry officials discussed further in the 1960s, in light of earlier intensive clear-cuttings as well as the increasing distance between wood-harvesting spots and wood-processing enterprises, it was important to use all the available resources in situ instead of relying on complicated logistics in wood supply.⁷

Since at least the 1960s, many forestry specialists insisted that the combination of the complex use of wood along with a high degree of mechanization and automation would spearhead the manufacturing of diverse products from wood, consumer and wood waste, and annual plants. As a result, it was hoped that growing economic and consumer needs could be satisfied by means other than increasing wood harvesting—through the more efficient use of wood and use of alternative resources in industry.⁸ As one ministry specialist stated in 1973, “The organization of full and rational use of forest resources based on continuous forest use and timely reforestation, as well as planned satisfaction of economic demand for wood, are the main problems of forestry and the forestry industry.” He continued that “notwithstanding how large our forest riches are, we cannot *simply increase* the volumes of cutting.”⁹ Rationality and complexity therefore proposed an alternative to the colonial solution to the wood crisis, representing what can be called the productivist approach to industrial forests.

This idea further intensified from the 1970s on, when economizing and the eradication of resource losses became even more pronounced discourses in wood harvesting and the manufacturing of wood-based products. As with the Stalinist industrial discourse of complexity, by the mid- to late 1970s, rationality and economizing were declared as a “Communist feature” (*kommunisticheskaya cherta*) and “the norm of our life,” urgent and necessary.¹⁰ Moreover, Soviet professional publications declared that the saving of material resources was an element inherent to the very nature of Soviet socialist planned economy.¹¹ In 1970, the Ministry of Forestry and Wood Processing Industry issued a decree

that obliged the heads of industrial enterprises and logging spots to “liquidate the irrational use of wood.” The economy was centered around saving all resources; total saving allowed for the production of more consumer goods despite the shortage of resources.¹² The need to “struggle for rationality” was declared and frequently repeated by employers of various branches of the forestry industry in their professional journal publications and industrial reports. Economizing implied preventing wastage of *seemingly* unneeded resources. In this sense, specialists saw wastage as a temporary problem—a capitalist hangover in the Soviet economic system that obstructed the goal of outpacing the West in the economic competition.¹³

As some specialists wrote in 1979, the Soviet economy had consumed the “best wood,” but disregarded the potential value of the rest of it.¹⁴ They declared this attitude to be backward, contradicting the modern principles of the economy and industrial production. Specialists sometimes labeled the habit of leaving waste in the forest as old, inefficient, and even barbaric, proclaiming it should be rejected as a sign of backward times. It implied producing more material goods and consuming fewer resources as two imperatives that moved the industry and particularly wood-harvesting sector. Consumer and harvest waste, along with other alternative resources such as annual plants, came to be viewed as materials that could provide the industry with resources and potentially decrease forest cutting. Specialists believed that complexity and rationality could help the industry solve the deficiencies of the extensive model, compensating for the lack of the most valuable and devastated coniferous wood. Wood-processing enterprises usually tried to refuse supplies

of deciduous wood, denigrating it as a less productive type from a technological perspective.¹⁵ Complexity, however, implied that enterprises could manufacture technologically simpler products, such as cardboard, from industrially illiquid wood, which was in demand for mass consumption, but was quite literally thrown away at logging spots and enterprises. Specialists asked why it was necessary to use high-quality wood to make low-quality packaging paper when one could use consumer waste and wood waste left in forests instead. Growing consumerism indicated a growing demand for simpler-to-produce goods, ranging from napkins to wooden toilet seats, which in fact did not require high-quality wood to manufacture.

From the industrialists' perspective, nature served the industry in terms of offering its resources, which had to be used rationally to sustain their availability for a long time.¹⁶ Rationality as an instrument of economic policy was intended to help treat nature, the "green pot," carefully and not deplete it but rather unlock its utmost potential to provide economic benefit.¹⁷ Overall, the drive to use alternative materials for manufacturing in place of wood was conceptualized as an important means to produce more resources at a lower cost. Embedding the use of wood alternatives as an urgent economic goal, the nascent environmentalist concerns of specialists and the state obviously remained constrained by industrial discourse. Saving natural resources was crucial for making more products in the future, and using various additional materials served this task too. Many specialists argued that the enormous amounts of wood waste left in forests as well as at sawmills and wood-processing enterprises along with the paper waste left after

consumption (albeit in much smaller amounts) should be reconsidered not as waste but instead as potential alternatives for wood that could provide a sustainable raw material base for industry.

