



## NEW RESOURCES OF RUSSIA

Russia has always been proud of its natural resources base. Its vast territories are matched by equally vast underground stocks that contain practically the whole Mendeleev's table. We have no reasons to envy resources-rich countries, Russia fully supplies itself with its own resources and exports it to other countries. Timber, oil and gas represent a substantial share of Russia's budget revenues.

However, the world is changing fast. Sooner or later we would run out of fossil fuels. More important, globalizing economy and changing paradigms of social and technological development set new challenges for countries wishing to secure their competitive edge in terms of economics and geopolitics. In addition to finding ways to use "old" resources more intensively these countries have to switch their attention to earlier ignored opportunities – this is one of the topics of discussion between economist **Sergei Sibiryakov** and expert in economic geography **Ivan Sidelnikov** featured in this issue of RER.

New wars over resources are just around the corner, asserts in his article Chief of Theoretic Department of St. Petersburg School of Scenario Making **Sergei Pereslegin**, and this is not limited to wars over hydrocarbon fields. Some experts emphasize the growing importance of water supplies. The CSR «North-West» analyst **Sergei Kostyushev** has analyzed Russia's potential resources in this sphere. The interview with Director of the Arctic and Antarctic Research Institute **Ivan Frolov** is dedicated to prospects for use of polar areas. Senior researcher of the Russian Academy of Sciences' Institute for Problems of Engineering Industry **Vladimir Fisenko** considers models for development of Russian energy industry as one of resources of the future. The current RER issue also features research materials by CSR "North-West" experts dedicated to Russia's present policy in science and technology and the sphere of tourism as another promising resource.

The country is on the verge of the long period of depopulation and the fight over human resources is not far off. Moscow State University professor **Natalya Zubarevich** and the Institute of Demography of the State University Higher School of Economics expert **Nikita Mkrtychyan** discuss ways to win the battle.

Solving demographic problems and mechanical increase of the population size is just a first step. It is necessary to educate people and to make them builders of the new structure of Russia, to expand the workforce capacity, - explains member of the Public Chamber **Vyacheslav Glazychev** and Rector of the National Institute Higher School of Management **Vladimir Nechayev**.

However, modern rapidly developing economy needs more than just old and new resources. Russia has to acquire the knowledge of value chain management, believes head of Management Company No. 1 **Sergei Chernyshev**.

Global war for old and new resources is just beginning. Russia aspires to win the war and considers new technology projects. All this is extremely important. The only way for our country to secure

the necessary new resources is to play a leading role in the battle for human capital and to combine technology with human resources.



## WHO IS WINNING THE COMPETITION FOR HUMAN RESOURCES?

***Natalia Zubarevich***  
***Director of the Regional Programme***  
***of the Independent Social Prognosis Institute***

The investment boom in Russia is generating euphoria and great expectations, but new opportunities are intensifying the competition for human resources at every level - between countries, regions and cities. For our country, where since time immemorial human labour has come cheap and has moved in a "western direction", this is a very significant change that demands a reassessment of our whole system of priorities.

This change has not yet taken place: it is prevented by "calming" factors - the low level of in-country mobility of a still poor population, the virtually closed border for labour migration to the West, and hopes of attracting Russian-speaking immigrants from CIS countries. However, as people's incomes increase, so will their mobility. And the border for migration of labour to the West is not closed for good, and when the situation changes, it will be too late to study the examples of Latvia and Poland, where the drain of qualified manpower to EU countries has reached what they call "industrial proportions". Statistics of Russian legal migration show that our fellow-countrymen do not return to Russia - quite different immigrants come our way: workers, and more often than not illegal ones.

The concept that high-quality human resources are the basis for the country's future development is growing gradually along with the depopulation. In major Russian cities and in towns around the capital the authorities have already experienced the effects of competition. Moscow sucks up the best human resources like a vacuum cleaner. Not for nothing does Moscow's mayor Luzhkov like talking about restrictions on immigration: the capital does not need to make any effort to attract manpower, and there is plenty to choose from. And the prognosis for Moscow is obvious - it will continue to attract immigrants, as do all the world's major cities.

However, a prognosis for Russia as a whole, where there are very great regional variations in human resources, is more difficult to make. Where will they be concentrated and of what quality will they be? Is it possible to influence the process of the territorial concentration of human capital? The powerful inertia of socio-demographic processes forces us to look to the future, ignoring established regional development trends. It would be better to focus on the cities, since human capital is concentrated in the cities, but city statistics are, unfortunately, extremely unreliable.

According to all the forecasts, demographic resources will decline, most of all in the older regions of the European Central and North-West Regions, with the exception of the two capital conurbations. The prospects for the medium term are that natural population growth will be maintained in only 6-7% of Russian regions. Measures to stimulate the birth rate are not capable of solving the problem of depopulation, since its proportions are so great: over 70% of the population live in regions with significant natural wastage (0.5 - 1.5% per year), and 16% of them live in regions with an extremely high rate between 1 and 1.5%. Demographic processes are sluggish, so natural wastage will continue to "squeeze" the habitable space, especially quickly in the ageing regions of European Russia. The demographic resources of the southern republics remain the last resort of a country which will dry up in the course of a generation or two.

Possibilities for the use of immigrant resources are limited: immigration has decreased by five times in real terms since the 1990s. The directions of migration have also changed as a result of stress factors being replaced by economic factors. In the 1990s it was the southern and western regions of Russia that received the main flow of immigrants, but since 2000 these regions have retained only small pockets of this flow. The country is seeing the restoration of the central-peripheral vector of migration characteristic of previous decades: the population is leaving the peripheral and less developed regions and is concentrating itself in the largest conurbations. This return to the long-term trend of the 20th century means that modern patterns of migration are settled and will continue for the foreseeable future. According to the estimates of Zh.A. Zayonchovskaya<sup>1</sup>, immigration will compensate for natural wastage only in the Moscow conurbation - in St. Petersburg there are already insufficient immigrant resources.

The flow of migrants from the northern and southern regions has stabilized at a lower level, and now depends on the balance of supply and demand on local labour markets. Whereas the economy of eastern regions will grow more quickly and attractive jobs will appear, the flow of immigrants will decrease still further. However, there is no point in hoping for a substantial flow of immigrants into eastern regions, even with a state incentive policy. As a resource in short supply, the population will be able to pick and choose attractive places to live.

The possibilities of immigration from abroad, in the author's opinion, are clearly overrated. Between 2001 and 2004 the recorded flow of immigrants compensated for only 9% of natural wastage, and 12-18% in 2005 and 2006. The positive trend of the growth of immigration to Russia is largely a statistical phenomenon, accounted for by the legalization of immigrants already living in the country. It is obvious that without encouraging immigration from other countries it will be impossible to solve the problem of the growing shortage of labour resources. A great deal will depend on the policy pursued by the state, which is as yet vague - immigrants are both welcomed and driven out. However, even a successful policy for attracting immigrants will be unable to compensate for the reductions in population in those Central and North-West regions with the highest natural wastage. Immigration from China and Central Asia will increase under any policy - their influence will be noticeable in the area from the Urals to the Far East, but forecasting the tempo of the growth of external immigration is a dubious business. Moreover, low-qualified immigrants cannot substantially improve the quality of the population. The declared policy of relocating Russians from the CIS to eastern regions will not compensate for the drain of qualified local people on account of the shortage of highly-paid jobs.

On the whole, the prospects for the country's demographic resources are not optimistic. In a territorial context two vectors are inevitable: firstly, the population will move to the west and the south, and secondly, it will be concentrated in the large conurbations, and not only in the form of immigration - peripheral and ageing agricultural districts will be depopulated more quickly. Against this background, it is quite obvious who is winning the competition for demographic resources: the large conurbations, two or three southern regions with better living conditions, and a few regions with a high standard of living.

However, the problem is not only in numbers - depopulation sharply increases the significance of the quality of the population: its mobility, the modernisation of its way of life, working motivations, growth of education and improvements in health. Regional variations in population quality are dependent on long-term factors: unequal access to economic resources, the population's way of life, the socio-cultural environment of regions and cities, migration trends (districts with an influx of

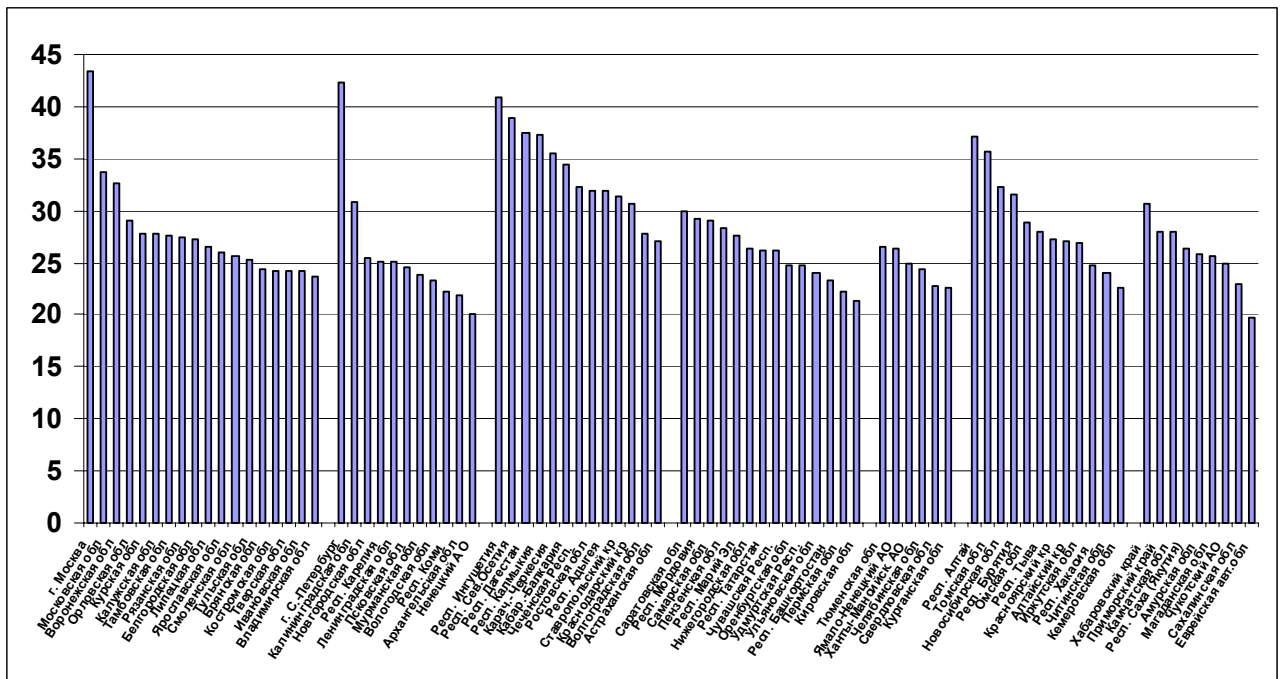
---

<sup>1</sup> Zh.A. Zayonchovskaya. "Migration is the Fate of Russia" //Russian Expert Review. 2007. No. 1-2.

immigrants have a more adaptable population, while for districts with an outflow the reverse is true), and so on.

There are no standard indicators of population quality; it can only be evaluated by circumstantial evidence. None of the indicators gives an entirely reliable picture for the country's regions. Let us start with higher education, an indicator that is traditionally used to evaluate the quality of the population. In Russia the move towards mass higher education is coming to an end; from the mid-1990s it has become increasingly regionalized, and it would appear that we can expect an extenuation of regional variations in the standard of education and the qualifications of the workforce. However, the proportion of employees in the urban population with a higher education is still more than twice that in the regions (Diagram 1). The advantages of the two capitals in their federal districts reflect a "modernization broadside", the degree to which population quality in the regions is lagging behind the country's major conurbations. The level of education of employees in the Urals is also low, and this will be an obstacle to the modernization of its industrial cities. Most of the regions in the Volga Federal District have similar problems. It will take a generation (twenty years or more) for regional variations to be reduced, and this is a very long time in terms of the country's development.

Diagram 1. Share of people having higher education in the urban population. Russian only.



