

Volga Vision – first phase of UNESCO’s Interdisciplinary Initiative for the Sustainable Development of the Volga-Caspian Basin

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Background

In October 1999 representatives of UNESCO’s intergovernmental environmental programmes, the WMO (World Meteorological Organization), GIWA (Global International Water Assessment) and the Project Leader of the Russian Federal Programme “Revival of the Volga” at the meeting in Paris agreed to co-operate in initiating a project for the environmental and human sustainability of the Volga River and Caspian Sea basin.

On 18 May 2001 the Chairs of UNESCO’s five scientific programmes agreed that UNESCO should take the lead in formulating and launching an interdisciplinary science project for the sustainable development of the Volga-Caspian basin. The General Conference of UNESCO consequently included this interdisciplinary project in its regular programme for the years 2002-2003.

The UNESCO Initiative was formally launched at the 4th Great Rivers Forum held in May 2002 in Nizhny Novgorod (Russia).

Following the request of the Russian Federation, the 32nd General Conference of UNESCO in October 2003 decided to extend the project to the end of 2005, with the second phase covering the entire Caspian basin. And this decision was also backed by several riparian countries of the Caspian Sea.

UNESCO’s initiative

The Volga-Caspian basin is of the economic, social and cultural importance for all its riparian countries and worldwide acknowledged. Therefore the rehabilitation and effective future management of the Volga-Caspian basin are urgent international tasks.

To the year 2001 several national and international programmes were launched in the Volga-Caspian basin to improve ecological and human health, develop monitoring protocols and improve natural resource management in the basin. They were based mainly on state-of-the-art scientific principles, methods and results, within well-defined scientific disciplines.

At the same time interdisciplinary research, is still in its infancy.

That is why a planning meeting held at UNESCO’s Paris headquarters in February 2002 decided that the initial goal in the first phase of the proposed project, would be to prepare a science-based Vision for the effective future management of natural and human systems.

Why the Volga Vision?

It was decided that the Vision would focus on the sustainable development of the Volga basin itself, as well as its delta and immediate coastal zone, addressing human well-being through a better understanding of the people-environment interactions.

Why the Volga basin was chosen for preparing the Vision?

There were two reasons:

1. The Volga basin is an important part of the Caspian Sea basin

The Volga River is the largest river system in Europe. It springs in the Valdai hills northwest of Moscow and flows 3 530 km towards the Caspian Sea. The river is navigable for about 2 600 km.

The Volga River basin area covers 1.358 million km² (about 136 million ha). There are more than 200 sizable tributaries of which many are navigable, including the Oka, Samara, Kama and Vetluga. Navigation through the rivers and canals is possible between the Baltic, the Caspian and the Black seas. The mean annual discharge of water at the mouth is 254 km³.

The Volga provides approximately 80 percent of total river discharge into the Caspian Sea, the largest closed water body of the planet. The Caspian Sea basin extends over 3 million km², 47 percent of which is occupied by the Volga basin.

Biodiversity of the Lower Volga region is of global importance and the delta wetlands are considered the best conserved in Europe. A part of the Volga Delta is designated the Astrakhan Biosphere Reserve and approximately half of the estuary zone (sea-side) as a Ramsar site. At least fifteen globally endangered bird species are registered in the Lower Volga, where four of the sturgeon species included in the IUCN (International Union for the Conservation of Nature) Red List have spawning and feeding grounds. One salmon species is on the brink of extinction.

European Russia has more forests than the rest of Europe together, as well as the highest percentage of protected forest areas. Nearly 23 percent of the Volga basin is covered by forest – some 32 million ha.

2. The Volga basin almost totally covered by the territory of the Russian Federation. Therefore organization of work, collection and assessment of information could be easier than in case of the whole Caspian Sea basin.

The Volga basin is shared at least partly by thirty-nine oblasts (or districts) in the Russian Federation and two oblasts in Kazakhstan. There are 444 towns located in the Volga basin area and 57 million people of various nationalities live there. The basin includes the country's most densely populated and industrialized regions including the capital, Moscow. The basin's average population density is 42 inhabitants per square km (thus almost five times higher than the average for the whole Russian Federation). About 80 percent of the population in the basin lives in urban areas. The basin of the Volga River comprises nearly 45 percent of the industrial potential of the Russian Federation, 50 percent of agricultural production facilities.

There is large-scale development of oil and gas deposits in the region. Annual production reaches 80 million tons of crude oil and about 40 billion m³ of gas.

What is Vision?

