CABRI-Volga

Report

Deliverable D4

CABRI - Cooperation along a Big River:
Institutional coordination among stakeholders for environmental risk management in the Volga Basin

The Volga Basin's Development: Today's Problems, Tomorrow's Challenges

Challenges and Obstacles in Environmental Risk Management in the Volga Basin

Collaborating partners of the CABRI-Volga D4 Report

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EXECUTIVE SUMMARY

Background

The present report is part of the third phase "Scenario development" of the EU-Russian CABRI-Volga project dealing with challenges and obstacles for sustainable development in the Volga river basin. The main objectives were:

- To identify the main issues, problems and challenges for sustainable development in the Volga river basin
- To identify obstacles to be overcome to meet these challenges
- To make assessments of challenges and obstacles in view of possible developments in the Volga river basin.
- To suggest measures and strategies

Methodological approach

The activities took place in a participatory setting. First, an interactive web site was established to offer a central access point for finding and managing information stored within the CABRI-Volga consortium and to facilitate the input of and discussion among experts. The obtained information has been used for the preparation of the Kazan meeting (3-5 April 2006) that has been organized by the Cadaster in cooperation with Wageningen University. The discussions in the Expert groups were divided into three phases: a) the identification of priority areas and policy objectives, b) a more detailed look into the problems and opportunities or challenges and c) identification of measures and strategies. The experts were also asked to provide their opinion on trends regarding problems and measures in four scenarios. The outcomes of the expert meeting in Kazan have been used in this report. Other important sources of information were: the outcomes of the previous expert meeting in Nizhny Novgorod, the UNESCO Volga Vision, Report D2 "*Environmental Risk Management in the Volga Basin: Overview of the present situation and challenges in Russia and the EU*", report D3 "*Environmental Risk Management in Large River Basins: Overview of current practices in the EU and Russia*".

Critical issues

The discussions in Kazan helped to rank the most important issues in the Volga basin. The critical issues or priority problems identified are summarized in **Table 1**.

Table 1. *Critical issues or priority problems in the Volga basin as selected by the expert groups at the Kazan meeting (3-5 April 2006).*

Environment	Social aspects	Economical aspects	Institutional aspects/ Governance
• Drinking water quality (microbiological contamination) • Ecological problems • Degradation of natural resources	• Poverty • Life quality in Volga basin • Flood risk management	• Ineffective use and management of natural resources • Equitable use of water resources • Economic potential for water transport is not utilized	• Insufficient basin management • Lack of public awareness and participation • Lack of reliable data and user-friendly information

Of all water related issues, water quality and that of drinking water in particular, was considered to be by far the most important critical issue. In general the water quality has improved, but microbiological contamination is still very high, particularly in urban areas. Sewage discharges into the surface water bodies form a major pollution source. Currently, none of the 444 cities in the Volga basin is supplied with drinking water that continuously meets the national standards and WHO regulations.

Biodiversity conservation in the Volga delta and protection of small rivers in the Volga basin are of a high-ranking priority on the basin agenda. Priority problems are the decrease of habitats, overexploitation (e.g. fisheries) and water quality issues leading to a deterioration of the biodiversity.

Although the Volga River is highly regulated by the cascade of dams and artificial reservoirs, floods are among the regularly occurring destructive natural disasters in the Volga basin. So far, the number of deaths has been relatively low. However, the number of people affected

has been much higher. Often, they cause severe damage to agricultural crops, infrastructure and buildings. The level of preparedness and protection in the flood-prone areas of the basin are insufficient. Particularly small towns and rivers are vulnerable.

Along the Volga, there is an increasing demand for water by different sectors. The allocation of water to the different consumers is a problem due to a lack of information on the quantities needed. Moreover, attempts to map this are frustrated by trading between different consumers as a result of price differences. Ineffective water use is a serious problem. For instance, water levels in the reservoirs of the Volga basin are suboptimal for power generation and irrigation for agricultural needs is in a poor state due to a lack of maintenance. The water consumption per capita in the basin is significantly higher than in the EU, pointing to losses during water distribution and/or wasteful ways of handling.

Over the last 15 years a sharp decline in the transport volume by inland waterway transport has been registered. Currently, only a minor fraction of the total freight volume (less than 4 percent) is transported by inland waterways in the Volga basin.