The higher education indicator also reveals other aspects. In the labour markets of poorly developed republics with a younger population and, as a rule, a higher level of unemployment, a division has occurred: the better educated section of the workforce is in demand, so the standard of education in the working population is at its maximum, while low-qualified workers are left out in the cold. This means that, with the expected increase in the number of new jobs, there will be a problem of "shortage in plenty" (i.e. the low qualifications and poor adaptability of the republics' numerous unemployed youth). Besides that, a high proportion of employees with higher education does not always mean an improvement in the quality of the workforce. In the Southern Federal District, the leader according to this indicator, the main reason was the accelerated move towards mass, low-quality higher education, the "buying of degrees".

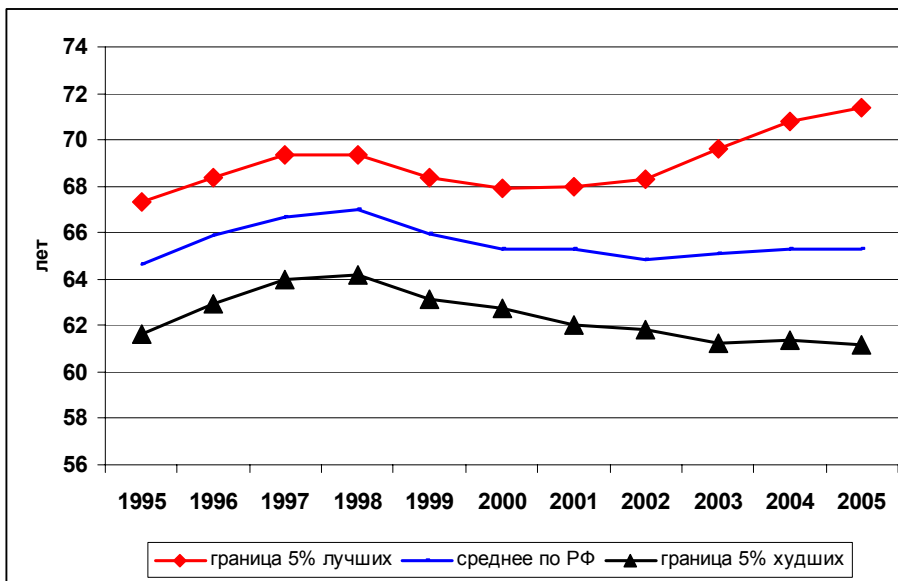
A clearer picture for prognosis is provided by the vital indicator of health and the modernization of the population's way of life - life-expectancy. In Russia this indicator fell during the first five years of economic growth and remains disastrously low: 65 for the population as a whole, and 59 for men (2005). In the more developed regions (Moscow and the autonomic districts of the Tyumen Region) life-expectancy is between four and six years higher than the national average, and continues to grow. This improvement has been brought about by higher incomes, better financing of the health system and, most importantly, by a change in the population's way of life under the influence of the fierce competition in the labour market for highly-paid jobs.

At the same time, some areas in Russia have an extremely low life-expectancy, particularly among men, and these are areas of social deprivation. The most critical areas are the poorly developed Tyva Republic and the northern districts where peoples of small numbers live: life-expectancy for men in these areas is no more than 46-50 years, as the consequence of mass alcoholism. A low level of life-expectancy can also be observed in regions of Southern Siberia and many regions in the districts of the European North-West and Centre with a strong marginalization of population, particularly in rural areas. Here the problem of the lowering of the quality of the population is no less acute than the reduction in its numbers.

The maximum indicators of life-expectancy in the republics of the Northern Caucasus are the result of a better climate, lower proliferation of alcoholism, and purely statistical factors (unreliable records of infant mortality). On the whole, however, the south is winning in the quality of population, measured by longevity. And this is a considerable advantage, and one which has not yet been realized.

The growing regional polarization of population quality is particularly evident from a comparison of the limits of life-expectancy for 5% of the best regions and 5% of the worst (Diagram 2). For the regions with the lowest life-expectancy any future competition for human resources has already been lost.

Diagram 2. Limits of life-expectancy for 5% of the best regions and 5% of the worst



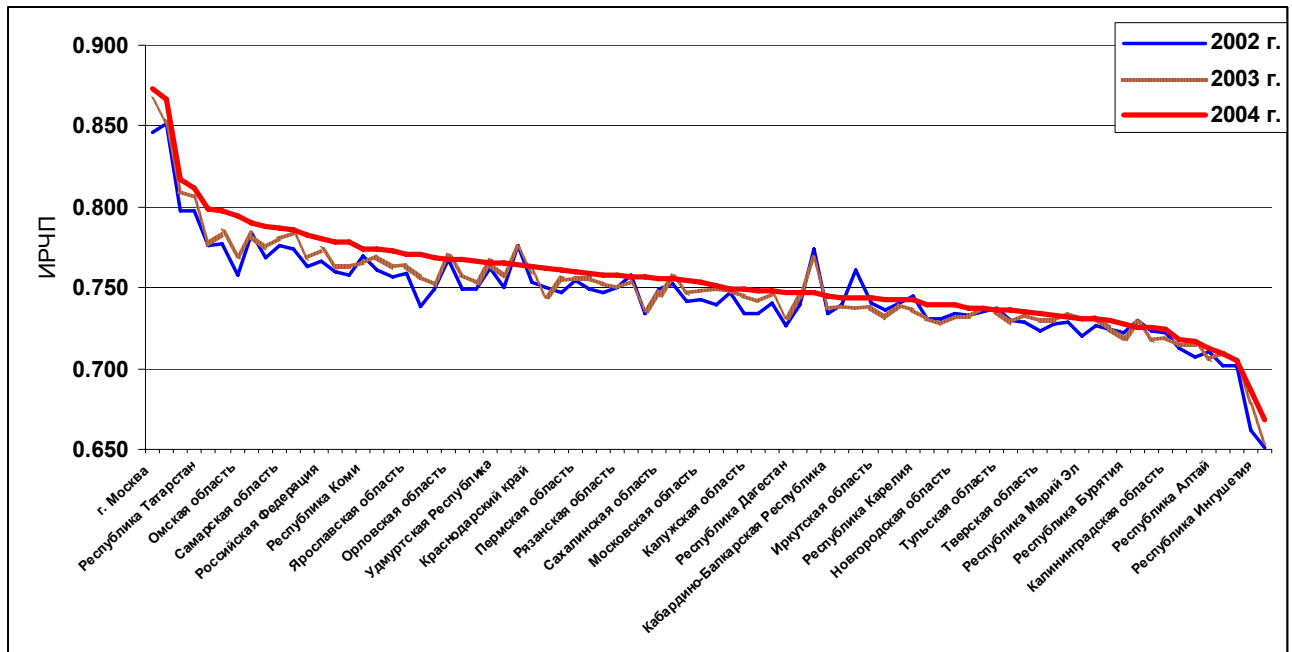
It is customary to consider that the root of the problems of population quality is low incomes, and that as incomes increase, so does the quality of the population. Such an interrelationship does exist in the long term, but one should not forget the role of the socio-cultural environment, which is

extremely important for Russia, where many cities are poorly suited for full-value life. The growth of incomes without a modernization of the way of life can reduce the quality of the population. For example, the problem of AIDS and drug-dependence (the principal way it is spread) is most acute in wealthy cities and regions, especially those that have attracted human resources without a developed social environment (the Irkutsk, Samara and Sverdlovsk Regions, the Khanty-Mansiysk Autonomous District, etc.). This is the problem of the "lost" generation - young people from well-off families, but with no developed needs or motivations. In such families a high income is not directed towards the development of human capital. The rate of growth in the number of those infected with HIV/AIDS remains high, and the geographical range is extending, so the quality of youth population in the most problematical regions will decrease.

The above indicators of population quality provide a contradictory picture. Human resources can be evaluated with the aid of the Human Development Index (HDI) devised by the UN Development Programme. This is an integral indicator consisting of three components: income (gross regional product per head of population), longevity (life-expectancy at birth), and level of education, measured by adult literacy and the education of children and young people.

In 2005 Russia was placed 67th in the HDI ratings, but was included in the group of developed countries for the first time (an index of more than 0.800). However, the regional variations in the HDI are huge and continue to grow (Diagram 3). Moscow is comparable with the Czech Republic and Malta, the Tyumen Region with Hungary and Poland, and St. Petersburg and Tatarstan with Bulgaria, though our second capital is noticeably inferior to the Baltic States. Russia's weakest regions (the Republics of Tyva and Ingushetia) are comparable in the ratings with Mongolia, Guatemala and Tadzhi-kistan.

Diagram 3. Human Development Index Russian regions 2002-2004



The HDI picture does not bear out the usual stereotype that there is Moscow and there is the rest of Russia. About 15% of the population lives in areas of the Russian Federation with an index rating corresponding to those of developed countries (over 0.800). Besides Moscow, these are the Tyumen Region (with its autonomous districts), St. Petersburg and Tatarstan. The leading areas remain virtually unchanged - they are the largest conurbations and leading regions in the export of

resources. They are where human resources will mainly be concentrated, though this is less likely in the Tyumen Region, whose development is too strongly dependent on oil prices. As for Tatarstan, we can probably talk of better possibilities for retaining its own human resources, rather than of a concentration of immigrants from other regions.

Is it possible to say that the other regions will be giving up their human resources? For regions with a low HDI rating, where only 6% of the population lives, this is inevitable, and the speed of emigration will increase year by year. For the numerous regions in the median ("middle") group with HDI indicators lower than the national average, which includes over two thirds of the country's regions and population, the same prognosis is most likely, though the rate of emigration will depend on the viability of their regional centres, the possibility of attracting human resources from their own internal periphery and holding on to their own population.

The main question is whether regions with major macro-centres such as Yekaterinburg, Novosibirsk, Rostov-on-Don and Nizhny Novgorod, as well as other Volga and Ural regions with cities of a million or more inhabitants are able to attract high-quality human resources. Here the prognosis is rather negative, since the majority of these regions belong to the "middle" group and do not have the necessary advantages in the form of a higher standard of living and population quality that could provide the essential "difference of potential". Regions that are not included in the HDI top ten (the Samara Region and Bashkortostan) do not possess sufficiently powerful centres, though the potential of the Samara-Togliatti conurbation is higher.

The answer to the question in the title of this article has turned out to be banal: hypercentralization is continuing, and the whole country's human resources will continue to be concentrated in the Moscow conurbation and in St. Petersburg. The situation can only be changed by a radical improvement in the standard and quality of life in other cities with high populations. For the moment, though, federal and regional authorities are occupied in battles with mayors and local governments. They simply don't have the time.

**RESOURCES OF THE FUTURE:  
"THERE WON'T BE A WAR, BUT THERE WILL BE SUCH A BATTLE FOR PEACE..."**



*Sergey Pereslegin*  
*Head of Theoretical Department*  
*St. Petersburg School of Scenarios*

1

In fact, this story begins many years ago, when Russia lost first the Crimean War, then the Russian-Japanese War. Although there was an important and famous triumph between these two defeats, it was only a victory over Turkey, and the "Turkish team" was not in the "Premier League", a fact that was understood by everyone.

The general conclusion arrived at by the Russian establishment between the Russian-Japanese War and the First World War was brilliantly summed up by Leonid Sobolev: "a military empire, covered with medals in memory of the dozens of wars it had fought, but incapable of war".

To be fair to the ruling elite, it realised this. The period between the first and second Russian

revolutions was filled not only with measures to increase the battle-readiness of the troops and the competence of their commanders, but also with concerted efforts to comprehend the fundamental causes of their defeat. Here it has to be said that even such biased and literate critics of the "rotten Imperial regime" as the Bolsheviks saw only the tip of the iceberg. They linked the defeat with the degradation and lethargy of the military hierarchy, the soldiers' lack of education, Russia's technical backwardness (incidentally, extreme backwardness in comparison with Japan, which had only recently set out on the road to industrial development), and social factors. All these undoubtedly "had their place", but on a no greater scale than in other wars that the Russian Empire, for better or worse, had won, so creating the world's largest continental colonial empire.

For many centuries the power and might of Russia was determined by the enormous size of its territory and its huge population. The empire possessed in full measure the two most important resources for traditional development - arable land and a population capable of working it. These resources were converted into numerous army regiments, warships, monumental construction in the capital, and railway projects that were vast by European standards. The defeats by the British-French coalition and Japan showed that the time had come when these resources were no longer effective.