Sustainable development of river basins necessitates an integrated basin-wide approach. Integrated management of natural resources and ecosystems must be based on an interdisciplinary approach that implies public participation and involvement of local authorities and representatives of civil society. In this sense, the present Vision is expected to serve as a catalyst for a consultation process lasting well beyond the preparation phase of this document.

A vision is a practical picture of a desirable future that can be achieved in a generation time and is worth achieving. The Vision is neither a political document nor a scientific work, yet some appreciation of both is useful in understanding its aim. It has been written by scientists, but with policy- and decision-makers as the primary audience.

The main ideas of the Volga Vision are as follows:

1. The future is largely dependent on the willingness of people to shape it. Therefore Vision provides a sense of mission and an enduring foundation for strategies and actions.

2. The vision concentrates on the environment of the Volga basin and its inhabitants who are part of the environment, both dependent on and responsible for it. It is human-centred, and based on interdisciplinary science, yet it is acknowledged that even within this defined domain the emphasis is on natural/environmental sciences and on the social components.
3. The Vision message needs to be heard and understood beyond the scientific community. Therefore the Vision must use a language and reasoning understandable to all.
4. The main objectives of the Vision, should remain valid for a long time. Consequently the vision should concern basic human aspirations. It would be of no use going into technical details in a vision as these would be obsolete anyway in a decade's time.
5. The objectives should be described with the quantifiable parameters in order to keep them clear and visible so that progress may be measured.

A Vision is not a strategy or action plan for a certain period of time. It concentrates on “where we want to be” as a starting point. Therefore it helps to identify the changes needed to make this future possible. The necessary changes represented through specific goals form the basis of strategies.

The human-centered objectives

There are many factors, which contribute to human well-being and happiness both individually and collectively. The most important things people need or want for themselves and their children, are very basic. They are fairly independent of culture and even education levels. Some needs are physical and other more social or spiritual. There is no doubt that such items as sense of belonging, opportunities for individual physical and cultural development, bringing up a family, having good marital relations are important. But they are not quantifiable.

On the other hand it is possible to identify factors can be directly influenced by a government's action, irrespective of the form of government. This is a set of physical parameters such as health, nutrition, security. Therefore basic physical factors are more fundamental and easier to address.

Based on the above reasoning, the criteria for indicators to describe both the future and the present situation are that they should be:

- centred around basic human aspirations;
- representative of something real and direct;
- valid for and understandable by all people;
- subject to verification;
- present even after twenty-five or thirty years (one generation's time); and
- related to the environment, or dependent at least partially on environmental conditions.

In the Volga Vision the most basic requirements of individuals are brought in the following groups: Health, Nutrition, Security, Housing and settlements, Environment, and Social and economic objectives.

Beside these 6 objectives there are two other aspects relevant in the Volga Vision:

- **Education and Science** and
- **Cultural heritage.**

Education and science are discussed because these two factors influence both how people consider their relation to the environment and the capacity to solve problems that originate from human impacts on the environment.

Cultural heritage is discussed primarily as a set of buildings, monuments, sites and landscapes that need to be protected against pollution or natural processes such as floods.

Such external factors as global change, climate change and variability, environmental and technological change, globalization are discussed in their relation to the physical aspects of the environment.

Description of the present situation

If the vision is to be realistic it would be counter-productive to set expectations too high. For that reason the present situation and existing conditions must be very well understood.

The present and the possible future are described by using selected variables and indicators. In most cases the indicators do not cover the whole scope of the objective they represent but clearly show how close the goal is to being achieved.

In the Vision the Volga Basin is divided into three zones: the Upper, Middle and Lower Volga. In order to make statistical aggregation easier the demarcations of the zones have been made by landscape and adjusted according to the administrative borders.

Very briefly the present situation in the Volga Basin can be described as follows:

Health

The health of the Russian population is not good when compared to various other countries.

In Russia, half of the men do not reach the age of 60.

Poverty and the related living conditions would seem to be the most important contributing factors to ill-health in the Volga Basin. Life expectancy is lower than the average in the poorest regions of the Volga Basin.

Child mortality rates are too high for a country like Russia. It is 4.5 times higher than in the related rate in the European Union.

Bad drinking water quality is one of the most important health factors for small children because it aggravates the effects of poverty, poor nutrition and ineffective health systems.

Microbiological pollution of drinking water is one of the main problems in the Volga basin.

At present none of the 444 cities in the Volga basin is supplied with drinking water that continuously meets the national standards and WHO regulations

The main reason is a very poor state of the water supply distribution systems due to lack of finance for maintenance and repair.