The changes which have been brought about in Russia have gone at the expense of coherence in policy and management. Institutional structures exist, but are not always effective owing to a multitude of reasons, the economic situation being one of the important factors. Despite efforts to use basin management approaches, experts emphasized that they are still not sufficiently used in the Volga basin. Many coordination and cooperation problems exist among and within different levels of Government. The lack of a clear and coherent strategy for the collection (e.g. monitoring programs), storage and exchange of data results in a poor and fragmented information supply, which does not form a good basis for effective management of water and land resources.

In this respect, the Volga basin is not unique, for the same is true for many other large river basins in and outside Europe (see also *report D3*). The need to improve the effectiveness of institutional structures and to strengthen the enforcement of law has been strongly emphasized in all expert groups.

As compared to the EU countries, public awareness and stakeholders' participation in decision-making is low. There is a low sense of urgency and low commitment of important stakeholders such as the industry which hinders decision-making and the implementation and enforcement of legislation.

Table 2. *Major challenges in the Volga basin.*

Critical issue	Challenge
Poor drinking water quality, including microbiological contamination	• To improve drinking water quality to WHO standards, • Access to safe water for all in habitants in 2030
Water pollution	• To determine realistic new environmental quality standards • Design of a process for implementation and enforcement of water pollution measures which enable achievement of both investments in clean technologies and economic viability
Ecological problems	• Avoid further loss of habitats and deterioration of biodiversity
Ineffective use of water resources	• Reduction of water consumption per capita • Equitable use of water resources • Improvement of operation of hydropower plants
Levels of preparedness and protection in flood-prone regions of the basin are low	• To reduce the risks of floods
Waterborne transport on Volga has a relatively small share in total transport	• To improve economic potential for water borne transport
Insufficient basin management	• To improve coordination of activities among and within different layers of Government in the Volga basin • To strengthen the enforcement of law • Increase of participation of important stakeholders (e.g. industry)
Lack of public awareness and participation	• To strengthen public awareness and participation in decision making

Major challenges

The formulated critical issues can be linked to challenges. **Table 2** gives an overview of the major challenges identified.

Summing up the results of the meetings in Nizhny Novgorod and in Kazan as well as the results of the project's midterm validation workshop in Karlsruhe, it can be concluded that the top 3 challenges lie in the area of:

- Water quality
- Basin management
- Public awareness and participation

Improving the drinking water quality towards WHO standards will be a major challenge. In principle, the state of technological knowledge as such is not an important constraint. All basic materials for construction and operation of water supply and sanitation systems are available for a rapid improvement of the present situation. The country has the technological know-how, there is sufficient space, and energy is inexpensive. So, a good basis exists to ensure that, e.g. in a period of 30 years, all cities in the basin have access to safe water and that all inhabitants are properly connected. The main obstacles to be overcome, however, lie in the field of legislation, basin management, financing of implementation measures and public awareness.

For a sustainable development, public awareness and participation is as important as the scientific and technological development of society. The need to increase public awareness of environmental issues and public participation has been identified as a major challenge. Awareness and participation are not objectives in themselves – they serve the higher objective of sustainable development by making decision processes better informed and by strengthening the implementation process through increased support.
The issue of public awareness and participation is relatively new. In the EU, only during recent years structural attention is given to these issues, for instance in the context of the EU Water Framework Directive. Many authorities in the EU are struggling to implement these new practices in environmental practices. The authorities in the Volga Basin stand for a task which is far more demanding, given the socio-economic conditions and the size of the basin.

A major challenge will be to improve administration efficiency and to strengthen the enforcement of law. With regard to the latter it was said that the first and most important task is to adjust the regulations and guidelines in such a way that industry and other important polluters such as municipalities can comply. It will be a major challenge to find the appropriate balance between the economy, environment and social system optimizing

economic and social benefits without irreversible damage to ecosystems or unsustainable exploitation of resources.

Driving forces and constraints

A variety of external factors may have either a promoting or inhibiting effect on actions aimed to achieve the objectives discussed. Some of these factors such as climate change and globalization are difficult to influence, while other factors – the most important of which are basic human needs – are internal to the country and can be influenced, at least to a certain extent. Important external factors are:

- Economic development
- Climate change
- Globalization
- Political and social processes
- Technological changes

Economic development is an important driving force for sustainable development, since environmental measures should be financed and this requires a healthy, taxable economy. The GDP per inhabitant in the RF is much lower than in Western Europe. Health statistics of the WHO show a lower life expectancy in the RF as compared to the EU countries. As far as the current socio-economic situation in the Volga basin is concerned, this region is full of contrasts and contradictions. The combat against poverty and the general improvement of life quality have top priority in the Volga basin. These issues have been discussed implicitly in the expert group meetings. The general opinion was that only improvement of these issues is an important prerequisite, to make real progress in the sustainable development of the Volga basin possible

Climate change has been observed throughout the whole Volga basin. A trend towards rising land air temperature and higher annual precipitation was clearly noted. Advantages are higher water availability in the basin and more favorable conditions for agriculture. Disadvantages are a higher flood risk in the wet areas and more frequent drought periods in the arid areas.

