

Ex-Soviet wood chemistry today: a postscript

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Personal views on the current situation in pulp and paper research and industry in the former Soviet Union



A genre of this paper is a letter from and to nowhere. By the time it is published, the situation will differ from when it was written. It is a psychological essay that may be of some use for the people who have or plan contacts with the ex-U.S.S.R., but it is to be treated as a personal opinion which does not pretend to be the ultimate wisdom. In it, the author does not distinguish himself from Russian wood science, therefore the criticism here is also self-criticism. Internationally, the point is to push aside the advertising hype. This is just a necessary dressing to the exotic dish called Russia that is being served in numerous enthusiastic articles on East-West cooperation.—S.M.S.

The collapse of the U.S.S.R. changed the landscape of wood science and pulp and paper industry in the former republics. It resulted in deepening isolation, a decrease in scientific standards, and a slowing of technical development.

Some years ago, we described the general situation and tendencies in wood chemistry in the U.S.S.R. [*Tappi J.*, 72(5): 211(1989); 72(6): 183(1989)]. This paper presents an epilogue, acknowledging the fact that a series of political and economic crises have changed the situation in science, education, and industry in Eurasia. *Tappi Journal's* readers were following a period of transition; where that transition has been leading is now more clear.

Russia: why bother?

According to recent opinion polls, only 4% of Americans are deeply interested in foreign affairs. The general public is tired of all these uncertain and unclear Russian matters. The interest and even enthusiasm of the Gorbachev era has changed to indifference. However, those in pulp and paper science and industry need to follow Russian events and maintain contacts with this country under any circumstances for the following reasons:

- The U.S.S.R. was first in the world in wood reserves (86 billion cubic meters); 20% of the world timber resources were concentrated in this country. Annual cutting in recent years was about 380 million cubic meters. After the dissolution of the U.S.S.R., Russia was left with the major part of these reserves and should be treated as one of the most important sources of renewable raw materials.
- Russia inherited the major part of Soviet wood science and industry because the overwhelming majority of pulp and paper mills, wood hydrolysis mills, and scientific and higher educational institutions are located in this still-existing remnant of the U.S.S.R. The only noticeable losses are the sources of cheap cotton and some hydrolysis (agriculture waste processing) mills in Central Asia.

- In the foreseeable future, Russia will export wood and low-grade wood products and purchase modern equipment and technologies as well as high-quality products. If (and when) its economy will be reformed and recover, the situation on the world market of wood products could change drastically. If not, it will need a large-scale exchange of raw materials for technologies, following the pattern of Third World countries.
- Russian wood science remains "invisible" because of language, political, and economic barriers. Many scientists and engineers there have good ideas that cannot be implemented by the backward national industry. Their salaries are unbelievably low; their future is uncertain. Right now the opportunity for scientific and technical cooperation is extremely good. If action is delayed, this opportunity will be lost.
- The world community is interested in conservation, recovery, and rational use of Russian forests. It is especially important because of a low rate of recovery characteristic of northern woods vs. southern woods (such as those of the Amazonian basin).

Industry and science: just divorced

Uncontrolled disintegration of the U.S.S.R. following its democratic evolution resulted in a deepening of political and economical differences between the regions, changes in priorities, and a general decline of the economy. It is by no means a crisis of restructuring; it is just a system crisis only partially connected with the timid attempts to reform the rotted and artificial economy. The time to pay bills comes, and there are too many bills to pay. Let me illustrate the problems facing local pulp and paper industries.

Russian wood reserves seem to be enormous. In fact, these reserves are rather limited, taking into account the infrastructure and shipping fares. The general policy of the U.S.S.R. was to build big pulp and paper mills close to wood sources. A very typical miscalculation was in underestimating the productivity of the mills and overestimating forest recovery capabilities. Some super-mills in northern European regions and Siberia devastated all the easily available forests. To continue production, they now must transport wood hundreds of miles and then transport products to the customers. The changes in real prices, especially those of shipping and energy, make even the existence of some great mills unjustified financially.

For many years, nobody gave much care to forest recovery. Under Stalin, timber cutting was a task given to prisoners of the GULAG and large expanses of forest were devastated. This forest holocaust has resulted in the substitution of valuable species such as Siberian pine by low-grade species of hardwood. In central Siberia, fertile soil is only a thin layer over firm rock, so that the land does not recover from erosion. The slow death of the Siberian pine is also attributable to the change of climate from typically continental to maritime over huge territories.

Several large, manmade lakes at the cascades of hydroelectric power stations along the main Siberian rivers further aggravate the problem. These stations were supposed to solve all the energy problems of Siberia. In fact, for example, the great Bratsk station's

electricity is almost entirely consumed by two big mills (aluminum and pulp and paper) in the city of Bratsk.