Nutrition

The following conclusions have been made concerning the nutrition and food production in the Volga Basin:

1. At present there is no lack of food supply in the regions of the Volga basin.
However, there is a clear difference in variety of food between urban and rural areas.
2. The average daily calorie consumption per person in the Russian Federation is approximately 2,700 kCal.
This figure is some 500 to 700 kCal lower than the recommended levels for the climate.
3. Food consumption patterns correspond to low purchasing power of a large part of the population.

Productivity of agriculture is low and first of all due to deterioration in the technologies and equipment and decrease in crop yield through the reduced application of fertilizers and pesticides.

This leads to low pollution from agriculture but also to low income of the rural population. Presently the socio-economic conditions of the rural populations are too far below those of urban populations.

Human and environmental security

Major types of natural hazards that occur regularly in the Volga basin and that threaten human security include river floods and coastal flooding, severe storms, forest and peat fires and associated haze, extreme snowfalls and frosts, droughts, landslides and insect infestations.

Poor communities in the rural areas of the basin are especially vulnerable as their ability to totally recover from disaster and to earn a modest income are limited.

A relatively high proportion of deaths in the Volga basin are caused by technological rather than natural hazards.

However, reliable methodologies for systematic damage assessment from emergencies and their negative human and environmental impacts across the country do not yet exist.

Floods are among the regularly occurring and destructive natural disasters in the Volga basin. About 4.7 million people in the basin are reported potentially vulnerable to floods. Settlements in many areas do not have the necessary engineering protection.

Housing and settlements

The average living space is about equal in the three zones in the Volga basin – approximately 20 m² per inhabitant.

There is large difference in supplying with communal services between urban and rural areas. The average indices given in the table are 50 to 80 percent lower for rural areas.

The most important recreational development is in a strip of land along the rivers in the Volga basin from the Upper Volga to Volgograd, where the optimum set of parameters exist: few people, attractive landscapes, numerous islands, and significant numbers of monuments of culture, archaeology, architecture and art.

Compared to smaller countries, the spacious system of Russian urban development is accompanied by an increased cost for designing and maintaining the centralized engineering infrastructure systems, including intra-urban transportation.

Underflooding is one of the most important problem for settlements in the Volga Basin. Practically all large cities of the Volga basin (including Moscow) are subject to underflooding.

No more than 12 percent of the Volga basin's affected cities has protection measures and structures against underflooding. And the area of underflooded lands, as defined on a cadastral database on very humid and waterlogged lands, has increased by 50 percent since 1980. This is partly due to an increase in precipitation in the last twenty years.

Environment

Today, the Volga River is not only a watercourse, but a water system controlled by a cascade of reservoirs. Over the last seventy years, 716 water reservoirs of over 1 million m³ storage capacity have been built. They store almost 70 percent of the mean annual runoff of the Volga basin. There are eleven hydropower stations on the Volga and its major tributary, the Kama. The Volga-Kama system of reservoirs can store almost 200 km³ of water. The total generating capacity of the Volga-Kama cascade is 11,409 MW.

This system is of great significance for the national economy, and is used for generating electric power at the lowest cost, ensuring flood control, creating favourable conditions for stable water supplies and for the navigation of large vessels.

The construction of hydroelectric power stations resulted in significant changes in the natural framework of the Volga basin, radical transformation of ecosystems related with the river network in the basin.

After the construction of dams, those fish species migrating upstream from the Caspian Sea disappeared from the Volga upstream of the Volgograd dam. Only two out of eleven dam structures (Saratov and Volgograd) were equipped with fish elevators having rather low efficiency. The populations of some permanent species were reduced sharply. Nevertheless, not a single fish species disappeared completely.

Before the dam constructions of the Volga, 74 fish species existed; at present there are about 88 fish species. Since the 1980s, some species from the White and Baltic Seas, as well as from the Black and Caspian Seas have appeared in the Upper Volga and migrated within this basin.

Environmental impact of the dams has not been totally negative. For example, negative results due to a slower water exchange in the reservoirs were accompanied by better water quality parameters such as: transparency, colour, content of suspended matters.

Officially the Volga River is moderately polluted. But the results of researches carried out in the Basin shows that water is beta-mesosaprobic, meaning that it is odour free, clear water with a rich vegetation allowing fish to thrive. So the quality is not always ideal, but it is certainly not poor. The alarmist statements about the environment of the Volga basin are not describing the full reality.

Presently, there is enough water available in the Volga basin for all human activities, and the rivers' reservoirs allow a large storage capacity. The average annual discharge at the mouth is 254 km³, and the total use amounts to 25 km³, of which about 3 or 4 km³ is not returned to the river. The volume of wastewater discharge constitutes 20 km³ of which only 10-15 percent are treated to the legally required standards prior to its release into water bodies.