Globalization may cause a change in governance, in particular to a strong role and responsibility at regional and local levels. In addition, dissemination of information facilitates the formation of interest groups and NGOs, and may enhance their political influence.

The transition towards new economic and political systems in the RF has led to new challenges and opportunities. The difficulties which are faced and the transitions which are brought about require time for adaptation. As a consequence, the transition process gives rise to uncertainties and problems. Decentralization of the institutional framework made the RF less cohesive and governance weaker at all levels which made it more difficult to enforce regulations and standards for water management.

Technological innovations in general in industry and transport, and technological improvements related to handling of waste products in particular, may also lead to substantial improvements in air, soil and water quality. Institutional arrangements may promote the development and implementation of such innovations.

Measures and strategies

A major part of the discussions resulted in a large number of suggestions for measures and strategies. An extensive inventory is presented in this report, together with factors that may promote, hinder or block their realization (**section 4.4** and **Annex VI**).

A complicating factor to improve water quality is that the emission source has become more diffuse. Currently, small and medium size industries and households are the most important polluters in the RF. They cannot afford to invest in more sophisticated purification systems, or provide the necessary maintenance of these systems. Therefore, experts proposed for incentives for installing water treatment facilities. However, also a thorough reorganization in the communal households' water supply and treatment sector is needed.

A better protection of the aquatic ecosystems in the Volga basin requires a combination of measures including improvement (or prevention of deterioration) of water quality, increase

of protected areas, multifunctional land use along the river (e.g. flood prevention and nature protection area).

To reduce flood risk it was recommended to improve monitoring and the reliability of forecasts, and to establish effective early warning systems. Protection against disasters through engineering works and other measures require funds. For policy making it is important to have more information on how many people are affected and to what extent. Furthermore, it was recommended to include flood risk in spatial planning.

Measures need to be taken to ensure an appropriate and equitable allocation of water to the different sectors. Both supply management and management of water demand should be undertaken to reduce water losses.

Waterborne transport may provide a valuable contribution to the growing economy of the RF. It was recommended to develop an integrative transport strategy, to establish intermodal (freight) ports strategically positioned at key trade nodes, and to improve the infrastructure.

Funds are needed to put the proper management practices into place and to create and maintain the appropriate infrastructure. At present the Volga river basin generates a considerable income, but little of this is fed back into the system for maintenance and development. It was recommended to introduce economic instruments to mobilize funds, for instance the 'Polluter Pays" principle and economic instruments for other users of the services and goods provided by the Volga, and to develop mechanisms for the allocation of funds to the water sector.

Standards for water quality in the RF are more stringent than corresponding standards in the OECD countries. However, the standards are such that in the majority of cases, the industry and other important polluters like municipalities cannot comply. High standards that cannot be implemented may take incentives to improve away and can be as such counterproductive. A developmental approach can be introduced: set high objectives, but give time, set out a path starting with less strict objectives, but ending at the level pursued. Such an approach

incorporates economic incentives to implement clean technologies and pollution-preventing techniques.

For policy making in practice it will be essential to increase the participation of stakeholders. A variety of issues related to coordination and interaction between the government and various stakeholders have been discussed in detail at the Expert Group meeting. The main question is: How to establish effective interactions between authorities at various levels, on the one hand, and business and civil society on the other hand?
Transparency of information and the possibility to call local authorities to account were considered to be of crucial importance for a proper management. An environment in a modern state can only be properly managed if stakeholders including the local population understand the problems and knowingly supports the necessary measures and restrictions.

Future developments

The future of the Volga basin is subject to many uncertainties making prediction difficult. Therefore, we sketch images of conceivable rather than probable futures. The experts were asked to give their opinion on the proposed measures in view of four scenarios which relate to different world visions defined by two axes: the free world market versus a much higher level of intervention and regulation by governments (horizontal axis), a global approach versus a more regional approach of problems and strategies (vertical axis).