These new conditions saw the arrival of the Commission for the Development of Production Forces in Russia. Its task was to investigate how resources were important in the industrial development phase, whether it was only Russia that had them, and, if so, where they were located and how they could be transformed from potential opportunities into a genuine military and economic force.

It immediately became clear that the dimensions of the country had been transformed from a resource into a potential weakness. In the first place, it was physically impossible to catch Europe in the amount of railway tracks, in spite of any records for laying them (the Trans-Siberian Railway is in the Guinness Book of Records in three nominations: total length, number of stations and speed of construction). Secondly, even the lines that had to be laid for purely strategic reasons would swallow up the entire state budget, while the speed of Russian mobilisation would still lag behind that of the European powers by several weeks. Thirdly, even if it were possible to guarantee industrial development at the same level as Belgium or France, Russian production would still not be competitive, since the average transport obligation in Russia would, in any event, be greater than that in Europe.

The most important result of the Commission's work was an understanding of the role of the transport and infrastructure connection in the industrial competition of world powers. The October revolution of 1917, industrialisation and the subsequent decades of Soviet history all took place against the background of the battle with deficiencies in the infrastructure. This battle was waged with varying success, but in general the task of building competitive industry in Russia was fulfilled. The role of the Commission in carrying out Soviet economic strategy was very great: suffice it to say that the State Commission for the Electrification of Russia, and later the State Plan, were based on the Commission's work. Sixteen research institutes "germinated" as the result of the expansion of Soviet industrial design under the Commission for the Development of Production Forces.

In this way, the task of accounting for Russia's industrial resources (adequate for the industrial development phase) expressed itself in the creation of a large-scale economic strategy, in which the key role was played not by natural resources themselves, though a great deal of attention was paid to them, but their linking through the advanced development of infrastructural components. To put it more simply, it can be said that an adequate mechanism for implementing the Commission's programme was created only in the 1970s, in the form of the conception of a territorial production complex. It has to be stressed that the revolutionary upheavals were an

essential condition for the implementation of an industrialisation programme for the country. Despite all its efforts and in any circumstances, Imperial Russia could never have implemented a structural rebuilding of the economy and an "upgrade" of the population to the needs of the industrial development phase. By 1916 this was evident not only to the most "progressive" members of the ruling elite, but also to the court clique. In actual fact, by 1917 the question of whether there would be a revolution or not was no longer asked. The only matter under discussion was who would come to power, by what means and at what cost. Stolypin was wrong: it is great upheavals that are the key to Russia's greatness.

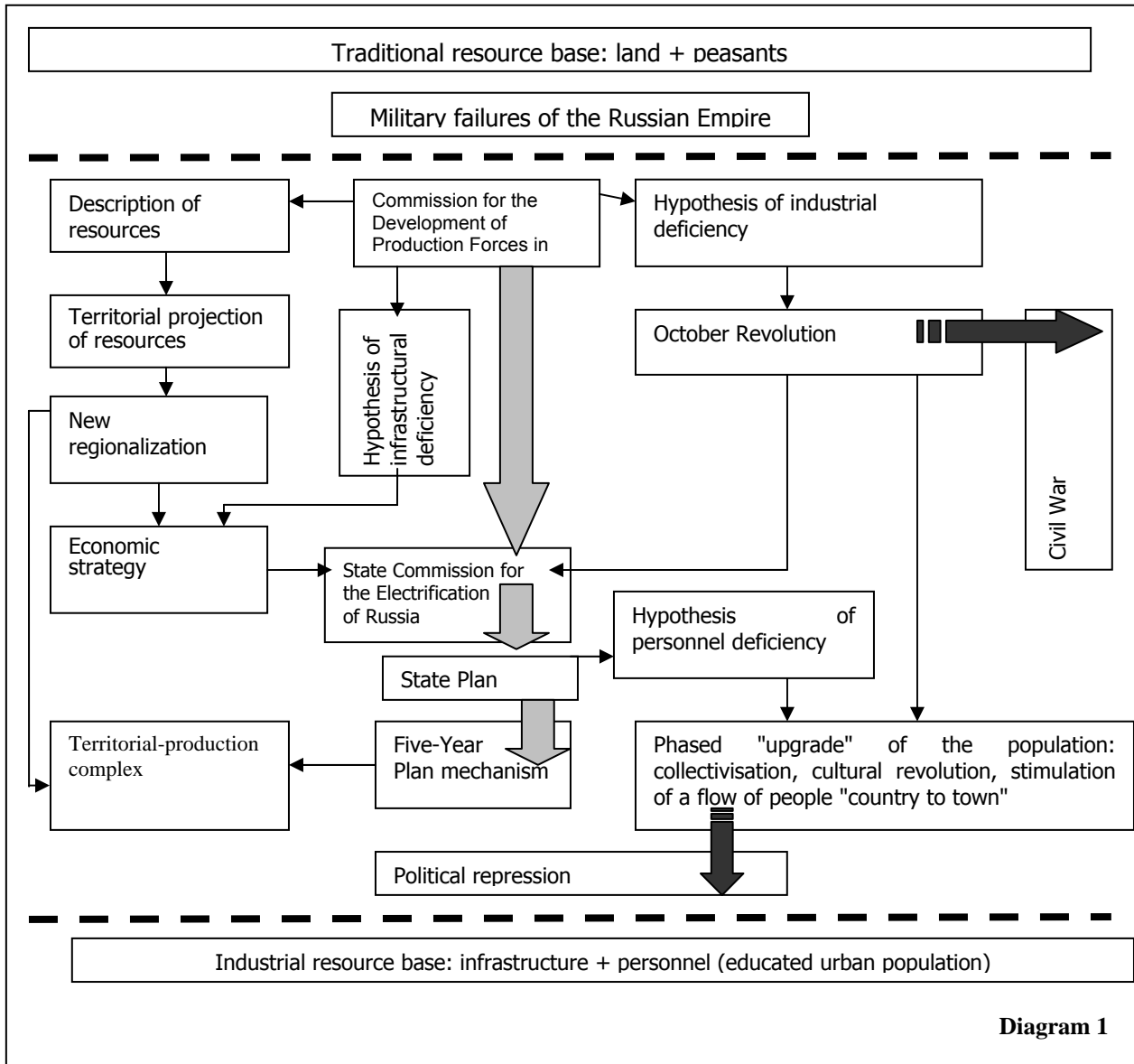
The cost of the transformation turned out to be monstrous - in people, in material values and in territory. In the next stage of development the greater part of the lost lands were returned, but not for long. We should bear in mind, however, that the phased reconstruction of an economy is always accompanied by human casualties, and there is no basis for thinking that in the course of industrialisation Russia lost a greater percentage of its population than, say, Britain in the course of its industrial revolution spread over two centuries. "The Sheep Ate The People", is what they said, and continue to say, about that period.

Whatever may be the case, in the first two decades after the revolution (1917-1937) the population of Russia/ the Soviet Union was transformed from a predominantly rural population into a predominantly urban industrial population. Its numbers fell (as a result of emigration, repression and starvation), but its quality improved. By the outbreak of the Second World War the country had fully restored its resources: the traditional "land plus peasants" package had been replaced by an industrial "infrastructures plus personnel" package.

## **Summary**

1. A search for "new resources" is undertaken only in conditions where the national elite recognises the insufficiency of a key package of "old resources" (in the traditional phase - land and peasants).
2. This search necessarily leads to the installation of a new package with resource-connected capabilities (in the industrial phase - infrastructures and personnel).
3. This installation is only possible by revolutionary means (in particularly favourable circumstances in the form of a "revolution from the top").
4. This revolution is accompanied by substantial public upheavals and significant human and material losses. The "old" and "new" key packages for the management of resources wage a relentless war with one another, and this war is waged throughout the whole country.
5. Degradation of human capital occurs: the social stratum that was previously the basis of productive forces becomes an economically passive "population" under the new conditions. The country begins to experience an acute shortage of manpower, which is overcome, firstly, by personnel logistics, and secondly by the development of adequate educational programmes.
6. The introduction of a new key package for resource management requires the territorial reformation of the country (a new regional policy). In many cases this reformation may lead to territorial losses or increased internal instability.
7. Refusal to install this new key package (for religious reasons, humane considerations or a sense of self-preservation) will lead to the country being transformed into a colony or semi-colony, and,

in the future, to the implementation of the same reformations, but under outside control. The "cost" of this scenario can be estimated by the examples of Turkey, China, Korea, and a number of other countries.



2

Human history has usually featured phases of identical activity. We can, therefore, introduce the concept of a phased human wasteland. The archaic, traditional, industrial or cognitive phased human wasteland is territory where the types of activity typical of that phase are either not fulfilled at all, or are fulfilled with very great difficulty. In the archaic human wasteland the food resource is, in fact, exhausted. The basic form of activity in the archaic phase is hunting and gathering, and, sooner or later, on account of the growth of the population, the territory loses its capability to provide the resource that is essential for the biological survival of the growing human population. Man, as an "absolute predator", "eats through the ecosystem", and its biological variety is disastrously reduced: an archaic human wasteland appears, where it is possible to live, of course, but with very great difficulty. Society begins to experience acute food pressure, and there are three

possible alternatives, two realistic and one fantastic. The realistic alternatives are degradation, and an attempt to move to a place where the resource is not yet exhausted; the fantastic alternative is an attempt to go over to a different means of organisation and to the use of fundamentally different resources (to complete the phase: to overcome the neolithic barrier and build the traditional phase of development).

We should note that it is possible, in principle, to move any number of times to a place where the resource is not yet exhausted, but if a shortage of that resource has already occurred once, it will be repeated again and again, and will happen more and more quickly. In the end, places on earth where it is possible to move in search of the resource will either simply disappear, or will turn out to be inaccessible to that particular community.

The following traditional phase of development resolves the problem of the archaic human wasteland once and for all. When "one works and six take the pickings", food ceases to be the most valuable commodity. Now the most valuable resource is arable land that can be cultivated and worked. Accordingly, the human wastelands of the traditional phase include lands that have to be taken out of use because of exhaustion, salty soil and other phenomena of that type. In the final analysis, man uses the potential of the land to the full: since he is altering the ecosystem in the area where he lives, and is adjusting the ecosystem to suit himself and his requirements, he becomes not only the supreme manager of a brick in the biological food pyramid, but a designer of ecosystems. This is a different level of development, and it provides far more possibilities. The population and the variety of forms of activity grows quickly, states and civilisations appear... and this has to be paid for by the impoverishment of the soil and building on the land, which has already been ploughed and irrigated, and now cannot be further improved. If we study the history of the American continent, we find that the progress from east to west from ploughed lands to virgin soil occurs with ever increasing speed. Again we see an inevitable human flow, from an area where everything has already been done and where there are already shortages to an area where land can still be found and cultivated.

Whereas in the archaic phase the ecosystem is "eaten through", in the traditional phase, where ecosystems are "assembled" and "dismantled", it is the landscape that is "eaten through".

With the introduction of the steam engine, and railways and ships capable of carrying large cargoes, the area where sowing takes place becomes totally unimportant. Arable land ceases to be an absolute value - it will always be found "somewhere", and if we have ships and railways, we can deliver grain where it is needed cheaply and quickly.

However, it then turns out that in the industrial phase the main activity is the creation and maintenance of communications. Consequently, the industrial phase "eats through" communications.

What does this mean: "eats through" communications? The industrial wasteland is a very special place: a place where, for some reason, building communications is unprofitable.

Naturally, the population begins to move away from this place. Villages and small towns in developed countries become human wastelands. People leave them and move to large cities - to regions of maximum communications.

However, the city begins to show resistance to communications. The "problem of the last mile" occurs. The most difficult thing is to deliver "anything at all" to the end user. Transporting bananas from Africa to a port is easier and cheaper than unloading them and sending them to supermarket

shelves.

The city turns out to be an area of high transport resistance. It absorbs more and more people, and communications are "eaten through" fastest of all.

In both the traditional and industrial phases we observe the same result: people flee from areas where a resource is scarce to areas where there is plenty of that resource, but at a given moment the concentration of population becomes so great that even the maximum resource of that phase becomes insufficient. The traditional Rome cannot provide itself with enough food: there are too many people for local production capacity, and importing food is too expensive. The industrial city cannot provide itself with enough food, water, electricity, heat, roads - there are too many people for the limited capacity of the railways and motorways.