The economy became disorganized after the "freeze" of hard currency accounts in the Vneshekonombank in 1991. Almost all the mills are equipped with Western machinery, and actual bankruptcy of the state which confiscated assets of the enterprises has cancelled modernization plans. Some lines were closed for lack of spares and imported reagents. Predictably, foreign partners lost faith in their Russian counterparts and Russian managers in the state. The result was an increasing tendency to understate profits and not transfer money to Russia. The need for foreign investments in Russian industry is acute, but clumsy policies often make them useless to the national economy because all the money eventually gets pumped back out.

In 1992, the Russian pulp and paper industry was partly paralyzed. Legalization of previously latent inflationary policies and real inflation resulted from the dissolution of the U.S.S.R. Further regionalization and numerous local wars made the majority of traditional internal consumers (enterprises as well as individuals) insolvent. At the same time, export was hampered by the special rules of licensing. Licensing tends to preclude efficient business dealing and is in essence a form of bribery. All that, in combination with unskilled management and marketing, left many mills with overcrowded storehouses, curtailed production, and personnel cutbacks in the beginning of 1993. In northern Russia, where a pulp and paper mill used to be the main employer for all the town, that led to an increase in social tension. Market mechanisms of price regulation do not work in a paternalistic state that has a monopolized economy, corruption, and political lobbyism.

This development drained industry's interest in national science and technology. Previously, a great deal of research funding came directly from industry, and industrial engineers, researchers, and educators maintained close contacts. In the current situation, the mills are much less concerned with environmental topics and technical innovations. Their only concern is to make fast money to survive. Moreover, poor education and questionable professionalism on the side of applied scientists and industrial managers and engineers led to mutual distrust.

To date, university science has lost almost all grants from industry and must rely on government subsidies alone. To support national science all the mills are taxed 1.5% for research subsidies, which are distributed by the government. Research funding has decreased sharply. Industry does not directly influence the research activity, and researchers themselves often just mimic industry-oriented activity without any real plans to participate in the development of national industry.

Science *in vacuo*: the choice between evils

The landscape of Russian wood science has been changed after the dissolution of the U.S.S.R., which influenced science more than industry. There was not any essential change in relative importance of research centers or scientific directions from what we described in 1989, outside of a general decline and geographical losses.

The most important change came with the separation of the Baltic states, although only Latvia has any pulp and paper science

and industry worth mentioning. A small country almost without natural reserves may benefit from this. However, not many political leaders in Latvia understand the benefit. Latvian independence brings with it a major loss for wood science both in Latvia and Russia. According to a rather strange system of state planning in the U.S.S.R., certain fields of science and industry were developed in a few strictly prescribed geographical regions. The Institute of Wood Chemistry in Riga, Latvia, was the major scientific center publishing the only special journal in its field—*Khimiya Drevesiny* (Wood Chemistry). The giant Soviet Union could subsidize such an institute and journal, but little Latvia cannot.

The institute will have a tough time surviving as an important European scientific center; it will likely become smaller and more technology-oriented. Further development of the Baltic states is easily predictable, taking into account their experience between two world wars: these countries will revert to the small science of small nations, and many researchers will emigrate or change their occupations to something more routine.

To retard such development, the Latvian government proposes to organize technological centers on the basis of former academic institutes. The aims of creating such centers are to spur an economic upswing, to solve the problems of employment, and to stimulate the production of new goods and technologies. They will serve as a basis for newly created small- and medium-size private enterprises and firms that could rent premises from the center and use its infrastructure, common services, and advisory services in marketing, solving financial and legal problems. This is a good idea for all the former Soviet republics, but it can work only if scientific and technical products will be exported. It does not help maintain basic science.

Unrest in the ex-republics

Unlike Latvia, which is open to the West only, the Ukraine and Byelorussia, two more ex-Soviet republics which have pulp and paper research centers and industry, are still closely connected with Russia. However, their political future is uncertain, and if these rather undeveloped countries become isolated as some kind of wild refuge for communism, they will lose their wood science as a result of the inevitable degradation of isolated small professional groups. After the separation of the Ukrainian Higher Qualification Commission, for example, academic degrees in wood and pulp and paper science issued in the Ukraine became dubious because of a lack of reliable expertise.

The problem of independent expertise always was acute and is worsening now. The Institute of Wood Chemistry in Riga, Latvia, was famous for its unbiased attitude, and no institute can substitute for it. The system of organization of research and education in Russia resembled that in the United States, the difference being in uncertain criteria. The system is still highly centralized and fund sharing in Moscow proceeds as a big battle of a few monsters. A sense of scientific community is almost nonexistent. University professors are neither influential nor highly respected in Russian society. Unfortunately, "kakistocracy" and "meritocide" are not just rare words from an academic dictionary. In Russia, we used to think that there are no important people, just important positions.