WASTE AS A MATERIAL OF MODERNITY

Following the paradigm of rationality, specialists came to conceive of alternative raw resources—the term that this book uses for describing different types of waste and annual plants—as modern materials in industrial production. The common definition of the concept of *waste* denotes that which is not appropriate for any further use, left behind and incapable of satisfying users' needs, and not needed.¹⁸ After the Second World War, the Soviet forestry industry witnessed a transition in thinking around many materials due to a new economic model of resource use that developed among experts: from waste to resource. Waste materials were reconsidered as valuable resources that could be used in industrial operations in addition—or even entirely instead of—critically disappearing wood. Over time, alarmism increased even further, entrenching expert's conception of waste as, in Marxian terms, “use value.”¹⁹ Industrial (harvesting and sawmilling) and consumer (used paper, sacks, etc.) waste was considered “a hard burden” for the economy if it was not used.²⁰ Some specialists criticized how, *in the past*, Soviet industry had seen alternatives as useless and, as some put it, “evil.” In 1964, for example, about 43 percent of each cubic meter of harvested wood was considered waste, meaning that a little over half of it was manufactured into wood boards, sleepers, packages, and so on. Some calculated that the use of waste industrially

would increase this proportion to 90 percent.²¹ Through the use of waste, it was believed, economic materials could be produced with less intensive exploitation of natural resources.

Waste, specialists said, should be transformed into economically useful material through the power of modern technology and experimental efforts, and specialists were to give greater regard to them. Engineers and scientists who worked at industrial enterprises and research institutions conceptualized these industrial waste materials as magical resources that would solve the problem of deforestation amid the voracious timber demands of enterprises. Wasting was also connected to inefficiency; from the perspective of specialists, it was not efficient to leave large amounts of potentially useful resources as waste. Alternative raw materials were plentiful, available, and more sustainable than cut trees. Raising the share of wood waste and other alternative resources in the production of consumer products increased the degree of rationality in resource use, according perfectly with the discourse of economizing.

Growing optimism over the industrial power of waste found its support in modern science and technology. At the close of the 1950s, chemistry promised change on a global scale, bringing far-reaching advances in people's nutrition and the quality of their material life. Now chemistry entered the forestry industry to offer crucial tools for achieving economic prosperity and abundance. Specialists saw forestry chemistry as the means of achieving "a radical solution to the problem of [the] rational use of fire and low-quality wood, harvesting, sawmilling, and wood-processing wastes."²² Chemistry could thus transform waste into ready goods, rendering wood a material of modern and rationally functioning

industry. Discourse around the transformative ability of wood emphasized the binary between, on the one hand, the traditional and, as many put it, primitive usage of wood, and on the other hand, modern or perceived progressive industrial methods. Technological achievements espoused by specialists assured the Soviet regime that it was becoming increasingly possible to build “the material basis of Communism” quickly and increase consumption levels in Soviet society—a pivotal issue in facilitating modernization in everyday life. Wood was a vital material of modernity, the importance of which was increased because of the Cold War rivalry to build a more modern society through increasing the manufacture of mass consumer goods. As such, the extraction of natural resources “in ever larger quantities” was not only, as some researchers have suggested, “the means of supporting the needs of the country’s military as well as its energy-intensive economy” but also central in driving the shift toward consumerism.²³

Specialists saw technology as a means of transforming waste material into modern products that could serve as a substitute for wood in traditional products (such as writing paper) and new goods (such as cardboard packages). Many wrote, for example, that the magic of chemicals could transform tree leaves into vitaminized powder and essential oils for the food industry. Soviet research and industrial reports explained that producing new types of plastic from compressed wood waste chips was crucial to replace “traditional” materials, such as expensive aluminum and copper that were in short supply. As engineers wrote, “[We] rely on the possibility of using wood plastics and [seek to] considerably increase their production for details in machinery making instead of metal.” Rapidity was important here to introduce

new and cheap modern materials. As some specialists argued, “The national economy would receive enormous savings on nonferrous metals and other deficit materials.”²⁴ Previously, they explained, this innovation was delayed due to the “low quality and difficulty of the technological process,” revealing industry’s lack of resources for implementing this progressive process.²⁵ In the 1950s, other applications of this process became particularly crucial: wood plastics were proposed for use in the manufacture of chipboards for construction and housing materials.

Another application of wood waste was furniture, especially kitchen cabinets, tables, wardrobes, and beds, which was in demand for the new individual apartments called *khrushchevkas*, built by the state as a solution to the housing shortage. Since the 1950s, most furniture was made from various modifications of so-called high-density fiberboards manufactured from pressed and laminated wood-wool, a waste product from sawmilling and wood processing. In 1962, up to 80 percent of panel furniture and other house details, such as doors, sidings, and floors, were made from fiberboards.²⁶ Soviet scientists revealed various characteristics of these fiberboards: unlike many wood-made products, they did not dry out, lose their shape, or burst, and were easily decorated. Making fiberboard furniture was quicker and easier industrially. Beginning in the mid- to late 1950s, as part of the postwar program to solve the problem of housing shortages, thousands of new residential buildings were introduced in the USSR. Industrialists and planners stressed that it was important to provide people with modern furniture that was both beautiful and cheap. They also suggested that consumers themselves could assemble furniture at home, thereby saving on manual

operations in industry. This concept was similar to that seen in contemporary assemble-it-yourself furniture companies like the internationally renowned IKEA. In 1985, the Project and Technological Institute of Furniture of the Ministry of Forestry, Pulp and Paper and Wood Processing Industry of the USSR developed a number of initiatives for making furniture in a series titled *Do It Yourself*. The consumer could choose elements to make up a furniture item, which they could then complete at home. As industrial designers explained, consumers became “coauthors” of professional designers and so expressed their own creativity in materiality.²⁷