The possibilities of the industrial city are, of course, significantly greater than those of the traditional city. For the traditional city the upper limit of development is reached when, as a result of its size, it becomes physically impossible to deliver the food it requires: it will be spoilt in transit (stolen, consumed...). For the industrial city the limit is determined by the physical impossibility of building still more communications. Moscow, for example, experiences a communication crisis every day.

Every time that a phase crisis occurs, the feeling arises that "it's not that bad". We could just build another ring road! However, this is similar to the reasoning of the Americans in the late 18th and early 19th centuries that they could move still further towards the west and find one more untouched field, or the reasoning of the archaic hunter that he would certainly find and kill one more mammoth. It is quite understandable that the population of industrial centres will grow faster than communications networks. And it will grow, above all, on account of the flow of people from villages and small towns. This flow comes from regions where the construction of communications is unprofitable to regions where it is already impossible to construct more.

The crisis of the phase is essentially caused by the flow of people towards the area of maximum development of the means of production characteristic of this phase.

In the traditional phase the law is executed in the form of barbaric invasions, whereas in the industrial phase it may be reformulated in the following way: all types of capital, including human capital, are drawn to the area of maximum capitalization, i.e. to major world cities, whereas forms of production tend to go out to areas of less capitalization and lower costs. That is, to an empty place somewhere. A mechanism is in operation that separates phased production and people. In effect, this creates human wastelands of two types, and the flow of people between them will increase<sup>2</sup>.

The Russian/Soviet Empire came up against this phenomenon in the 1970s in the form of emigration, losses of territorial capitalization and degradation of personnel. The country virtually began turning into an industrial human wasteland of the first type, not supporting industrial forms of activity. Although it was not as noticeable as in the Crimean or Russian-Japanese Wars, in fact, the Arab-Israeli Wars, the conflict in Afghanistan, the political events in Poland, and the diplomatic defeats in the Middle East all demonstrated the country's inability to conduct a modern war. The irony is that on this occasion the social revolution, with all its economic, political, humanitarian and

---

<sup>2</sup> Based on "An Introduction to Medium-Term Forecasting" by the "St. Petersburg School of Scenarios" and "Constructing the Future" research groups

territorial "costs", had neither a plan nor an aim. As a result, twenty years of history were senselessly lost<sup>3</sup>, which, of course, cost far more than Ukraine and Kazakhstan put together, to say nothing of the other republics.

In the last years of the Putin era we have noticed a shift towards the creation of an original Russian post-industrial design system, which has put on the agenda the question of the redescription of the country's territories and the evaluation of its post-industrial resources. In this case it is appropriate to say: "better late than never, though a pity that it is so late".

### 3

The fact that the country now has a post-industrial design system clearly presupposes that the main problems of the industrial age have been solved. To a certain extent this means communism's "material base", whose creation occupied generations of Soviet people.

The foundation of this base is energy: despite the widespread opinion in the West, the post-industrial economy needs immeasurably more energy than the industrial economy, and the development of energy-saving technologies will not help: it reduces the proportional, but not the integral energy consumption of production.

Consequently, the resources of the future will remain the familiar ones of oil, gas, uranium and coke (we will exclude other types of coal, peat, shale and biological fuel from this list because of their low calorie content and their contamination with sulphuric and nitric oxides). Russia has a surplus of these resources, a fact that causes "righteous anger" in many countries. We have already heard several times that "Siberia should be seen as a raw material base for the whole world, not as the individual property of Russia". An important corollary to this thesis is the forecast that Russia will inevitably break up into three states: Russia proper, Siberia and the Far East (sometimes "Russia proper" is additionally said to be set to lose the Volga-Ural Region, the Kaliningrad and Murmansk Regions, but this, of course, is "wishful thinking").

The rapid expansion of geological exploration in Russia will lead, in all probability, to the discovery of new deposits and, consequently, to the appearance of new areas of conflict. In my view, these additional centres of tension will be located in the district of shelved seas - along the Northern sea route and in the Far East. Sooner or later Russia will declare the Okhotskoye Sea to be part of its territorial waters, whereupon the pieces on the "world chessboard" will begin to move... Russia's strategic joke in planting a flag at the North Pole was taken seriously by its neighbours: Canada announced it was building "ice-breaking" cruisers, the USA (for some reason) promised to send an aircraft carrier, while other countries confined themselves to verbal protests, which were incomparably cheaper and just as effective.

Another very important industrial resource is transport (infrastructural) communications: lines of

---

<sup>3</sup> I do not at all wish to undervalue or denigrate the huge amount of work of the Russian political and economic elite during these years. However, having successfully completed the tasks of the country's survival and the restoration of its political and, in part, military status, our government has made virtually no progress towards the creation of a key package for the control of resources that is adequate for the tasks in hand. In fact, the installation of this package was the only justification for "perestroika" and the losses incurred in the course of it. In the meantime, we have only proved that we are capable of getting out of the hole in which we have got ourselves. The creation of an "energy superpower" on the wave of high oil prices is, in essence, an attempt to reintroduce the Soviet Union, but without the colonial empire and the Marxist ideology. The obvious question arises: why, in that case, was the old one destroyed? The example of China clearly shows that a neoindustrial market project can also be built on Soviet political structures.

communication, including pipes and distributive energy networks, railways, motorways, ports and airports, fibre-optics, the main Internet servers, mobile networks (we exclude telephone networks as a rapidly ageing resource). It is clear that infrastructural resources, however many of them there are, are insufficient for post-industrial (cognitive) development, but it is bad when even the "norms" of the industrial age are not being fulfilled.

In the infrastructural field matters in Russia are not entirely hopeless, and that is the best that can be said. It is essential to bear in mind, however, that our country possesses huge potential infrastructural resources: territories without roads and coastlines without ports. There is no question that these resources will be actively "consumed", both by Russia and by the world community.

Separate mention should be made of the Northern sea route, whose importance as the shortest line of communication between Europe and the Asia-Pacific Region is hard to overestimate. As they approach their climatic optimum, the polar seas will begin to be free of ice, increasing the importance of the Arctic, which is already high anyway, both for its strategic significance for the deployment of rocket-launching submarines and for its supposed reserves of oil.

In describing areas of conflict in the near future, it makes sense to start with the political conflict in the Arctic.

Military conflict is also highly likely in the Asia-Pacific Region, where there is a clash of oil-gas and political interests, and a new super-market is taking shape, where separate states and colonial empires continue to exist, and where frontiers are of a fairly debatable character.

The third important resource is people. When the subject of "demographic problems" is brought up, a typical substitution of concepts occurs. There are more than enough people everywhere in the world, and Russia also has sufficient people. But there are no personnel. Human capital, which is talked about so much both here and in the West, was produced in industrial schools and industrial higher education establishments, and is quickly degrading in the post-industrial period. Today there are not even sufficient personnel for established industrial production, let alone for ambitious programmes for a nuclear revival and a nanotechnological breakthrough. What is needed is new-generation personnel, whom nobody educates and who sometimes just appear, but in totally insufficient numbers.

The battle for this resource will be particularly fierce, but it is necessary to bear in mind that the key positions have already been captured by Anglo-Saxon countries, mainly the USA.

We will make the proviso that the situation will change dramatically when a technology for the "enrichment" of human resources appears. This technology will ensure the resource replenishment of several countries, above all those in Eastern Europe, where some remnants of Soviet education survive, providing fairly rich "ore". One can only imagine how fierce the conflict for this cognitive resource with a soul and consciousness will be<sup>4</sup>.

Finally, we will point out as one of the key resources a country's representation in the "market of the Future", its readiness to fight for this market, proposing and promoting its models of

---

<sup>4</sup> The demands being made on cognitive human capital are very high: they include systematic industrial education, philosophical (methodological, religious) education, a high standard of health, high mobility in every sense of the word, trans-professionalism, a high degree of passion, and the understanding and acceptance of the relativity of life and death.

development, its cognitive design system, its vision of the values, aims and threats of the "forthcoming world". Here Russia has historically held quite strong positions. I would suggest that Russia is at least in the "top four" in this respect, along with the USA, Japan and United Europe. The status of an "energy superpower" is good in that it provides the opportunity to set out its position to the world.

The battle for the sphere of ideas describing the Future has been waged for a long time, and now, thanks to the emergence of "advanced" Japanese prognoses, the new developments of the "RAND" Corporation<sup>5</sup>, the black humour of American kremlinologists concerning the murder of Putin<sup>6</sup> (5), British versions of the Future and the work on Russian development scenarios, it has rapidly heated up. We can expect this "front" to remain active in the next few years, and the "conflicts of images of the Future" to assume not only an international character (the Russian version versus the American one), but also a domestic character. For example, several significant structures advancing concrete versions of the Future have already appeared in Russia. It is inevitable that foreign organisations will also intervene in this "ostensibly purely scientific debate".

It is still too early to talk of the next group of conflicts, connected with the new post-industrial regionalisation of the country and the world in general. It is perfectly clear, however, that the "human wasteland" concept will become broader, forming the concept of cognitive human landscapes. These landscapes will certainly include those whose assimilation will promise significant advantages...

## Summary

We can expect a period of bitter conflicts. In the information sphere the conflicts will revolve around images of the Future. In the human sphere the most valuable commodity will be people capable of working with cognitive ideas - a very limited number of people, and, perhaps, systems for training such people. In the sphere of communications the battle will be for regions with unbuilt roads and ports. In the sphere of materials energy resources - oil, gas and uranium - will be of most importance. In territorial terms the conflicts will be grouped in the Arctic, the Far East, and in the most developed areas of the industrial phase: the USA and Japan. However, Russia and the European Union will also not remain on the sidelines in this imminent world conflict.

*"General! I'm scared, we've come to a dead end.  
It's the revenge of a vast expanse.  
Our pikes are rusting. Pikes are  
No longer a guarantee of a target.  
And our shadows do not go before us  
Even in the hour before sunset"*

*(Joseph Brodsky)*

---

<sup>5</sup> The "RAND Project" (now the "RAND Corporation") was founded early in 1945 by a number of American generals at the Douglas Aviation Company in Santa Monica (California, USA), with the aim of protecting the national security of the country. In May 1948 RAND became an independent, private, non-commercial, non-party organisation. One of the corporation's main tasks remains the guarantee of US national security by research and analysis of the most acute problems faced by American society. RAND works closely with the American army.

<sup>6</sup> This refers to the report "Alternative Scenarios for the Future of Russia", prepared by experts at the non-governmental Centre of Strategic Research and published in Washington in late 2007. In one of the scenarios President Putin will be murdered, and a number of regional leaders executed.

## POLAR PROSPECTS



*Ivan Frolov*

*Director of the Arctic and Antarctic Research Institute*

**RER:** As we all know today there are not so many territorial disputes over the Arctic and the Antarctic. Many experts emphasize the growing importance of technological and economic aspects of polar lands exploration. What countries use most efficient and safe technologies and how does Russia fit into this picture?

**I.F.** The Arctic and Antarctic Research Institute does not deal with technologies per se, but you have raised a very important point. Russian Arctic zone accounts for 50 percent of the territory and 60 percent of resources, but for no more than 2,5 percent of Russia's population. Neither our country nor other countries possess technologies for efficient use of these resources. The Canadians and the Norwegians have certain experience in this area, the USA possess some skills. Russia is at the beginning of the process and has to use foreign experience.

At the same time our country takes a leading position in technologies for atomic fleet development. Our nuclear icebreakers are indispensable members of any more or less significant expedition to the Arctic, even when other foreign participants have their own nuclear vessels.

**RER:** Let us discuss another aspect of the topic – prospects for Russia's development of the Lomonosov Ridge for exploration.

**I.F.** It is a serious matter. Natural resource extraction is absolutely necessary. For example, Norway has been producing oil from Arctic shelf for several decades. Of course, accidents happen, but they calculate their risks beforehand and try to minimize possible losses. Naturally, it requires development of certain technologies and appropriate financing. We can not stay aside from the process. Russian needs to produce oil. There is a clear conflict of interests: we have to preserve environment and, at the same time, to maintain comfortable standards of living. A compromise needs to be found but one thing is certain: in exploitation of any resources we need to combine time-tested techniques and modern technologies and to be prepared for elimination of possible accidents. Any activities associated with the operation of ships and uses of mechanical equipment involve risks, the risks needs to be minimized.