The general opinion is that economic growth in the RF will increase the burden on the environment in the next decades. Without appropriate measures water pollution may evolve into a significantly more widespread problem affecting both human health and ecosystem services and goods. Particularly the 'world markets' scenario and the 'regional markets' scenario carry a high risk, for in these cases economic growth will occur, while environmental issues will receive low priority in the government. Similar future developments are foreseen with respect to ecological problems, the equitable use of natural resources, including water resources, and human security (flood risk). The experts agreed that the challenges identified need to be tackled with high urgency and that the measures proposed constitute a robust, minimum strategy in all scenarios studied.

It is expected that – with the exception of the regional communities scenario - the private sector is more willing to invest in the improvement of water borne transport, in order to fully utilize its economic potential. Consequently, less interference and incentives by governments are necessary and governments will play a more facilitating role. Though less urgent, the measures proposed on this issue can be considered necessary and are well in accordance with the developments foreseen in the scenarios.

As public information and participation are already incorporated in the global cooperation and regional communities' scenario, measures to increase public awareness and participation are expected to be less urgent for these scenarios than in a more market-economy dominated society. Nevertheless, continuous efforts to strengthen public awareness and participation remain necessary. The same is true with respect to basin management. The experts agreed that measures to improve the effectiveness of institutional structures have high priority for all scenarios

CONCLUSIONS

- The water quality of the Volga basin, especially of drinking water, is by far the most important water-related issue. Priority should be given to improve the microbiological quality of drinking water.
- In principle the state of technological knowledge as such is not an important constraint in efforts to improve water quality. The main obstacles to be overcome have to do with legislation, water basin management, financing implementation of water sanitation measures and public awareness.
- Economic development is considered to be one of the most important driving forces for sustainable development. Only improvement of the economy and life quality will make real progress in the sustainable development of the Volga river basin possible.
- A major challenge will be to find the appropriate balance between the economy, environment and social system optimizing economic and social benefits without irreversible damage to ecosystems or unsustainable exploitation of resources.
- It is important to implement regulations and guidelines in such a way that industry and other important polluters like municipalities can comply and are stimulated to make investments in clean technologies. A 'developmental approach' is recommended: set high objectives, but give time, set out a path starting with less strict objectives but ending at the level pursued.
- It is recommended to introduce economic instruments to mobilize funds and to develop mechanisms for the allocation of funds to the water sector.
- For policy making in practice it will be essential to increase participation of stakeholders including the local population, industry, NGOs, scientific communities. In particular, the participation of industry is essential because of – generally speaking - its high influence with respect to environmental issues.
- The improvement of the effectiveness of institutional structures will be an important challenge. In particular, the need has been identified to strongly improve coordination of activities among and within different layers of Government in the Volga river basin and to strengthen the enforcement of law.
- The need to increase public awareness and participation has been identified as a major challenge. They may strengthen the implementation process through increased support.

1. Introduction

The present report is part of the third phase "Scenario development" of the EU-Russian CABRI-Volga project (www.cabri-volga.org) dealing with the opportunities and constraints for a sustainable development of the Volga basin. It is a following-up of the State-of-the-Art Analysis report and Good practices report (Deliverables 2 and 3 respectively) which contain the results of the initial phase of the CABRI-Volga project.

The main objectives of the third phase were:

- To identify the main issues, problems and challenges for sustainable development in the Volga basin
- To identify obstacles to be overcome to meet these challenges.
- To make assessments of challenges and obstacles in view of possible developments of Volga basin
- To suggest measures and strategies

The results obtained at this stage of the project will form the basis for the next stage: "*Recommendations and Future Actions*".

1.1 Scope of this report

It is important to define the scope of this study in order to ensure that the level of expectation matches the amount of time and resources available. In contrast to several EU projects like EUROCAT or NEWATER, with partially comparable objectives, the CABRI project does not focus on research but on networking. Hence, it needs to assemble existing knowledge and information in a participatory setting.