Figure 3.1 Many Soviet publications advertised synthetic materials extracted from cellulose. Source: Anatoliy Averbukh and Kseniya Bogushenskaya, *Chto delaet khimiya iz drevesiny* (Moscow: Lesnaya promyshlennost', 1970).

Some specialists also proposed using wood waste as biofuel. Compared to simply burning wood waste, a practice heavily criticized by many specialists as a waste of valuable materials, the biofuel extracted from wood wastes could economize the costs of production and hence was an environmentally friendly modern practice.²⁸ Others criticized the enterprises because they did not utilize tree bark, which was mostly discarded as rubbish. Burning bark was declared dangerous for the environment, and some specialists claimed that it would be better to use bark for fertilizing soils.²⁹ In the 1970s, waste was also used for manufacturing souvenirs, such as *matryoshkas*, Santa Clauses, and other small goods.³⁰ In many cases, it would help shift the production of consumer goods from handmade to industrial scales. Specialists stressed that waste was a substituting material; a cubic meter of chemically processed pine tree wood could, for example, provide 160 kilograms of synthetic silk or 170 kilograms of wool. By contrast, “direct” producers could offer significantly less: a silkworm produced half a kilogram of silk while “the best sheep gives 6 to 7 kilos of silk per year.”³¹ In production, as specialist E. Lopukhov estimated, making ready products from waste would make them up to 20 to 30 percent cheaper than their previous cost.³² Another engineer argued that by the year 1970, according to his calculations, the need for wood would exceed 850 billion cubic meters. It was an incredible number, which the Soviet wood-harvesting industry was simply incapable of supplying. “This is why,” he said, “we will destroy all the economic plans if science did not find new ways [to use waste material], because waste is *more valuable* than wood.”³³ A lack of action in this sense was seen as a potential economic loss, intensifying fears about the future.

Modern technology processed natural materials as well as helped the industry solve the contradiction between the lack of industrial forest resources and consumer demand. Using alternative materials in industrial production was an experimental solution to this dilemma and attempt to develop more sustainable manufacturing. The variety of waste in forestry was wide, and an increasing number of items came to be considered as valuable resources. Waste thus emerged as part of industrially embedded ecology as the implied “savior” of industrial forests, moved by the economic purposes of modernity. The saving effect of waste was often emphasized in late Soviet propaganda films, which drew a connection between no-waste production/consumption and a relationship of care to the motherland.³⁴ Here, discourses of personal duty, social responsibility, and the waste economy overlapped.

CONSUMER WASTE GAINS INDUSTRIAL VALUE

The 1950s were particularly important for reconceptualizing paper waste. Several professional initiatives investigated ways of using paper waste in industrial production aimed at sustainable economic growth. Despite the fact that consumption levels of paper were fairly low, wastepaper was believed to provide a solution in the search for alternative resources in the forestry industry. In June 1955, the Academy of Sciences of the USSR held an important meeting on the use of waste where officials of high rank gathered, including the influential minister at the Ministry of the Forestry Industry of the USSR and “patriarch of the Russian forest” Georgiy Orlov, minister of the Paper and Wood Processing Industry

Feodor Varaksin, and well-known academicians such as forest specialist Vladimir Sukachev.³⁵ Their discussions resulted in the conclusion that new technology and forms of industrial organization for the use of waste were urgently required.³⁶ In realizing this task, they understood waste in a broad sense, stating that everything ranging from wood harvesting, wood processing, and sawmilling to consumer paper and paper-based products constituted usable waste products. Urgency, as it was formulated at the meeting, reflected the fact that the participants saw modernity as a challenge and held that measures to use alternative raw materials constituted a modern practice of production as well as consumption.