**RER:** The Arctic and the Antarctic are a huge potential reservoir of fresh water. The UN experts predict that the wars of the 21st century will be fought over water. What are advantages and disadvantages of fresh water concentrated in the polar zone?

**I.F.** Yes, freshwater reserves in the Arctic are enormous; a large ice sheet is located near Greenland. At the same time there are no technologies for transportation of this water. Also, the effects of fresh water and sea water mixing remain largely unstudied. In the process of transportation of an iceberg to Africa the iceberg will be melting and we do not know how it may affect the environment of a region. Cataclysms cannot be ruled out. First, there would be changes in the heat balance, second – changes in the atmosphere-ocean interaction. In general, the idea of

such transportation seems to be not sufficiently sound. I think mankind will act exactly like in the case of gas and oil, i.e. will start pumping it out, after all, there are such large reservoirs like the Baikal Lake.

Polar icebergs are a reserve to be used in future, when there will be developed appropriate technologies. Some time ago our institute was involved in developing projects for possible transportation of icebergs. Our experts came to the conclusion that it will be necessary to have very powerful boats and also to create a protective coating to prevent the ice from thawing en route. In general, conversion of salt water into fresh water seems to be a much easier process. Actually, desalination facilities have been used in the Caspian Sea area for a long time. Of course, the quality of such water is far from being perfect, but the problem can be very simply solved by adding different mineral elements.

**RER:** What will happen to commercial fish stock? Some experts predict that global warming will change its migration patterns. This may trigger disputes over commercial fishing zones for different countries.

**I.F.** Yes, there are certain quotas set by international organizations for commercial fishing in fishing areas. There has been a lot of talk about dangerously low fish stocks in the Bering Sea. However, research shows that fish migration has happened in the past, there is natural cyclicality in the process. We believe there is no need to overdramatize the role of CO<sub>2</sub> in global warming. So, there are no reasons to expect that man's activity will have a significant impact on fish migration cycles.

**RER:** Do you regard the Arctic and the Antarctic as areas of active exploitation of oil or other resources in the immediate future?

**I.F.** At present exploitation of natural resources in the Antarctic is too expensive. It is a reserve for the future.

As to the Arctic its rich hydrocarbon resources have been intensively explored for a relatively long time. Production developments of oil has been in progress in Alaska for years Norway has been exploiting oil in the area and Russia is just beginning its drilling activities. Oil producing countries would drill further out into the sea if it proves to be expedient and strategically beneficial. Oil companies would continue to develop inexpensive-to-produce reserves. Only when existing oil wells run out they would shift to other places

**RER:** Are there any specific issues in Arctic and Antarctic exploration that would be beneficial for Russia not only in terms of economy?

**I.F.** Our institute studies climate and weather. The Arctic strongly influences the European climate and the weather in some of Russian regions. Climate and weather are extremely important for planning economic activities.

The institute has been exploring the Northern Sea Route since the 1920s; after almost 90 years of our work the route is completely open for commercial exploitation, only there is not much cargo to transport. The size of population in Russia's Arctic zone is inadmissibly small. We need to develop the region, to create transport infrastructure and this requires knowledge of climate-related issues. Weather and climate studies have great economic impact on navigation in the Arctic, on cargo and passenger transportation.

**RER:** Does Russia have its own territorial sector in the Antarctic?

**I.F.** No one has. Under the provisions of the Antarctic Treaty that has been in force for over 50 years and has been extended for another 50 years there are no territorial sections in the Antarctic, although some countries like Chile and Argentina have claims over parts of the Antarctica. But as long as the treaty remains valid (for the period of over 40 years) the current Antarctic's status can not be changed.

**RER:** And what about the territorial issue in the Arctic?

**I.F.** At present there is an international agreement to limit economic activity in the Arctic to a 200 mile zone that follows national coastlines. However, the continental shelf can extend beyond the 200-mile zone. According to the international law the country must offer geological proof that its continental shelf extends beyond its 200 mile zone. But at the present time modern science fails to give the unambiguous answer.

The USA, Canada and Denmark as well as Russia have always been concerned with the problem of continental shelf limits. But not all of them have made definite statements on the issue. So far natural reserves contained in the 200-mile zone seem to be quite sufficient. However, natural resource exploration will be continued.

**RER:** So, you don't expect the Arctic and the Antarctic to become a potential zone of interstate conflicts.

**I.F.** I don't think it possible, as long as the UN convention that regulates the division of territory is observed. I doubt that existing territorial disputes between Russia and Norway and between Russia and the USA would escalate into full-scale conflicts. I don't think there would be any threats to Russia's sovereignty in our 200 mile zone., although there has been a lot of speculations in the foreign mass media about unfairness of having so much energy resources in a scarcely populated Siberia.

I think we will be working on exploration of the Antarctic all together, like the Americans and the Norwegians are working currently in the Arctic. It is also important to note that the area behind the 200 mile zone is covered with thick ice and so far there are no techniques for drilling deep beneath it. Building of specialized ships will take decades. An attempt to drill into ice beyond 400 meters failed, and I think techniques for drilling thick ice are unlikely to emerge in the next 20-30 years.

The Antarctic has been declared a demilitarized zone. In the Arctic the situation is different. Submarines are constantly patrolling waters of the Arctic Circle and dozens of satellites are monitoring the area. For Russia it is a matter of national security, after all, the Arctic coast accounts for almost 70 percent of Russia's maritime border.

## **REALIZING THE POTENTIAL OF RUSSIA'S WATER RESOURCES**



***Sergey Kostyushev,  
Analyst, Centre for Strategic Research "North-West"***

The modern practice of water usage is based on the "unfair" cost of fresh water - in other words, water is an undervalued resource. Without doubt, the perception of this raw material as local, almost inexhaustible and easily accessible<sup>7</sup> (in comparison with, say, fossil fuels) is gradually changing with the introduction of more or less effective legislation on nature preservation and the gradual development of water-saving technologies. However, these positive processes are lagging behind the growth of the world's problems in the accessibility of good-quality water. The lack of water is more and more frequently becoming a "bottleneck" in the economic development of many countries and territories.

In areas where water shortage is critical - in China and India, for example, its use in agriculture is actively subsidized by the state, since it largely dictates the security of the food supply in a country with a huge population. In European countries with a developed water sector - Austria and Germany, for instance, water for irrigation - on the contrary, by virtue of its accessibility - is also provided with minimal cost to manufacturers. The question of a "fair" price for water does not arise.

Increasing the use of water, principally at the expense of the involvement in economic turnover of resources that have not yet been tapped, makes one think of their exhaustibility and "limits of growth". The prospect of a global water shortage is looming. The solution to this problem makes the question of the "reevaluation" of this raw material very pertinent, and also the establishment of a water market or markets - macroregional and global - as a mechanism to regulate the consumption of a limited resource. The market cannot solve ecological problems, but can establish new relationships between consumers.

The practical actualization of water resources as one of the factors of worldwide development will be reinforced under the influence of the following conditions:

- The increasing lack of fresh water resources and the unevenness of their distribution among countries and regions;
- The growth of the economic value of water, the development of a global water resources market, the development of technologies for the transportation and treatment of water.

Accordingly, various scenarios for realising the potential of water resources will be implemented. The alternatives will be linked both to the expansion of the water resource base and a change in the role of water as a factor in production and the cost of assets, and to the factor of the attractiveness of territories to investors and the sphere of technological development.

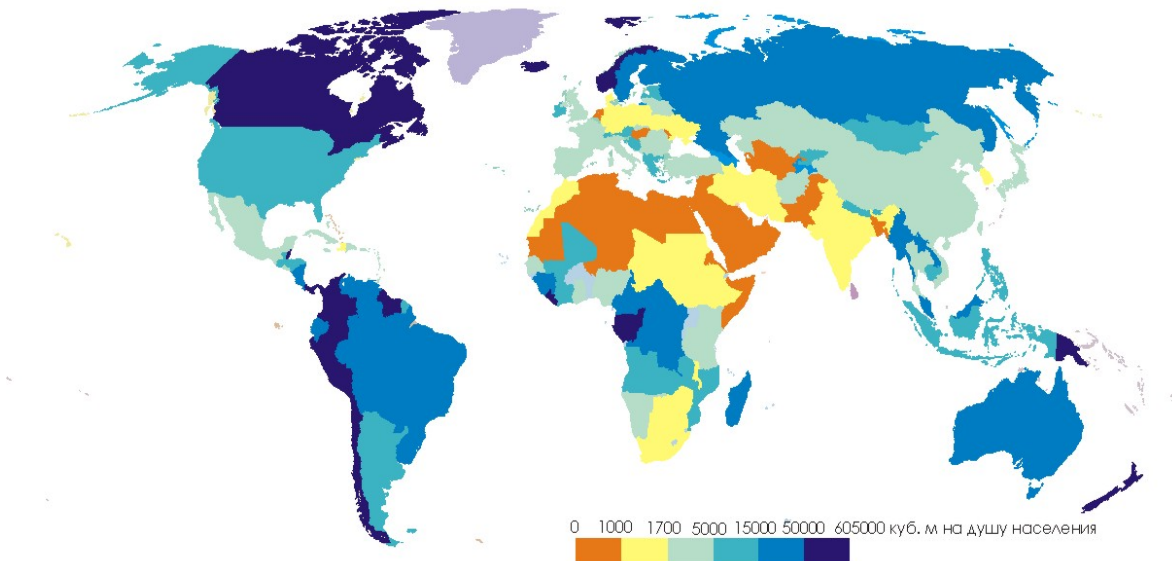
Around a quarter of the world's surface and underground fresh water is concentrated in Russia, but the population of Russia is only 2% of the world's population. In addition, the geographical distribution of water in our country does not coincide with the distribution of the population, which has an influence on the means for realizing water resources. The actualization of water resources in Russia as a factor in the development of individual regions and groups of regions is based on the increasing shortage of water in neighbouring Asian countries, and the low standard of water supply and drainage.

---

<sup>7</sup> This does not apply to drought areas.

Diagram 1. Distribution of fresh water resources in world countries. Dated 2000.

Доступность ресурсов пресной воды по странам мира на 2000 г.  
(сток рек и подземные воды)



Источник: World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life. World Resources Institute (WRI), Washington DC, 2000.

## Agriculture

Agriculture, particularly irrigation farming, is the largest consumer of the world's water resources. By 2030 the world will need 55% more food than it does today, which will lead to an increase in irrigation. Because of the growth in population, which is exceeding the increase in arable land, the area of ploughed field per head of population is decreasing. The resource of undeveloped arable land remains very insignificant, though Russia does have such resources. In combination with sufficient water resources (albeit with significant interregional gaps), this gives our country the possibility to realize the potential of grain production and will guarantee it a niche on the world food market. The priority regions from this point of view are the European part of Russia, southern regions of Siberia and the Far East.

For this potential to be realized, the problem of the uneven distribution of water will need to be addressed. A major federal project aimed at resolving this problem is the construction of the Southern Transregional Water System (STWS), whose 1400 km network of pipes encompasses the south of the Volgograd Region, the west of the Astrakhan Region, the northeast part of the Stavropol Region, and the Kalmyk Republic. The STWS, which is due to be ready in 2013, will provide valuable experience in the design and construction of large infrastructures for water transportation. It will demonstrate the economic and social effectiveness of such projects, and also the consequences for the environment.

## Hydro-Electric Power

The output of the world's hydro-electric power stations shows a tendency for growth in developing countries - in developed countries the potential of such energy has, to a large extent, been exhausted. Russia has the world's second largest hydro-electric potential (852 billion kilowatts per hour, after China with 1,750 billion kwph). This accounts for 12% of the world's hydro-electric

potential<sup>8</sup>, and the level of its development in Russia is not high (around 20%). Our untapped hydro-electric power resource amounts to 200 billion kilowatts, equivalent to the burning of over 60 billion cubic metres of gas annually.

The investment programme of the "HydroOGK" company, which has the Russian monopoly on hydro-electric power, envisages the building of a number of hydro-electric power stations of varying capacity in various regions of Russia before 2010. About 80% of Russia's hydro-electricity potential is concentrated in Siberia. The potential in the central part of the country is not great and is limited to the construction of hydro-accumulative stations; there are specific resources for the possible use of hydro-electric power in the Northern Caucasus (small and medium-sized power stations).