Specially protected areas cover 6% of the Volga Basin territory. There are considerable areas of protected natural territories of provincial and municipal value such as reservations, the natural monuments and historical park complexes. Data on these territories still need to be collected and taken into account. They are in area quite comparable with specially protected areas of federal importance. Specialists believe that the total protected area needs to be increased in order to maintain the region's biodiversity.

In 2000, the total amount of hazardous waste generated In the Volga basin was 41 million tons.

Dumping waste into landfills is common practice in the Russian Federation compared to western countries. About 70 percent of the dumping sites comply with corresponding official standards. Due to the insufficient number of official dumping sites for storing and burying industrial waste, the environmentally harmful practice of illegal dumping has become widespread.

Over the last decade, the total mass of air emissions from stationary sources in the basin has been reduced by 53.6 percent. This is mostly due to the decline of industrial production in the region, and not the adoption of cleaner production techniques. Despite the improvement in air quality in the basin's cities and industrial centres, air pollution is still high in many places. The main reason is the increase of emissions from mobile sources, particularly due to a sharp growth in a number of cars during recent years.

Despite sharp reductions in carbon dioxide emissions, the Russian Federation remains the world's third largest emitter of carbon dioxide from energy, contributing 17 percent of the world greenhouse gas emissions, yet with 22 percent of the world's forested area, it plays an even more significant role in absorption of atmospheric carbon dioxide.

There is considerable potential for greenhouse gas reduction, as energy efficiency in Russia is fairly low. Manufacturing energy use per unit of output is up to twice the level in western European countries.

Social and economic objectives

The current socio-economic situation in the Volga basin is full of contrasts and contradictions. On the one hand, there are regions with a sustainable industrial and agricultural growth potential, attracting Russian and foreign investments. On the other hand, there are depressed regions with a stumbling economy and insignificant investment levels.

In the year 2001 the GDP per inhabitant in the Russian Federation was less than a third of Western Europe's. When the GDP per inhabitant is low, it is much more difficult to find funds for other sectors, like science or the environment, than for immediate basic needs.

Over the past nine years, the income of the middle class has gradually been eroded and the gap between the rich and the poor has widened. At present the income distribution in the Russian Federation is even more skewed than in the United States.

Nearly half of the population (43%) has an income below subsistence level.

In the Russian Federation the percentage of high technology exports as a percentage of manufactured goods is low, while the primary exports as a percentage of merchandise exports is high. This means that the country is not making sufficient use of its scientific potential to earn income.

Education and science

The Russia Federation entered the third millennium as one of the world's **most educated countries**. The adult literacy rate is more than 99 percent.

During the past ten to fifteen years, major changes have occurred in Russian education, affecting every aspect of education from forms of ownership, financing, curricula and educational methods

Economic instability in recent years has led to **insufficient funding** of most educational and scientific institutions and programmes.

Serious under funding leads to the situation when education and science became mostly theoretical because of lack of funds for laboratories and workshops.

Cultural heritage

The cultural heritage of this region is a significant and important part of the multinational population's heritage of the Russian Federation as a whole. A number of 10,922 monuments and sites in the basin have the status of being of federal value and as such are included in the Uniform State Register of objects of cultural value. Seven sites located in the Volga basin are on UNESCO's World Heritage List.

According to the official data, in 2001 in the Federation, more than 13,600 monuments of a historic and cultural value were under negative influence of environmental factors.

Over the last seven years, anthropogenic factors dominated over factors of a natural origin leading to damage to cultural heritage objects.

It is estimated that about 4 percent of the Volga basin's cultural heritage objects are lost every year. That is much more than in the rest of the Federation where the loss is estimated to be around 0.3 percent.

The Volga Basin in a generation's time

Taking into account all the factors that have been set for each of the desired objectives the vision of the future in relation to the past can be presented in table form.