Under these circumstances, freedom is absolute in some respects. One of my colleagues submitted a paper on pulping with an unidentified compound "F," and this paper was published! Another colleague published a routine gas chromatogram with two overcrowded peaks which were ascribed to D- and L-stereoisomers.

A prosperous professor has unequivocally ascribed all the bands in a Fourier-transformed UV spectrum of lignin to certain chromophobic groups. When his younger colleague from the same institute openly criticized this strange paper, the professor just fired him: A good example of a scientific discussion.

What is the explanation of the optimal water/solvent ratio in organosolv pulping? It is in the number of molecules of water coordinated with protons. Why? Why not?

Totalitarian traditions and long-time isolation from the world of science produces "scientoids." A scientoid looks like a scientist but is not. Such an animal is common everywhere, but certain conditions are especially favorable for its reproduction. Such conditions would include a general tendency toward preferential funding of very applied research, some kind of instant science (1–2 years from a lab to a mill) in conditions that permit almost nothing to be applied to the national industry. Scientoids produce papers that lack specifics but are full of promises and declarations.

Independent international expertise would help correct the situation but does not look possible, for this reason at least: no one officer will permit anybody else to distribute state money because it is a major source of personal power, though for now, the country has no money to pay foreign experts anyway. It means that isolation is continuing even after the Iron Curtain has gone. A swamp curtain remains. Thus, an international meeting with great Russian participation is a meeting of noncomers. Under the communists, scientists were not permitted to go; now they have no money. The result is the same: Russian delegations too often include unknowns whose scientific interests are limited by hard drinks and shopping. These are former *apparatchiks*, modern businessmen, and party officers.

Easier access for Western scientists and industrialists to Russia still does not mean that Russian wood science has become more open or more international. The monetary curtain works very effectively. Exchange of information is more important than exchange of people, but availability of modern technical literature to Russian scientists is limited. For example, there are no subscriptions to *Holzforschung* or *Wood Science and Technology* in St. Petersburg. It does not mean that there is no money at all, it just reflects the unchanged attitude of the authorities to science.

Currently, the easiest way for wood science to survive in the former Soviet Union would be close cooperation with Western science and industry. Some years ago we thought that real scientific and technical cooperation would be possible in a new political climate. We expected too much of the good intentions of foreign partners, in contrast to the bad intentions of local bureaucrats. Really, why not work together? Taking into account the exchange rate of the local currency and shamefully low cost of labor, small investments in Russian wood science and technology promised a high output.

Unfortunately, it proved to be false logic. First, the real political climate has not changed as much as one may conclude from mass media. Secondly, nobody is interested in creating competitors. Moreover, the general policy of nontransfer of research money and nonhiring of foreigners became stricter with the economic recession in North America and rising nationalism in Europe.

Of course, some type of cooperation always existed, but the most popular was that with the countries of the same intellectual habits. East German visitors would copy Russian internal technical reports and later transform them into nice German technical papers.

Wood science in Russia is becoming more and more esoteric. There are only two national journals in this field, the technical *Pulp, Paper, Cardboard* (Moscow) and the more general *Forest Journal* (Arkhangelsk); collected papers of the institutes are of moderate value and receive limited distribution. On the other hand, not many Russian wood scientists can prepare a paper in English acceptable by a refereed international journal. A new academic journal on wood science is planned to be founded in St. Petersburg. It will be translated into English and may become a good substitute for *Khimiya Drevesiny*, but it is hard to predict the quality of this new journal. One of the problems is that researchers and educators are not interested in writing good papers because it obviously takes time from money-making, and the quality of publications does not influence a person's academic position. Like their American colleagues, Russian professors are preoccupied with writing proposals and reports.

Small amounts of research money still trickle through, but usually not enough to support any serious work. Routinely, federal grants are about US\$ 1000 annually (half of which goes back as taxes), with a 3–4 month delay of payments at fixed rates. In conditions of galloping inflation, fixed grants taunt researchers and promote a very depressing atmosphere of uncertainty. Besides that, grants are routed through the institution rather than directly to the researcher. Very often a great deal of the money is lost as a result of internal manipulations.

Because of the mutual distrust, researchers are trying to sell their results to developed countries and industrialists prefer to buy complete equipment from the West but not invest money in the research work on innovations in their own country. Altogether, this policy is opposite to that of developed countries and fosters backwardness in the ex-U.S.S.R.