The UNESCO Volga Vision is in this study the prime source of information on Volga basin and forms an important basis for the identification of the main problems and challenges. This report has been a cornerstone for this study. Other information used for this study has been obtained from existing EU projects, papers from open literature (see references), from the input of participants to the web based discussion setup for this stage of the project, and in particular from the input of all participants to the meetings in Nizhny Novgorod (28-30 September 2005) and Kazan (5-7 April 2006). Existing scenarios have been adopted to make

a limited assessment of the problems, challenges and strategies possible. Time and resources did not permit the development and/or implementation of models, so that only a qualitative approach ('expert judgment') was possible. In summary, the report presented here summarizes existing information, recapitulates the views of about two hundred experts from Russia, the EU and the US, and extracts the main conclusions about problems, challenges and measures as discussed at the meetings. The report cannot be comprehensive and may be less balanced in places as contents reflects the input of experts present at the two workshops which was given under high pressure.

1.2 Content of this report

After a description of the applied methodology in *Chapter 2*, a concise overview of the present situation in Volga basin will be given in *Chapter 3*, focussing on the themes that will be discussed in *chapter 4*. For this overview, D2 and D3, and also relevant parts of the Volga vision were used. *Chapter 4* adds the identification of the issues which have the highest priority. These issues were the outcome of the online web-based consultation and of the discussions in the expert groups 1-5 at the workshops in Nizhny Novgorod and Kazan. The issues were linked to policy objectives and subsequently be formulated as main challenges which need to be addressed. Hereafter, important drivers and constraints will be discussed which may affect the human and environmental situation in the Volga basin. Subsequently, the proposed measures and strategies will be discussed, as well as factors that will either promote or hinder the proposed measures. These factors were also taken from the discussions of the expert groups. The robustness or effectiveness of the proposed measures and strategies were assessed using four scenarios describing different socio-economic trends in the Volga basin. In *Chapter 5* we highlight the most important results of this study. We evaluate and interpret their implications and, if possible, relate them to results of other programs or experiences gained in e.g. EU-countries.

2. Methodology

2.1 Approach and project structure

The approach adopted can be summarized as follows:

1. A concise literature survey
2. An interactive web based discussion among a small group of experts
3. Discussion in Expert Groups focusing on priority issues, problems, opportunities and measures in Kazan. The experts were also asked to provide their opinion about trends regarding problems and measures in four scenarios.
4. Analysis of the outcome of the discussions and literature survey, synthesis and preparation of the report.

The project structure was designed based on the following considerations:

1. The activities had to take place in a participatory setting – the report should not reflect just the views of a small team of scientists working on the project.
2. The work package had to be in line with the logic of the entire project and thus be structured according to the five expert groups:
    - River and environmental rehabilitation
    - Human security and vulnerability
    - Natural resources and their sustainable use
    - Connecting goods and people
    - Institutional coordination and cooperation
3. The working methodology had to provide structure connecting issues, challenges and strategies/measures. This logic had to be clear, transparent and simple, as it had to be explained and applied in a short time space. A simplified means-end network was chosen for this purpose. A schematic view is shown in **Fig. 2.1.**

Fig. 2.1 starts from the overarching objective of the project: the need for sustainable development of the river basin. Three different dimensions are discerned. The discussions in the five Expert Groups may contribute to more than one dimension of sustainable development. The discussions in the Expert Groups were divided into three phases: a) the identification of priority areas and policy objectives, b) a more detailed look into the problems and opportunities and c) the identification of measures and strategies. Strategies

entail in this context a combination of measures which have a good perspective to achieve the development pursued.