In 1956, the Central Institute of Cellulose and Paper Industry, the only institute of its kind in the country, held another meeting of its economy section, during which specialist Feodor Kuteinikov reported on the use of wastepaper in industrial manufacturing. Trained in economics, Kuteinikov worked in the forestry industry and devoted many years of research to the use of wood, paper waste, and other materials in industry. In his presentation, he explained that “the growth of industrial and individual consumption increases the amounts of industrial and household raw materials, which can be a solid basis of our socialist industry. The rational use of waste materials acquires quite an important economic meaning because it enables the increase of amounts of industrial raw materials.” Kuteinikov estimated that about one ton of wastepaper could replace one ton of timber. If his calculations were correct, however, the collection of wastepaper and cardboard in the Soviet Union (16 percent) was half that of Western countries (30–35 percent). The reason for this was the lower levels of consumption of paper and

cardboard, on the one hand, and the backward infrastructure of waste supply, on the other hand. In addition, it was a lack of knowledge among Soviet consumers about sorting and preparing waste for recycling. He provided the following example: consumers submitted paper waste without preparing it properly (not removing paper fasteners and other non-paper elements), which required more workers to prepare the waste in the absence of any automatic cleaning or sorting systems for wastepaper in the USSR at that time.³⁷ This is why a significant portion of collected paper was thrown away as waste—that is to say, waste from waste, because only the cleanest part of it could be used for industrial production. While this recursive approach conceptualized waste as a service for industrial manufacturing, it largely depended on consumer action.

Kuteinikov gave another illustration: a rubber-making factory supplied soot sacks to the Leningrad factory of technical paper for recycling but did not clean them. The paper factory refused to recycle them because the whole process of cleaning the paper required five additional days of work in what were described as unsanitary conditions. As a result, the rubber-making factory burned three tons of waste just fourteen kilometers from Leningrad, the second most prominent Soviet city. He also stressed that workers sorting waste were not well qualified and well versed in the technology of papermaking and cardboard making for which the waste was collected. They did not understand that different forms of waste were used for making different types of paper and cardboard. Kuteinikov complained, “We have been projecting recycling enterprises since the 1930s, but until now we have not constructed anything. Ministry workers did not

come to waste disposals to see how much valuable raw material is just *dying* there."³⁸ For the years of Soviet power, he continued, "we have not constructed any waste recycling enterprise and wastes are recycled at enterprises which have historically developed conditions for recycling facilities."³⁹ Enterprises did not take into account that it was important not only to collect wastepaper but also to invest in the infrastructure needed for preparing waste for recycling. From his point of view, then, the problem of consumer paper waste in the Soviet Union lay in weak knowledge about the specifications of industrial operations that were seen as simpler than they were in reality. Animating waste as a living organism left to die and perish in ways that were similar to how forests were often described, Kuteinikov revealed a weak waste consumer culture, including the sorting and cleaning of waste, at the individual level. As specialist Viktor Mudrik put it in 1971, "We have an enormous gap between the possibilities and demands."⁴⁰ Some workers and engineers complained that the wastepaper they received was decaying and not usable for making goods of high quality.⁴¹ This spoke about a gap between producers and consumers, or those who delivered and used consumer paper.

Referring to the West as an example of desired practices, specialists frequently criticized their domestic model of waste use. Thus as one said in 1956, in the United States it was forbidden to wrap food in newspaper, even a new ones, but in the Soviet Union, *used newspaper* was delivered to factories that supplied paper to the Ministry of Food Industry—and sometimes they sent wastepaper to food enterprises directly (he did not clarify the purpose of it, though). As with other components of the Soviet–United States Cold War rivalry,

specialists saw a US waste culture as more advanced, modern, and civilized. This was the counterpoint that spurred a general drive in the Khrushchev era to increase the quality and hygiene standards of production and food consumption. As the discussion of 1956 showed, engineers imagined that countries of the West more generally were far more advanced in the recycling of waste. As was noted by female specialist G. I. Shcherbina, Swedish enterprises sorted forty types of paper wastes (compared to thirteen types in the USSR) because of “excellent technology” and a *proper* waste culture.⁴² Soviet waste-recycling technology to a large extent remained a matter of professional imagination rather than a real practice, and many specialists criticized this fact.

Overall, many specialists were critical of the waste problem in the USSR, connecting wasting, sustainable industrial development, and consumer culture. Discussing waste culture in the Soviet Union, specialist A. Shuko asked, “Tell me, how many [old] newspapers in your life you have submitted for recycling? I have submitted nothing, and I think that you all are similar to me.”⁴³ He also stressed that the question of recycling had been discussed since the early 1930s, but had not led to any fruitful results because of the lack of infrastructure.

Yet even as they continued to emphasize the high need for using waste, later specialists complained about a poorly developed wastepaper culture and blamed infrastructural obstacles. In 1971, at the conference held in Leningrad on new technologies and equipment for recycling used paper, specialists mentioned that industrial enterprises practiced fraud and delivered waste of mixed quality, placing good-quality waste above a mass of far worse quality. One also

criticized the fact that specialists had talked about the same problems for decades but with no effective result: "If you listened to conference papers yesterday, you might note that we [still] discuss the same issues we did forty to fifty years ago, including such basic things as the sorting and cleaning of waste." In fact, many complained about how waste materials supplied from industrial enterprises were sometimes sullied with mud, food, and plastic waste, which littered filters when recycling. As the same speaker underscored, "We receive waste with so many additional components that even workers are afraid of getting tons of bad-quality paper [produced from waste]."44