A time of choices

Is the situation in Russian wood science absolutely hopeless? Surely, not. This article concentrated intentionally on the problems and contradictions; good prospects and achievements have been presented in numerous articles, including those written by the author. However, in times of crisis the choice is rarely between good and evil; often the only available choice is of the least evil. Russian wood science will survive because Russia is a big country, rich with wood reserves. It needs to train professionals, to have a developed educational system. And many Russian wood chemists are skilled scientists capable of good research. However, the next

decade will be a hard time, even if the general political development avoids catastrophe.

Everybody makes their own choices. It is quite clear that neither Russian pulp and paper industry nor science are competitive on the world market of goods, technologies, and scientific research. Nobody expects substantial foreign aid of any type, and it is hard to believe that national industry or the state will become more interested in the development of science. A few of the best professionals are still trying to make national science competitive and maintain certain standards. Others are ready to become just dealers of foreign companies. Many professors teach only, without conducting noticeable research.

Many researchers change their occupation or adjust their work to the current situation, being ready to take every grant available irrespective of its scientific value. For example, it became popular in recent years to conduct studies on the pulping of irradiated (Chernobyl) wood, and no moral problem over the possible use of the results arose. Researchers also do routine analyses for foreign companies. Altogether, it means that wood science and the educational system will survive but probably grow shorter quantitatively and not develop qualitatively.

A new beginning: the same old trick

The political situation in Russia is certainly the major factor influencing its economy, science, and prospects of international cooperation. In spite of a widespread opinion, Russia is not being quickly reformed. It is still far from achieving a market economy and democratic standards.

The ex-Soviet republics are back to where they were a hundred years ago. In many ways they resemble feudal communities with permanent ethnic and clan wars, the law of power instead of the power of law, amalgamation of the state and religion, numerous trade barriers, an uncertain monetary system, and so forth.

Unlike Hungary, Poland, or Czechoslovakia, Russia was not an accident victim of a political raper; "Communism" was not the result of an occupation but of internal development and still has deep roots. Soviet "communism" came much more from Benito Mussolini than from Karl Marx; therefore, its eventual transformation into classical Nazi regime looks at least as probable as its democratic evolution. The majority of ex-Soviet republics are moving in this direction. It is not an unavoidable evolution, but something common in the development of East Europe in this century.

"New beginnings" are typically and regularly repeated tricks that permit a new government to shun responsibility for the debts of their predecessors. This is true on large and small scales. For example, permanent reorganizations of the ministries in Moscow have disorganized the work of applied institutes because in the middle of the year the channels of previously guaranteed money transfer were closed without explanations or establishment of new channels. When the situation is worsening, a "new beginning" looks more and more probable.

In this aspect, regionalization, national separatism, and discrimination become the major threats to ex-Soviet science. The

problem is that local leaders (mostly, former communist party or military bosses) establish numerous barriers inside Russia in order to keep their own power, without providing support to Russia as a state. They do not want to pay taxes to the federal budget and are even less interested in subsidizing science and education from local budgets. This is one of the ways in which science is being degraded in Russia.

Even if it maintains its modern borders, Russia will become more of an Asian country, being separated from Europe by a strip of unfriendly, unstable, and unpredictable young states. As a result, the major channels of trade, communication, and exchange of people with European Russia in the nearest decades will be air and sea shipping. Consequently, the importance of a few Russian seaports—St. Petersburg, Arkhangelsk, Murmansk, and Novorossiisk—is rising. A big new trade seaport near St. Petersburg that is planned to be built promises to become the major channel of wood products shipping to and from Russia. Moreover, Finland, in spite of its recent economic problems, has good prospects to be the major trade bridge between Russia and the outer world.

What will be the fate of wood science in the ex-U.S.S.R.? If an alliance of pro-Communists and nouveau-Nazis brings on a civil war, Russia and the other republics are ruined. If this alliance,

which holds a majority of votes in the Supreme Soviet (a paraparliament; Russia still has no legal parliament, constitution, or even national emblem) wins without a war, a neo-Stalinist regime will be established and Russian science will disappear within a closed and repressed country.

If the situation of the last two years continues, characterized by a democratic but very weak rule without certain political program and any means to put any program into practice, national science and industry will remain open to the world community. However, it will not help them to escape some extent of degradation. Some kind of sound nationalism might help more than unjustified hopes in international programs. But the most necessary catalyst for any progress is a more stable, stronger, and less-corrupted democratic regime that can correctly formulate and protect the system of national priorities and prevent further disintegration of the country. Such a new beginning would be the only guarantee for Russian science and industry to occupy a worthy place in the world. [1]

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