The development of hydro-electric power in Siberia and the Far East is dictated by the potential demand for energy that may be created in the regions or abroad. There is talk of exporting electric power to China, which is the largest potential consumer. The realization of the hydro-electric potential of water resources in Siberia will provide the energy infrastructures essential for the creation of regional "points of growth" in the form of clusters of power-consuming industries, as well as energy for export.

### **Residential Water Supply**

Around 80% of the world's communal water services are provided by the public sector. It is only in France, Britain and the Czech Republic that the water sector is largely controlled by private companies. The world's private water sector is dominated by two French companies, "Suez" and "Veolia", which handle around 70% of private water contracts. There are also several European companies with small shares in the market. The leading magazine in the water market, "Global Water Intelligence", estimates the annual volume of the global water market to be worth from \$425 billion to \$700 billion.

In addition, the magazine forecasts that the Eastern European market, and the Russian market in particular, will not grow substantially in the medium term. Meanwhile, several years ago Russia began transforming its residential water supply, which facilitated the country's inclusion in the global market of municipal water usage. By virtue of its high reserves, the sector is intending large-scale long-term investment. Taking into account the deterioration of infrastructures in the Russian municipal economy (60-80%), the state is not in a position to provide the necessary level of capital investment and quality of management. As a result, the movement towards increasing the role of private enterprises is understandable. At present, according to information provided by "Rosstroy", private operators in the sphere of water supply and drainage account for 41% of all enterprises<sup>9</sup> (3). They include several large (by Russian standards) interregional companies affiliated to major Russian businesses. At the same time, the international financial institutions (the EBRD and the World Bank) and Western companies (Veolia), which can provide the necessary technology and design experience, are showing an interest in the Russian water market, which is to significant degree open and loss-making from the point of view of financial resources.

---

<sup>8</sup> Source: "HydroOGK".

<sup>9</sup> For more detail, see: A.Bazhenov. "The Future of Domestic Water Usage in Russia" (Russian Expert Review. 2007. No 1-2).

## Cross-Border Aspects of the Use of Water Resources

Water resources still rarely figure as an export commodity. Nevertheless, there are some private examples: one of the few widely-known large-scale projects of this type is the pipe from Turkey to Israel; water from France is delivered to Algeria by tankers. The scale of projects for the transfer of fresh water within national frontiers is constantly increasing. Construction of dams and canals is being undertaken everywhere. Examples of projects to divert the flow of rivers in the USA are well known. Today the real proving ground for such projects is China.

The question currently under discussion concerning the possibility of China and Central Asian countries using the rich resources of Siberian regions is a sensitive subject for all parties. In all probability, by virtue of the growing demand for water, the enormous difference between the resource potential and its use in neighbouring countries, the question will arise again and again, in spite of ecologists' warnings.

Total water reserves in China are 2.8 trillion cubic metres (6% of the world's reserves), while annual consumption is 840 billion cubic metres. China has the world's fourth largest reserves of fresh water, but it needs only 2300 cubic metres per head of population (121st position in the world). In 2004 the average consumption of water in China was 427 cubic metres per person. In cities the average daily consumption per person was 212 litres, and in rural areas 68 litres. Today the annual shortfall in water is 30-40 billion cubic metres. Considering the size of the population and the intensive urbanisation of the country, both proportional and absolute figures for water consumption will increase rapidly.

The intensive use of water resources in China has its limits, which makes the importation of resources from other countries potentially feasible. According to forecasts by the Chinese Water Ministry, by 2030 the volume of water resources per head of population could fall from the current 2200 cubic metres (less than a third of the average world figure) to no more than 1800 cubic metres, while the total demand for water in China is comparable with the volume of accessible water resources in the country<sup>10</sup>. By that time the use of water resources from Siberia will already be on the agenda in some form or another. There may be several alternative solutions, but the mildest and most mutually advantageous scenario is already demanding attention.

The economic development of the countries of Central Asia also depends on a solution to the problem of water. Climatic conditions and inefficient irrigation technologies in cotton farming - the principal industry in their economies - make Uzbekistan and Turkmenistan the countries with the highest consumption of water per head of population. Despite its diminishing resources of water, Turkmenistan has announced plans to double cotton production in the next decade. This is one of the reasons for the reviving of discussions concerning the transfer of water from the Ob basin to the Syrdarya and Amudarya basins.

One of today's pressing problems for Russia, China and Kazakhstan in the management of cross-border water projects concerns the Chinese plan for the construction of the Cherny Irtysh-Karamay Canal. The projected canal would take 20% annually from the flow of the Cherny Irtysh, which could lead to the shallowing of the Irtysh and problems with water supply for some regions of Kazakhstan and Russia through which it flows. In Kazakhstan 2.5 million people live in the Irtysh basin, and in Russia over a million. Currently around 10% of water from the Irtysh is being used in Chinese territory. By 2020 China plans to increase the removal of water from the Cherny Irtysh by an additional 1 to 1.5 cubic kilometres per year. Taking into account the current level, the total

---

<sup>10</sup> Source: "Sinhua"

removal will be approximately one quarter of the border flow of the Cherny Irtysh.

To guarantee a mild scenario, it is expedient that the solution to these problems should be institutionalized in an all-party format. It is obvious that Russia, China and the countries of Central Asia face a number of "water" challenges that require an all-embracing solution. The all-party format will help to balance the political and economic weight of these countries: China as the largest consumer with the most powerful economy, Russia as the possessor of the largest untapped resources, and the Central Asian republics headed by Kazakhstan, the largest and fastest growing economy in this group of countries. The aim for Russia in this situation is to warn of the risks of the exhaustive use of cross-border water projects in China and Central Asia, and at the same time to realize the potential of Siberian waters with minimal ecological and political risks.

Rejecting or delaying the working out of a scenario for the joint use of water resources that is mutually advantageous and takes into account the variety of potential, may have negative consequences for our country. An adequate platform for this process could be the Shanghai Cooperation Organization - on condition that their relevant agenda is followed.

### **Prospects for the Formation of a Water Market**

The rapid economic growth of developing countries is the main cause of the price increases on the world raw materials markets. For water resources the principal factors in the increase of consumption are: the industrialization of developing countries (increase of water consumption in energy and industry), global urbanization (increase of water consumption in cities), and the growing global food shortage (increase of water consumption in agriculture).

The growing consumption of water resources and their gradual exhaustion will provide the stimulus for the urgent formation of a water market. As already mentioned, the volume of water consumption in China will be close to the volume of the country's water reserves by 2030. By 2070, according to the European Commission, most EU countries will be suffering acute droughts. The significant increase in water prices will guarantee the payment of transport expenses and will trigger large-scale trading in water.

For the transportation of water to be economically acceptable it will be necessary to substantially "revalue" it several times over. There are well-known examples of increases in the price of other raw materials: in 1973 oil prices quadrupled in the space of only six months. The world's dependence on oil as a strategic resource, essential for the functioning and development of the economy, then became evident.

The shortage in water resources has not yet reached a level to threaten a global economic crisis, and stable supplies of water are not problems for production or economic security on a world scale. The world's economy cannot therefore be called "water-dependent" in the full sense in the same way that it is energy-dependent. However, considering the rapid increase in problems of water supply, this prospect is becoming ever more real.

An obvious consequence of this prospect is the appearance of powerful stimuli for the development of integral groups of water technologies: for saving water (for example, effective irrigation technologies), for manufacturing it (desalination of sea water), and technologies for the storage, purification and transportation of water.

## Possible Scenarios for the Actualization of Russian Water Resources

Based on the above, one can put forward three possible scenarios for the actualization of water resources in Russia, to be implemented in various regional and time frames.

Scenario 1. In conditions of general economic growth we will see an intensification of water usage caused by an increase in demand for water as a raw material or as a link in the technological chain. This process will be accompanied by intensified pressure on the environment and the limited introduction of economically effective mechanisms of water usage and ecological defence mechanisms.

Scenario 2. An increase in the use of water resources, accompanied by a revaluation of those resources. This scenario will also be accompanied by intensified pressure on the environment and the introduction of economically effective water usage mechanisms and ecological defence mechanisms. Water will become an important factor in the competitiveness of commodity prices.

Scenario 3. The formation of a macroregional/global water market. The rapid development of trade in water resources with the aid of various transportation technologies (bottled water, pipes, tankers, canals). Water will become an important factor in the cost of companies' assets and a factor in the attractiveness of regions for investment.

## TOURISM AS A RESOURCE



*Irina Smirnova,  
Analyst, Centre for Strategic Research "North-West"*

Today tourism is one of the world economy's growth sectors. The turnover in tourism is higher than that in the automobile industry, the electronics industry or in the agriculture sector<sup>11</sup>. The comparison is inspiring, but are Russian regions really prepared to use this resource?

\*\*\*

A round table dedicated to prospects for development of outbound tourism in Northwest Russia in the situation of the growing globalization of the tourism market was held in St. Petersburg<sup>12</sup>. The event was organized by the Northwest regional branch of the Russian Union of Tourism Industry and the Center for Strategic Research "North-West". Although the discussion was focused mainly on regional aspects of tourism the issues raised by participants of the round table apply to all Russia's regions that develop tourism.

Below you will find some of the thesis discussed by participants of the round table.

### A globalizing market

---

<sup>11</sup> In 2005 world tourism generated over 2 billion dollars a day, according to the World Tourism Organization In 2005 the tourism market volume reached 680 billion dollars and is expected to double by 2020. For reference: in 2004 the estimated volume of such important market for Russia as petrochemistry was 650 billion dollars.

<sup>12</sup> For more information please visit the CSR "North-West" web-site <http://eng.csr-nw.ru/>

The tourism market has become globalized. Russia's regional tourism markets are rapidly losing their isolation and are becoming part of all-Russia, macro regional and global tourism markets. Russian outbound tourism sector has already entered the global market and Russian citizens have a real opportunity to choose tourist products offered by Russian or foreign companies. For Russian companies it means the emergence of the growing number of new competitors.

An overview of the situation as exemplified by the Northwest Russia:

Type of tourism	Regions	Competitors of Northwest at the tourism market		
		2007	2012-2015	2020-2025
Cultural tourism	St. Petersburg, Leningrad, Kaliningrad, Novgorod, Pskov, Vologda oblasts	Eastern European capital cities (Budapest, Prague)	Baltic capital cities (Tallinn, Riga), Kiev (Ukraine)	Non-capital cities in Europe and in the European part of the CIS (Krakow, Lvov).
Ethnotourism	Arkhangelsk Oblast, Karelia	Scandinavian countries	Baltic and Southeast Asia countries, Russia's south, Siberia's south	
Fishing Hunting	Karelia, Murmansk Oblast	Scandinavian countries, Astrakhan	Canada, African countries, Tver Oblast, Siberia	North America, Africa
Active and extreme tourism	Karelia; Pskov, Murmansk, Leningrad, Arkhangelsk, Novgorod, Vologda oblasts; the Komi Republic	Scandinavian countries	The Urals, Russia's south, Siberia, Mongolia	American continent, Africa
Recreational tourism	Leningrad, Kaliningrad, Novgorod oblasts; Karelia	Baltic countries	Moscow agglomeration; Ukraine	
Congress tourism	St. Petersburg, Kaliningrad	Moscow, Baltic countries	Sochi, Yekaterinburg, Kazan	

\*today practically non-existent in Russia

At the same time globalization of the tourism services market opens new opportunities for establishing partnership relations, giving new impulse to consolidation processes in the industry. The question is: would Russian regions take advantage of the opportunity and what kind of services would they be able to offer to this new and highly competitive market?

### **Emergence of new tourist destinations and shift to new territories**

Tourism is a fast growing industry that tends to spread to new regions. World Tourism Organization (WTO) predicts that in the next 15 year the highest growth rates will be

demonstrated by markets of the "new tourism development " countries in Asia Pacific region, in the Middle East, in South Asia and in some of politically stable countries of Africa. Vietnam, Tibet, Tanzania have established themselves on the world tourism map, and even Pakistan is making first attempts to attract tourists. These changes result in global redistribution of world tourist flows.