On the experimental level and in experts' imagination, the use of waste was successful and the appeal for the use of consumer waste grew stronger by the end of the Soviet epoch. The idea of saving raw materials and making no-waste production seemed to have reached the peak of its popularity by then. In 1982, for example, engineer D. Kovaleva wrote enthusiastically that each gram of wood waste was valuable for the economy because "wood is forest that required decades to grow, [and] a lot of money and labor to invest."⁴⁵ While consumer waste remained smaller than wood and sawmill waste, the latter became the subject of experts' concern even more often. Overall, however, the recycling of wastepaper in the USSR grew but did not reach sufficiently high levels; it produced 826 thousand tons in 1970, 1,050 thousand tons in 1975, 1,300 thousand tons in 1980, 1,533 thousand tons in 1985, and 1,590 thousand tons in 1988.⁴⁶ Recycling thus did not increase radically: while in twenty years it almost doubled, it was still much lower than in many other countries.

The problem lay in the fact that the volumes of waste use were not sufficient while at the same time supplies of wood could not meet demands for making pulp and paper-based products. Viktor Mudrik, a specialist from the Moscow headquarters of Giprobum, the planning institution for paper industry, stressed “the enormous gap between the possibilities and demands.”⁴⁷ He complained that even the biggest factories could not fully use wastepaper, emphasizing the problem of recycling materials. Experts’ complaints therefore revealed the lack of technical possibilities despite the spread of more progressive thinking about industry-nature relations and consumption culture.

WOOD AND SAWMILL WASTE ARE PUT TO ACTION

From the mid-1950s on, some specialists of the sawmilling industry discussed not only the industrial importance of paper waste. They also raised alarm about the huge amounts of tree components (such as branches, bark, and roots) that were left as waste in forests, rendering them ‘littered’ (*zakhlamlennye*), and at industrial enterprises. They viewed this abandoned material in forests and at enterprises as both a waste of crucial industrial materials and exacerbating the wood crisis. They particularly noted that the total sawmill waste made up a large share (36 percent) of all wood in the sawmilling industry.⁴⁸ The search for better usage of harvesting and sawmilling waste arose together with concern around consumer waste, spurred by alarmist warnings of the finite availability of resources. Now specialists recognized that developing technologies for processing these waste products was needed to help increase productivity in the use

of forest resources. Referring to forests as a national treasure and “green pantry,” many specialists also spoke about wood and sawmill waste as a potential green pot.

The use of wood and sawmill waste in this sense implied the possibility of better use of raw materials (from low-quality wood and various parts of cut trees) in manufacturing demanded products. It would also help leave forests clean and decrease the number of forest fires—a problem that was among the biggest in the Soviet Union, as it remains in modern Russia and other countries (one might recall the recent devastating fires in Australia, the United States, and Greece).⁴⁹ Using waste and, as sources often put it, *struggling* for each cubic meter of wood meant discovering (*vskryvat'*) how the riches of resources could be made rational in industrial operations, decreasing the costs of energy needed for production along with the amount of wood used.⁵⁰

Primarily, the logic of rationality and complexity as well as the imperative to decrease quantities of “wasted waste” evolved from industrial priorities. In 1970, the amount of forestry waste produced in the USSR neared 220 million cubic meters per year, and still only 15 percent of this was used as raw materials while the rest was burned as fuel at enterprises.⁵¹ In 1973, the increase in the amount of waste used by the forestry industry (from 11.2 million cubic meters actually used in 1970 to 23 million to be used by 1975) was included in the prospective plan of development of forestry, wood processing, and the pulp and papermaking industry between 1976 and 1990.⁵² Some enterprises indeed successfully developed the use of waste material, such as the Beregometsk forest combine in Ukraine, an unforested region that traditionally suffered from a lack of wood; by 1979, over

60 percent of the raw materials they used was constituted of recycled waste.⁵³ The Kostroma plywood plant was another story of success. In the mid-1970s, the plant used up to 80 percent of all the waste it produced for manufacturing fiberboard, largely used in the furniture industry. It also manufactured coat hangers and ice cream sticks from dry veneer using machinery constructed by the plant's inventors, and supplied these goods to shops. Through developing the technology of mixing cut plywood waste with synthetic glues pressed at high temperatures, the plant made toilet seats and stools, which were in short supply in the USSR.⁵⁴