Indicators	2000	2030
Health		
Life expectancy at birth for women	72	77
Life expectancy at birth for men	60	67
Child mortality (under 5 years of age) per 1,000 live births	22	10
% of people in urban areas receiving safe drinking water	50?	90
% of people in rural areas having safe drinking water	30?	60
Nutrition		
Average number of calories per person per day produced in the basin	2900	3200
Animal product (proteins) consumption in grams per person per day	41	50
Agricultural areas with heavy soil pollution in 1,000 ha	130	70
Security		
Number of deaths by natural disasters per year, averaged over 5 years	70?	30
Volume of timber lost in forest fires per year in 1,000 cubic metres	100	50
Housing and Settlements		
Living space in square metres per person in urban areas	19	25
Green open space in urban areas in square metres per person	100	100
% of urban households connected to water supply and sewage systems	85	97
% of rural households connected to water supply	22	60
% of urban households connected to usual systems, such as heating, etc.	68	80
Environment		
Number of endangered species as % of those listed for the year 2000, according to the Red Book	100	100
Specially protected areas in 1,000 km ²	43	120
% of river stretches of high enough quality for fish to reproduce	80?	95
Spawning area in Volga Delta in 1,000 ha	525	700
Sturgeon population as % of the year 1990	60?	100
% of cities where waste and wastewater are properly managed	30	80
Social and economic objectives		
% of people with an income lower than subsistence level	43	20
% of people unemployed or in informal sector	30	10
Part of total income in % received by the poorest quintile of population	4.4	7
Public expenditure for education and science as % of GNP	4.6	7
Other matters		
Public expenditure for cultural heritage as ratio of that of year 2000	1	3
Percentage of damage to cultural heritage because of environmental factors	50	10

It summarizes the results of consultations among scientists on how a desirable future in a generation's time could/should look like in the Volga basin.

The targets given in the table for the year 2030 are not like those used in economic planning. They do not aim to represent infallible truth. Rather, they indicate the direction that has to be taken and their value is a measure of the effort that has to be made to improve the situation. Thus the framework remains flexible. It is quite possible that a certain value be reached already in 2015 or a target value is not reached in 2030 but in 2040. In the end both cases are acceptable.

The objectives for the year 2030 are attainable because the basin has everything that is required for meeting it: the necessary natural and energy resources, sufficient water and a well-educated population.

However, some changes will be necessary to bring about the right conditions for a better future, and these are indicated in the conceptual framework of the Vision.

Concerning the possible future the following statements are relevant:

At present many problems in the Volga basin are related to lack of financial resources. Therefore economic growth is of particular importance for sustainable development of people and the environment. It can not be expected that financial resources will be made available from outside the basin; thus they have to be

generated from within – from services, industry and agriculture. GNP per inhabitant could be tripled in thirty years and this would make possible the creation of a healthy environment.

However, it must be taken into account that such activities will be accompanied by the production of waste. In principle, all industries are able to handle their wastes properly, but there should be incentives and the industry must be able to finance the measures. At present environmental standards in the Volga basin (and in Russia as a whole) are even tougher than international ones, which probably makes them unrealistic. In order to have a better compliance of industry with the environmental standards, the standards and regulations should be reviewed in cooperation with industry becoming stricter only gradually.

It will be necessary to have an agriculture that brings more income and a better social status to the farmers and the rural population in general. Improving agricultural productivity can make more land available to nature.

Improving the microbiological quality of drinking water is the first priority among the environment-related factors that influence public health. The present excuse for frequently providing unsafe drinking water to the population – that is, the bad quality of river and reservoir water and the state of distribution networks – is unacceptable.

As related to the environment it is clear that there is space enough in the basin for maintaining biodiversity at its present levels. More research is necessary on the interrelation between pollutants and human health and biodiversity. It is important to have good knowledge about the man-made factors that impact the environment, such as industrial processes.

In the field of environmental security it is necessary to develop new methods to quantify damage from natural disasters. These methods should be able to cater for possible climate change.

In order to improve environmental conditions, first of all we have to know and understand the present state of the natural environment and its needs. Therefore the environmental monitoring is and remains very important. The environmental information is to be comprehensive, have a purpose, be freely available and be sufficiently documented so that it can eventually be criticized.

There is an urgent need to eliminate the knowledge gaps in the foundation of sustainable development. Data, information and their scientific analysis is needed to prepare the appropriate, well informed policy decisions. In the context of this Vision the policy-relevant research is expected to be multi- and interdisciplinary in the broadest sense. In the transitional phase research must capitalize on its potential to prepare for a better social, economic and ecological future.

Conclusion

One of the main ideas of the Vision is that the future is not determined and not determinable. The future is open. By the year 2030 the Volga Basin is seen to be home to a healthy population, a place with a flourishing economy where there is enough food of the right quality for everyone and where people live in a safe, healthy and interesting environment.

While this Vision aims to develop interdisciplinary approaches to tackling complex problems, UNESCO also expects to assist in the formulation of complementary project proposals, based on this Vision, that would be suitable for donor funding.

The full version of the Volga Vision and a thirty-page Executive Summary of the Volga Vision available as a separate document are supposed to be spread among the policy- and decision-makers.

The electronic version of the Volga Vision is available on web-site:
<http://volga.unesco.ru/docs/index.htm>

The vision approach is expected to be transferable as a concept to other large river basins worldwide.