The tendency is reflected in the Russian market although the intensity of changes is somewhat smaller. The regions like Baikal, the Urals, and Altai are making first steps in positioning themselves on the tourism market. Tourism as a priority development of economy has received a government-level support. The seven tourism and recreational zones created in Russia (Kaliningrad and Irkutsk oblasts, Krasnodarsky, Stavropolsky and Altaisky krajs, the Republic of Buryatiya and Altai) are expected to become new tourism destinations due to availability of rich natural resources and as well as to rapid growth of the infrastructure. Another landmark government project in the tourism sphere for the next 10 years is creation of the infrastructure in the Krasnodarsky Krai for the Olympic Games to be held in Sochi.

New tourism regions will be competing for tourist flows with traditional destinations like Moscow, St. Petersburg, and the Golden Ring cities, which, in their turn, declare intentions for strengthening their positions. According to the General Plan for the Development of Moscow the tourist flow to Russia's capital city is expected to reach 20 million a year by 2025. Currently about 3,8 million tourists come to Moscow a year. The northern capital city also has its plans. According to the Program for Development of St. Petersburg as a Tourism Center the city is expected to attract 5 million tourists a year by 2010.

According to statistics on the country-wide scale the tourist flow has been increasing, but its distribution is uneven. For example, the growth rates of the tourist flow to Russia's Northwest are slower than Russia's average. If this tendency stays unchanged there is a high risk that Northwest regions would shift to the periphery of the tourism market.

### **Consolidation of players**

Big western players that enter the Russian market with their standards and high level of services have strong impact on the market situation in the industry.

Thus, the entrance on new airline and cruise-line operators to the Russian market implies introduction of new standards of work, brought about by foreign companies from highly competitive markets. To stay competitive national carriers have to adapt to global standards.

They confront a choice: they may attempt to outstrip competitors or they may perform some of the functions of foreign companies fitting into their chains. A good illustration of the situation is the global cruise market where Russia occupies a couple of one-hundredths of one percent. The current state of national sea cruise infrastructure (most ships were built in the 1970s), absence of modern passenger terminal facilities with adequate passenger capacity etc), as well as insufficient financial resources, make competitiveness of Russian sea companies questionable. There are two possible variants for development of the situation: either they will be overtaken by Western companies or they will have to leave the market and change specialization.

Many international hotel chains and tour operators realize their projects in Russia creating a highly competitive environment. This process is beneficial for foreign partners as well as for Russian regions which get a pass to the world of big tourism: hotels with international names (like Radisson, SAS, Park Inn, Marriott International) guarantee quality to potential clients and create an

additional motivation for their “own clientele” to visit the country. At the same time, creation of Russia’s hotel chains is underway.

Shopping is an important part of any tour. Therefore, the state of retail business services plays an important role in development of the tourism market in Russia. In the mean time, organized retailing has finally emerged from the shadows of unorganized retailing and is rapidly growing, while new retail formats are actively introduced on the Russian market. The entrance of foreign retailer chains has contributed greatly to development of the market.

**Modern retail markets dynamics**

The tourism market expansion leads to the enlargement of business. A significant tendency is the emergence of an “integrated travel plant” a company that unites air carriers, hotel chains, tour operators and tourism services. The tours are getting more sophisticated, new programs are created and inter-regional tours are launched.

Russian tourism business is also going through unification processes. Tour operators (like Geliopark Group) and hotel owners combine and merge. Russian business starts investing in tourism projects: in creation of ski-resorts (Sheregash, Gladen’kaya etc.), in development of recreation zones around large cities, in particular, around Moscow and St. Petersburg, in construction of sports and leisure complexes (Moscow region is experiencing a real boom in this sphere). Investments are made in hotel business. At the same time, large-scale projects can be realized only by large-scale investors, often by those for whom tourism is not a core business. So, tourism industry experts predict further strengthening of the tendency for consolidation at the Russian tourism market and emergence of vertically integrated holdings.

Although these processes reflect the global trend towards consolidation, Russian travel market players’ attitude to them is ambiguous.

**Tourism clusters in regions**

New technologies are being introduced in tourism business management. Some of Russia’s regions are planning and establishing tourism clusters - networks of compatible interrelated companies and organizations working together to strengthen tourism industry.

Projects of this type are being developed in Russia as well as in Kazakhstan and Ukraine (Crimea), while Turkey already has some experience in implementation of such projects.

*Table 2. New technologies in tourism business management*

Organization and marketing	Transport	Accommodation	Tourism offers
<p>Emergence of an “integrated travel plant”- a company that unites air carriers, hotel chains, tour operators and tourism services.</p> <p>Travel voucher is more than provision of transportation and accommodation. It is a complex product that involves selling new</p>	<p>Improving accessibility of tourist destinations through development of:</p> <ul style="list-style-type: none"> <li>• High-speed railway systems</li> <li>• Low-cost segment of air transportation market</li> </ul> <p>Introduction and active use</p>	<p>On-line booking systems account for almost 60% of all hotel bookings and bill payments in Europe. In Russia the on-line booking is offered by a small number of hotels in large cities. On-line booking accounts for 5% of all hotel bookings and bill payments made by Russian clients in Russia and other countries.</p>	<p>Health. Replacement of traditional treatment procedures by SPA-technologies. State-of-the-art technologies and traditional medicine make the process of rehabilitation less boring and, therefore, more pleasant and exciting</p>

<p>experience, emotions and a certain consumer style. Transformation of the "anchor" makes it possible to involve areas that lack traditional tourist attractions through creating of artificial importance, playing "historic heritage", where the "anchor" is an idea (like thematic parks, where the fairy take characters, games and water attractions act as the "anchor"). Russia's first attempt to commercialize" folk lore was made in Ustyug ("Father Frost's Home").</p>	<p>of on-line booking and payment for air or rail tickets in Western countries. In Russia this business is at the early stage of development and its share in ticket sales structure is negligible.</p>		
---	---	--	--

### Unification of tourism services

Along with changes in tourism management the industry undergoes qualitative changes. Most significant is the tendency towards unification of tourism services and introduction of a networking product.

Unification implies introduction of new internationally accepted standards. The key process is creation of a recognizable tourism product that guarantees a certain quality of services.

- Tourism networks win their own consumer audience which in the choice situation selects familiar service with a familiar price.
- Tour operators networks and travel agencies franchise networks introduce unified standards in a number of spheres – from document processing to company image and quality of services in different network representative offices.
- Global hotel chains guarantee their clients a certain quality level and a set of additional services thus setting the pace for hotel business.
- Creation of interregional routes that combine tourist attractions on a network principle, i.e. in the unified format. For example, Paris suburbs, Baltic seaports combined in a cruise etc.<sup>13</sup>
- Establishment of networks of cultural attractions and historic monuments. For example, the Association of Castles and Museums around the Baltic Sea incorporates 50 castles in 9 countries. (Russia is represented only by the Vyborg castle). In addition to research work the association members organize cultural events that attract additional tourist flows.

In present-day Russian tourism industry the unsegmented market with traditional forms of conducting business is gradually becoming a thing of the past. Experts believe Russia has entered the early stage of travel business unification and in the next 5-7 years Russian travel market will be

<sup>13</sup> In Europe the process of tourism business networking is developing rapidly, it involves not only hotels but also museums, castles (as historic monuments and as an accommodation) and even cities visited by cruise ships. The list can be expanded because the process of integration goes at different levels and in many spheres of activity

segmented and will become more specialized. Regional tourism industries face a challenge: to adopt Western quality standards or to leave the market.

## INNOVATIONS ON THE SIDE



*This article is based on the contents of "An Analysis and Calculation of the Socio-Economic Consequences of Scientific and Technological Development in a Regional Context", prepared by the "North-West" Centre for Strategic Studies and commissioned by the "Kurchatovsky Institute" in 2007 (Head of Research V.N. Knyagin, members of the working group E.A. Alexeyeva, M.S. Lipetskaya, V.V. Movily and others).*

*To guarantee the development of the country's economy in the new phase, the Russian system of innovation technology must undergo substantial changes - above all in the field of state and corporate control of scientific-technical policy (STP).*

### Three trends

There can now be hardly anybody in Russia who needs convincing of the necessity of basing the country's economy on the growth of its innovative segments. It is more important to understand how this growth occurs. Let us establish one thing immediately: the development of a modern innovation technology system in our country is largely being implemented, and will proceed in accordance with general world trends, but undoubtedly with its own national specifics.

The changes in the world innovation environment are currently proceeding in accordance with three trends, dependent in one way or another on state and corporate control of STP.

**The First Trend.** In developed countries the state, after creating the economic and legal environment for the innovation development of the economy as a priority, largely cedes supremacy in the determination of STP to business, primarily to big business. Corporations that demonstrate the demand for a hi-tech product pay the costs of developing it themselves, so becoming the main motive force of innovation activity in the global economy. In the USA the state's share of expenditure on Scientific Research and Experimental Design (SRED) in 2003 was only 30%, in comparison with over 50% in the early 1980s. In Europe too business is taking on more and more of the costs of SRED. Whereas in Britain and France in the early 1990s over 50% of expenditure on SRED was financed by the state, in 2003 these parameters had been reduced to 30% and 39% respectively, and in the last few years have fallen still further.

According to the data of analysts from the American agency Booz Allen Hamilton, 1000 companies - the world leaders in the volume of expenditure on SRED - spent a total of \$407 billion in 2005, whereas in 2004 the figure was \$384 billion. This means that in 2004-2005 alone expenditure by major corporations on SRED increased by 4.2%. As a whole, the share of private investment in SRED in the "golden billion countries" is now close to 70%.

**The second important trend** is connected with changes in approach to the control of STP in the corporations themselves. The creation of technologies within major companies (or under their direct control) is becoming an integral part of the business processes of the most competitive corporations. Frequently companies' research and development departments, thanks not only to their financial capabilities but also to their flexibility and adaptability to market demand, outstrip higher education establishments and scientific research institutions not only in the volume of funds invested, but also in the launching of finished products on the market.

In this situation the role of the traditional research structures - universities, academic and associative scientific research institutes - is radically changing: they are more and more frequently involved in the innovation activity of corporations, becoming part of their scientific-technical policy. The companies, renouncing SRED isolationism, are becoming the clients of scientific centres, forming pools of designers from departments in high-profile educational establishments, scientific research institutes and design bureaux for joint work on specific projects, reserving for themselves a controlling ("conducting") function.

As a result of this co-ordinated action, corporations have reduced expenditure on their own SRED in the last three years from 4.5% to 3.5% of total sales, in a period when the volume of SRED outsourcing rose from 20% to 35%. Such indicators are demonstrated by, for example, the American company NineSigma. It has renounced the absolute priority of internal SRED and has extended its co-operation with independent designers and the multinational giant Procter & Gamble<sup>14</sup>. The company has a technical intelligence department with forty employees, whose tasks include seeking and signing contracts with independent designers of new concepts throughout the world. In addition, Procter & Gamble, with the assistance of the Eli Lilly pharmaceutical company, has created a special website - InnoCentive.com, whose database includes over 70,000 innovative designers. The world has even seen the appearance of whole companies that act as innovation technology brokers - "holders" of research networks. The same NineSigma has created a database of scientific research institutes, research centres that are part of various companies, and independent scientists and designers, including more than a million and a half specialists. It is used to seek out innovative ideas and recruit the members of project groups, designing new technologies commissioned by NineSigma's clients.

**Another trend** determining the development of the world innovation sector is the global migration of centres of industrial manufacture (the principal contemporary consumer of innovative products) and the consequent relocation of SRED centres. The main motive force for such relocations is also the multinational corporations.

At first the relocation of manufacturing affected low-technology branches of industry - the extraction and initial treatment of natural resources. Then large metallurgical companies extended their operations into resource-purveying countries, and timber-processing operations were relocated in districts of timber procurement (this is also evident in the changes taking place in the timber industry in North-West Russia). All this is being brought about by corporations striving to be closer to their resource base, and also to major ports, by the simplification of logistics, i.e. the access of goods to their consumers. The most attractive countries for the transfer of resource-intensive production are currently considered to be the BRIC countries (Brazil, Russia, India and China). The production of oil, gas and chemicals is being relocated in districts rich in raw materials: the BRIC countries, the eastern Arab countries, Pakistan, Vietnam, and now more and more in Africa.