Despite successful examples, the share of waste use in industry remained at just 10 percent by the end of the Soviet project.⁵⁵ Even at this point, almost half of the harvested wood was still left in forests while the enterprises used less than 10 percent of wood and sawmilling waste material. Providing concrete calculations, specialists said that enterprises usually utilized just 8 percent of waste but frequently burned it as fuel as they had done before. "Other waste (41 percent) just *dies*, 16 percent decays in the forest, and 10 percent is burned while 15 percent just lies in the store houses."⁵⁶ From a hundred harvested cubic meters of wood, only half was delivered to consumers, while waste made up almost 50 percent of the harvested wood. A considerable quantity of waste was transported to a disposal area, or in professional slang, *v otval*. This happened not only in the old forested regions but in the new eastern lands too. Hence the Maklakovo-Yeniseysk region in Siberia, chosen as the most appropriate for the complex use of wood by Soviet colonizers, consumed only a limited amount of waste. As the Siberian branch of the Academy of Sciences reported to Moscow, "Wood waste

does not find its full use and is thrown away or just burned,” representing big losses for the economy.⁵⁷ According to other calculations, enterprises in the Far East produced more than four million cubic meters of wood waste per year but only used a small proportion of it: 11 percent was used for technical purposes, 1 percent for making consumer goods, and 14 percent was burned as fuel because “of the deficit of fuel resources such as coal, peat, and mudstone.”⁵⁸

Specialists complained that the progressive idea about using waste in numerous industrial operations did not have any infrastructural support, even in the new industrial forestry regions. Nor did enterprises have appropriate techniques and facilities for using waste industrially. If low levels in the use of paper waste were to a large extent connected to a poorly developed recycling culture among consumers, specialists believed infrastructural problems at enterprises were to blame for the low levels of wood and sawmill waste use. Indeed, most enterprises, especially in traditional forestry regions, often saw these materials as secondary and time-consuming, while their infrastructure was often inappropriate for waste recycling. As such, forestry logging spots complained that after clear-cuttings, they received huge amounts of branches, which no one enterprise wanted to take stock of.⁵⁹ The successful use of waste was largely dependent on the ability of enterprises to organize a separate industrial shop to make consumer goods.

Using waste therefore remained more a matter of industrial discourse than practical reality—a point of strong criticism against Soviet wood harvesting and processing among many professionals. As an engineer stated, even in the 1980s at most enterprises, “waste is used at a low scale mainly as

[primitive] fuel. No one calculates how much of it is used.”⁶⁰ Industrialists often blamed research institutes for the lack of adequate research and recommendations for using waste resources in industry. For researchers, the most problematic question remained how to make machinery for cutting waste into wood chips, the most important preparatory step in waste use. In 1990, specialist N. V. Sinyaev criticized the use of wood wastes. He complained that they were not used in Karelia at all but still simply thrown away, or at best used as fuel for heating. According to him, in the whole country in 1990, only 26 percent of waste was used and then mainly as fuel.⁶¹ Others complained that enterprises still burned waste even in the newly established “enterprises of the future” in the eastern regions, thereby continuing what was seen as a barbaric practice. As the head of the Institute of Forest and Wood of the Siberian branch of the Academy of Sciences wrote in a newspaper article titled “Fires of Poor Management” (*Kostry beskhozyaistvennosti*), enterprises in the Krasnoyarsk region annually burned millions of tons of wood waste that could have been used in pulp and papermaking industries.⁶²

Industry failed to realize plans to manufacture products like plywood, fiber wood plates, and wooden houses from waste. Due to the increasing diversification of paper products, Soviet consumer industry suffered from a lack of new products like receipt tapes with thermo adhesive lines and label paper. In the mid-1970s, the Gosplan, the main Soviet planning institute, insisted that the manufacturing of these two products “is completely insufficient.”⁶³ Similarly, the industry did not produce enough goods that combined paper and polymers—products with “polymeric vaccination” as one specialist put it.⁶⁴ In 1976, the Department of Forestry

along with the pulp, papermaking, and wood-processing industries of the Gosplan, concluded that the availability of forest resources was insufficient for future industrial purposes and constituted the reason “it is impossible to satisfy the needs of the economy” even for “the minimal needs.” As such, the department asked the Gosplan not to decrease the rate of cutting in the European and Ural parts of Russia. Significantly, even despite the crisis in supplies with raw materials, Soviet authorities continued exporting timber abroad.⁶⁵

The story of waste use entails two important observations. On the level of implementation, the use of various waste met infrastructural difficulties perceived by specialists as technological backwardness and the lack of needed facilities. This infrastructural deficiency of the state socialist economy was an obvious and tragic obstacle in the way of ambitious projects that could lead to the green economy. On the discursive and experimental levels, the use of waste was part of intensive discussions exposing “progressive” ideas about complexity and rationality as crucial conditions for modern production and consumption. This was evidenced in growing industrial ecology as a new industrial consensus, though restricted by technical possibilities and low investments. To a large extent, industrial ecology embedded in progressivism and economization remained an imagined and desired project implemented in only a few enterprises.

THE LIMINALITY OF FOREST

While industrially embedded ecology remained a discourse shaped by industrial priorities and aimed at production, it gradually saw the rise of more environmentalist attitudes

among specialists. The use of waste was primarily connected to notions of economic efficiency and cost saving. By the late 1970s and early 1980s, a new line was gradually developing within the Soviet forestry industry. Some specialists increasingly spoke about the recreational function of forests as part of their economic meaning, arguing, as one observed, that “forest use is a multisided process” that requires “the rational use and reproduction of forest resources because forests are not only a unique part of natural environment but also an inherited part of [the] ecological [*ekologicheskogo*] and socioeconomic welfare of humans.”⁶⁶ Sustainable forest use in this sense was still explained through a consumerist vision of nature, which implied that trees were not simply a source of wood but fulfilled recreational and aesthetic functions too. For these reasons, they were to be conserved for the present and future of humankind. This line emphasized the need to preserve forests. It did not mean, however, that forests were to be left untouched. Ideas about the sustainable use of resources were born in parallel with the gradually developing environmentalism along with criticism of the ecological externalities of modern technologies in the West, to a significant degree stimulated by Rachel Carson’s *Silent Spring* (1962). In countries like Sweden, early attempts to develop greener production were undertaken around that time, seeking closer cooperation between producers, the state, and environmentalists. To a certain extent, the late Soviet Union’s closer consideration of forests as a resource in danger was triggered by international discussions on environmental issues across the Iron Curtain.⁶⁷

The notion of *sustainable forestry* (*neistoshchitel'noe lesopol'zovanie*) was rooted in the nineteenth century and well

employed by Soviet specialists. In a 1964 article, A. Shcherbakov wrote that the use of forest resources would be possible in different areas for between twelve to fifty-five years, denoting the period during which forests could be cut while securing their bounties for the future. After that, he warned, a critical threshold would be crossed, initiating a kind of death spiral for forest resources. When asking the reader what would follow depletion, Shcherbakov stressed that no Soviet development plan had an answer. As he pointed out, wood harvesters knew well that trees cut yesterday would only regrow in fifty to sixty years. Only the future Communist society (which as the Soviet leadership declared would be largely reached by the year of 1980) could exploit these forest resources, Shcherbakov insisted; forestry employees should remember that the results of their activities would have long-term consequences and contribute to the prosperity of the future Communist society. Combining ideology and sustainability, then, he maintained it was important to search for new ways of “exploiting [the] forest riches of our fatherland,” which could help produce high-quality but cheap wood as well as provide quick and firm reforestation in the coming years.⁶⁸ In his words, and as was indeed typical of Soviet discourse, it was urgent to use forests economically (*po-khozyaiski*) because, according to the ideological mantra, forests belonged to the Soviet people. Here he translated two ideas quite typical for late Soviet discourse around forest resources. First, he connected forests and natural riches, stressing that forests were an inherent part of national treasures, even though they were to be industrially exploited. Second, he discussed the regeneration of resources and their industrial exploitation as both efficient and quick. Conserving various resources was the

main trigger for introducing complexity in the resource use, and the conversations over waste contributed to the sense of the increasing value put on forest.

Forestry scientist Nikolay Anuchin, who carved out a brilliant academic and administrative career under the Soviet regime, also contributed a great deal to the notion of sustainable forestry. In his explanation, he insisted that the volumes of a forest's use should not exceed its annual growth within a short period of time.⁶⁹ Similar to Shcherbakov's view of forest sustainability, Anuchin emphasized the need for non-exhaustive types of cutting and consumption of wood. With increasing frequency by the end of the Soviet period, specialists proposed that economizing was not simply about taking care of forests as a resource and raw material for the national economy and society but also about preserving a recreational asset serving society. Householders were urged to care about the future of the forests and hence themselves. Technical progress transformed the image of the value of forests: they were not only a source of wood to improve the quality of a growing consumer society but a factor for "improving the environment around the human" too.⁷⁰

By the late 1970s, some called for the development of ecology-oriented industry; "one of new features of modern industry is its more ecological nature [*ekologizatsiya*]," as one person put it. Industrial technology, in this sense, was not only a means of industrial manufacturing but could provide more ecological types of wood harvesting and processing as well. New techniques and better methods were crucial here, showing how progress could positively influence industry-nature relations.⁷¹ By the 1980s, the growing demand for wood was further constituted by specialists and high-level

politicians as “an objective necessity. In the course of the economic, social, and cultural development of the people, individual needs for natural resources are growing up not only in terms of quantity but also in terms of diversity.”⁷² Addressing the global state of forests, specialist V. Kyucharyants stated in an article titled “Wood to Construction Sites,” published in a regional newspaper in 1981, that forests were being turned into deserts through enormous levels of exploitation.⁷³ Forests remained “a colossal treasure of people, its national heritage [*dostoyanie*],” and conserving and enlarging forest riches was now “one of the main tasks of the Soviet economy.”⁷⁴