At the present time major research technology centres of resource branches are being relocated in these countries (an oil and gas technopark in the UAE, research and design centres for technological equipment for the mining industry and metallurgy in China, biotechnological centres

---

<sup>14</sup> Whereas in 1970 only 5% of international patents were granted to private inventors, the number has now risen to a third and is still growing. Experts believe that it is difficult for a company with a turnover of \$50 billion to achieve substantial growth based only on its own ideas. In order to increase sales to \$100 billion, 500 new products with a turnover of \$100 million each or 50 products with a turnover of \$1 billion are necessary.

in Brazil, and so on).

In the last decade changes in the world's economic geography have also been taking place in the most technological branches of industry. Developing countries are more and more often being used as outsourcing and offshore zones in car manufacture, ship and aircraft building, precision engineering, electronics and IT. According to the estimates of McKinsey, car manufacture will be relocated still further in the BRIC countries, and the mass civil high-tonnage shipbuilding industry will be transferred from Europe and Japan to Korea and China, where technological centres of shipbuilding, car manufacture, power engineering etc. have been taking shape over the last 20-30 years.

This redistribution of market centres is also leading to the migration of centres of innovation technology. Their proximity to clients and markets (the markets of developing countries are also becoming the main consumer centres) is a token of their long-term competitiveness. This also includes communicational, institutional and cultural accessibility. The attraction of China and India for outsourcing is based, among other things, on the widespread use of English as the language of education, research and technical documentation, which significantly lowers barriers of communication. Since 1993, when Motorola based its first overseas scientific laboratory in China, the number of SRED representations has grown to 700 in that country alone. In India one of the world's major multinationals, General Electric, has taken on more than 2400 employees for the design of aircraft engines, long-life consumer goods and medical equipment. The pharmaceutical companies Astra-Zeneca, Eli Lilly, GlaxoSmithKline, Novartis, Pfizer and Sanofi-Aventis conduct clinical research in India. All this facilitates not only the active development of the process of transferring technologies to that country, but also the creation of India's own technological bases, which will enable it to achieve competitive positions in the world technology market: the centres of technology production being formed there are beginning to focus not so much on internal consumption as on the global market.

### **In Russia - Similar, but Different**

What then is the situation in our country? Firstly, it can be said that Russia's innovative technology system, while remaining an original and independent participant, is being drawn more and more into the global innovation system. A great deal remains to be done, of course, for our innovation environment to become as fertile a ground for the rapid growth of technologies as it is in developed countries. It is essential to finally define intellectual property in legal terms, giving a higher school the freedom to develop on its base numerous small companies, the humus of general innovative growth, and correspondingly to consolidate tax and other preferences by legislation to nourish this growth, without confining it in special zones, etc. However, a general trend is already noticeable.

There is a noticeable redistribution of funds for science and SRED from the state to corporations. For example, the expenditure of "Norilsk Nickel" on SRED is two and a half times greater than the sum Moscow State University allocates to scientific research<sup>15</sup>. Today the research budgets of oil, gas and metallurgical companies run into billions. However, still greater funding for new knowledge and technology is beginning to be allocated by the state not directly through the budget, but through state corporations that are being created. The three-year budget of "Rosnanotekhnologiy" exceeds 150 billion roubles, and this money is earmarked exclusively for the development of new technology. Substantial funding for SRED is promised by "Rosatom" and "Rostekhnologii", which are coming under enormous pressure from the competitive global environment.

---

<sup>15</sup> [www.asi.org.ru](http://www.asi.org.ru)

State corporations will have to arrange research work internally, after swallowing up multiprofile companies. Without doubt, in the case of a large corporation, the arrangement of intracorporate outsourcing - between manufacturing and research companies - will happen more quickly. Large Russian corporations, having "privatized" many high-profile educational establishments, also work with them on the principle of intracorporate outsourcing. However, promising ideas may also be developed "on the side", as do "Norilsk Nickel" and Moscow State University in its hydrogen project. "Bazel", "Rusal" and other major Russian corporations have their own departments devoted to the search for new ideas. Banks are also not averse to this: "VTB" has a successful investment subdivision, whose responsibilities include searching for new ideas and presenting them in a venture package.

The very factors of development in the field of innovation technology are changing. The most advanced, developed branches of Russian industry have already completed the first stage of constructing an innovation technology module in the new paradigm. This stage is largely connected with the appearance in the Russian market of leading world companies - equipment suppliers and service companies seeking to relocate their service centres closer to the market. For example, major suppliers of mining equipment have already arrived in Kuzbass: "JOY" (USA/Britain), "DBT" and "Eickoff" (Germany), "Glinik" and "Fazos" (Poland), and others. "Parker Drilling", "Pride", "KCA Deutag", "ENI-Agip" and "Nabors" are drilling in the Khanty-Mansiysk and Yamalo-Nenetsky autonomous republics. Service centres of suppliers of timber-processing machinery are now located in Irkutsk, Arkhangelsk and Vologda.

In the next stage, with the growth of the consumer market for technically complex production, we should expect the relocation of hi-tech manufacturing in Russian regions in the form of outsourcing. We are talking here of entire branches of industry, using Russian qualified personnel and foreign technological bases. Later scientific centres developing hi-tech products will begin to appear in these markets. Moreover, new science and technology modules will be created on a different institutionalised base, where the role of global players will be particularly great.

*Table 1. Stages of development of traditional and new innovation technology modules in the Russian Federation*

	Stage 1	Stage 2	Stage 3
Traditional Innovation System:	Creation of Scientific Research Institutes, centralized control of the innovation process.	Creation of large scientific-industrial associations. This stage is characterized by maximum productivity.	In market economy conditions, elements of the traditional innovation system cease to work effectively. With the weakening of state control, links between subdivisions are destroyed and the scientific-industrial associations are broken up into segments.
New Innovation System:	Appearance of service centres, orientated towards the production market.	Introduction of outsourcing. Relocation of industrial enterprises closer to the production market. Competitive conditions demand that production quality is constantly improved and the time taken to release products on to the market is reduced.	The necessity of creating a scientific-technological platform under the market requires the relocation of scientific research subdivisions. Creation of mother technologies.

The current development of the Russian economy is redrawing the map of the country's functional macro zones. The geography of the main industrial specializations is also changing. The transport framework is being reorganized. Clusters of logistic and transport services are forming.

We are seeing a shift of manufacturing to new regions in the country. In the raw materials sectors of the world "raw material supercycle" economy, as a result of the exhaustion of known resources, there is an incentive to discover new sources of raw materials. This has led to the appearance of new areas of exploration, primarily in the north and east of Russia.

Along with the relocation of extraction work, the geography of manufacturing output is also changing. This also applies to large-tonnage raw material production relating to the initial treatment of hydrocarbons: the manufacture of mineral fertilisers, synthetic rubber, technical carbon, caprolactam, and so on. Its capacity (and most of these products are for export) is reaching its limit. New manufacturing output is being located on industrial sites in Tobolsk or Surgut, planned in Soviet times, or on sites close to major transport hubs in direct proximity to export markets, and in places convenient for gas connection. Also, as a result of the exhaustion of workable deposits of iron ore, chiefly in the Urals and in Siberia, the question of transferring metallurgical plants (or creating new ones) in the north and east of the country is being raised.

The growth of the domestic market is creating the conditions for an increase in the mechanical engineering sector, orientated, on the one hand, towards end-users (for instance, the manufacture of cars and car components), and, on the other hand, towards investment (the production of heavy mechanical engineering and metal-working). A cluster of car component manufacturers has actually been formed in the central and north-western regions of Russia.

In common with world trends, the relocation of consumer markets for hi-tech products will bring with it the migration of scientific-technical modules. More dynamic will be the science and technology centres, working in liberalized markets, integrated both corporately and institutionally into the global economy. If centres orientated towards industrial consumption follow extraction and mechanical engineering production to the new Russian regions, companies orientated towards the supply of technology to end-user markets (again car manufacture) will, in future, be concentrated near the major consumer markets - Moscow, St. Petersburg and other large cities. As far as the protected markets, particularly the defence, space and nuclear industries, ship and aircraft building are concerned, in the medium term they are most likely to retain their current scientific bases established in the previous stage of the country's development, stationary in both geographical and institutional terms.

It has to be said that in order to relocate innovation technology clusters in the Russian territories, the environmental improvement of those areas will have to be tackled seriously, and specialized markets for educational services and labour organized. There is already a clear tendency in the world for hi-tech clusters to actually formulate the specific organization of the places where they are located, leading to "IT" and "Bio" cities, "aerotropolises", and so on.

As yet the shift of industry to the east is not guaranteed to a sufficient extent by innovation technology. Virtually all the major sectors of the innovation infrastructure are concentrated in the west of Russia, primarily in the highly-populated cities. At the same time, the old industrial regions are facing another problem: they will not have sufficient new industrial parks to accommodate new businesses ("Greenfields"), or technical parks for design and technology. For them the burning question will be how to retain on their territory innovation technology modules of branches of industry that have effectively already emigrated.

## **Barriers to Innovations**

The creation of new scientific-technological centres in the country's territories requires the solution of a number of substantial problems, and will take place in several stages.

The creation and development of new science and technology clusters will, of necessity, be carried out in conditions where the consumer market for Russian innovation technology is not yet fully formed. Most Russian innovation consumers are not yet prepared to be fully-fledged clients: this will take time, so the designers of scientific products will have to aim towards future market demands.

The majority of corporations that are capable of being the driving force for the development of science and technology have not yet established internal systems of "knowledge management". Meanwhile, major western companies, operating according to the strategy and canons of "knowledge management" technology, have included in their own systems exchanges of innovation technology and scientific knowledge with leading Russian technical colleges and research centres. Multinational companies have located their research subdivisions in Russia, and they form the backbone of the innovation sector of the Russian economy<sup>16</sup>. The aim of these corporations is, above all, the reduction of research costs by employing cheaper highly-qualified personnel, and also comparatively inexpensive access to the designs of Russian scientific organizations. The research undertaken by the subdivisions of these multinationals is mainly of an applied character.

Another barrier for the innovation technology sector is the country's shortage of scientific personnel with the necessary qualifications. Russia has the world's fifth largest number of workers in the research and design sphere - 144 for every 1000 people, but we are only 24th in expenditure on SRED and gross domestic product (data for 2004). Russia comes almost bottom in the index for quotes from scientific works and in the number of patents granted, which demonstrates the ineffectiveness of Russian scientists' research work.

This shortage of scientific personnel will only increase. According to data produced by the Social Information Agency, no more than 10% of Russian postgraduates go on to work in scientific jobs. The average time a young scholar spends in science is 6-7 years, but four of these are spent in writing a dissertation. A third of the permanent teaching staff at Russian higher educational establishments are over 60 years of age.

Another problem is that Russian higher educational establishments are not significant players on the technology market. Research and educational activity in Russian higher educational establishments are separate, unlike American and European research universities, where graduates have far more opportunities to participate in design projects than their Russian counterparts. The share of higher educational establishments in the Russian research and design market does not at present exceed 5%, and it is largely research financed by the state and not by business. In the establishments themselves expenditure on research accounts for only a few per cent of the total budget, substantially lower than in the world's most powerful universities.

The problem of the development of the sector is that traditional higher educational establishments

---

<sup>16</sup> This differs from the previous strategy of foreign companies of employing Russian specialists in their research and design departments. Now, according to expert opinion, research and design is largely outsourced (especially if the basic processes, in particular management and marketing, and also the finding of a niche in the market, remain with the client).

and scientific research institutes are outside the market centres where the clients for innovation technology are concentrated. For example, many of the high-profile educational establishments training chemical specialists (the Gubkin State Oil and Gas University, the Mendeleev Russian Chemical-Technological University, the Lomonosov Moscow State Academy of Fine Chemical Technology, the Open University, the Textile University and others) are located in Moscow. At the same time, Astrakhan, Voronezh, Omsk and Ryazan, relatively major centres of oil and gas chemistry, do not have their own higher chemical-technological educational establishments or even the corresponding faculties.

A significant responsibility for the solution of all these difficult problems lies with the corporations. The state's task is to co-ordinate the development of a science and technology module by "mild" means of control, including a cluster policy, and national and regional foresight. Above all, however, the state must convincingly demonstrate by its actions its interest in carrying out a distinct technological policy.

\*\*\*