Late Soviet industrial legislation looks very environmentalist, even if quite formalized. In 1981, the Council of Ministers of the USSR decreed the imperatives to economize and make rational use of various resources, including waste, to save labor costs, materials, and capital investments as well as protect the environment.⁷⁵ Furthermore, “the Main Directions of Economic and Social Development of the USSR” for 1981–1985, looking forward to the year 1990, insisted on the need to employ the complex use of raw materials, resource-saving techniques, no-waste and energy-saving equipment, and various types of resources including used raw materials. In 1984, the Central Committee of the Soviet Communist Party and Council of Ministers issued a decree on the rational use of forests that held as its main aim the sustainable use of forests, citing the consumerist value of forests. Forests were not valuable until they were used by people. The logic underpinning this statement implied that if forest resources were not proposed for use, it would not be important to save them. From this perspective, sustainability was packaged

into an industrial discourse and closely connected with production and consumerism. Yet forests were now seen not only as a source of consumer products but also a natural actor producing biodiversity.⁷⁶

These decrees were not effective in practice and mainly remained “a law on paper.” They were, however, important in terms of the conceptualization of a new philosophy of forest use, emphasizing that rationality in the exploitation of natural resources evolved initially from the need to make cheaper consumer goods, and gradually coming to incorporate views about the value of biodiversity and the recreational function of forests, while nonetheless remaining part of industrialist discourse. Prior to the end of the regime, new industrial legislation allowed the enterprises more freedom and made them responsible for the quality of production, as the 1988 decree on enterprises stated. At the same time, it appealed to the rational and complex use of natural resources, and invoked the mild negative impacts on the environment. In practice, though, it did not work. One of the most notorious examples was the Baikal’sk pulp and papermaking plant. Launched with unfinished water treatment equipment, the plant became a disastrous polluter of Lake Baikal. Another illustration was the wood harvesters of the Dal’lesprom industrial merger, which cut forests without permission for years.⁷⁷ But in the late Soviet years, some engineers stood for more ecological production, clearly connecting economic rationality and environmentalism. Interestingly, in the mid-1980s, professional forestry journals began to publish articles on environmental protection that highlighted measures that enterprises had taken for treating air and water pollution near production sites. In the 1980s,

there were so-called technical committees that worked at enterprises to discuss the industrial impact on the environment at each particular production point, investigating local water basins, forest stocks, and so on.⁷⁸ In 1983, A. Kubenskiy, vice chief engineer with a specialization in wastewater, wrote, “The debt of every Soviet person is to take care and save nature” because nature is “our great treasure, the foundation of material production, the source of welfare and health.”⁷⁹ He still saw nature through the lens of its material potential and first listed the industrial meanings of nature (to produce goods, for instance). Yet unlike earlier commentators, he stressed that Soviet people had to take care of nature as it was their civilian and moral debt.

Indebting the importance of forest protection to each person reflected a typical Soviet approach of making collective tasks a personal obligation. In line with Marxism, Soviet citizens were members of the collective, but simultaneously took personal responsibility for fulfilling (and overfulfilling) the plan and increasing the quality of manufactured products. From the perspective of this shared responsibility, every person, whether a specialist or not, was to take care of forests. But specialists themselves saw the role of experts as most crucial in developing a more environmental approach to nature. As an engineer said in 1990, “It was impossible to normalize the economic development without *purifying ecology*. It means that ecological aspects must be included in every scientific research and engineering project. Specialists—scientists and engineers—must have the weightiest say here. We must awake the civilian responsibility of those who work and create the technique already today.”⁸⁰ These appealing words echoed the spirit of the day that followed “the storm

over Baikal” in the 1960s, disaster in Chernobyl in 1986, and rise of Soviet ecological activism and environmentalism in general. By the end of the Soviet regime, some engineers used environmentalist rhetoric, underscoring that saving nature was an inherent part of industrial development and the main sign of progressiveness. This fixed a shift of focus from a perspective that understood the value offered by forests as purely economic to one that emphasized a higher degree of ecology in industry. As one commentator asserted, “The time when [a] forest was seen as a source of wood [only] is stepping away. In the first place is now the complex and multisided use of all the useful services of [a] forest and the making of sustainable forest use.”⁸¹

In the 1980s, pollution and the contribution of deforestation to climate change became another ecological dimension added to the counting of losses. Many connected the irrationality in both the protection and exploitation of nature to negative environmental consequences. As noted by G. Vlasov, an employee of the Bratsk LPK, because of the enormous air and soil pollution of this enterprise, many forests “*died and were poisoned*” near Bratsk.⁸² Simultaneously, the overcutting of wood to supply the industrial complex led to dwindling stocks of fir forest. Despite this loss, enormous amounts of waste were still left in forests and near waterways, contributing to a complicated picture of Soviet industry-nature relations.⁸³ Those supporting the use of waste also attributed environmental dangers to burned wood waste and waste thrown away, in contrast to the singularly productivist lens through which they had previously seen waste as an economically unprofitable practice.⁸⁴

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