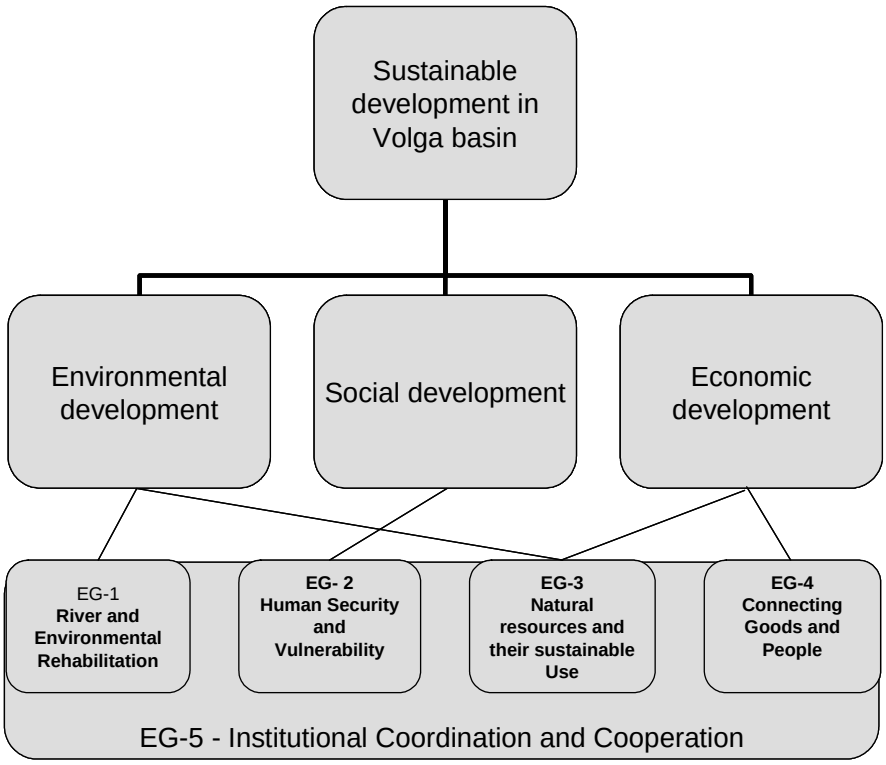

Fig. 2.1. Simplified means-ends objectives network (only main links are shown).

2.2 Interactive web site

An interactive website was established to facilitate the above process (https://portal.wur.nl/sites/CABRI/). The software used for the web site development (Share Point Portal Server 2003) works with Microsoft Windows Explorer, Microsoft Office applications, and Web browsers to help create, manage and share content throughout the joint project. A detailed description of the website is given in **Annex I.**

The site offered a centralized access point for finding and managing information provided access to information stored inside the CABRI-Volga consortium, allowing users to find experts, sites, documents, and other content regardless of location or format. It also facilitated experts working together on documents and other efforts by using the combined collaboration features of Microsoft Share Point Products and Technologies.

During spring 2006 consultation and questionnaire survey took place, where registered experts and partners of the CABRI project contributed to a ranking of Volga sustainability problems across the five thematic areas. The survey's results are given in **Annex II**.

Following this, expert groups' debate took place in Kazan to verify these findings and suggest policy response measures. The discussions helped to define a shortlist of three priority issues.

2.3 Consultation of experts

The Expert Group (EG) meetings in Nizhny Novgorod and Kazan of the CABRI-Volga project brought each together more than a hundred distinguished experts from Russia and the EU countries. The meetings were devoted to improve coordination and collaboration between stakeholders and interested parties in the Volga river basin.

The participants of the EGs were selected and invited on the basis of their professional experiences relating to the main discussion topics within five thematic areas of CABRI-Volga. Each EG consisted of representatives of different stakeholders including the public, business, scientific community and decision-makers.

At the expert group meeting in Kazan the experts had the chance to continue and to intensify the discussion of the first expert group meeting in Nizhny Novgorod. A neutral moderator ensured and organized interactive discussion process and independent expert assessments.

Experts have been asked to discuss particular questions proposed by the moderator. For this the Delphi method was used (see **Annex III**). A briefing note has been written by WP3 describing the working mode including a general guidance for the expert groups (**Annex IV**). A short introduction about CABRI-Volga, WP 3 and the tasks of this meeting started this session. Expectations regarding the outcomes were mentioned including an overview of the major problems of natural resources in the Volga basin, key factors and possible measures.

The session started with the definition of the priority problems. Each expert got cards where to write major problems in the Volga basin in his opinion. The cards were collected by the

moderator who clustered and sorted them in groups. Afterwards all experts named and defined these groups. Finally the named topics were compared with the results of Nizhniy Novgorod added and adapted where possible.

Assessments, results of brainstorming and discussions in EGs were summarized for Report D2 "Environmental Risk Management in the Volga Basin: Overview of the present situation and challenges in Russia and the EU" and for report D3 "Environmental Risk Management in Large River Basins: Overview of current practices in the EU and Russia". These documents were used for the present study.

2.4 Scenario analysis

The WP3 team proposed to test the outcome of the methodology outline above in a scenario approach to examine the robustness of the conclusions to different socio-economic trends.

Scenarios are not precise future predictions but may help to portray the effectiveness of policy strategies in different possible futures. In the present study four socio-economic scenarios developed by the Cadastre (Yaroslavl, Russian Federation) were used. They were based on the 4 scenarios in EURURALIS[1] 1.0 developed by Wageningen UR and RIVM and on the Foresight Future Scenarios (Berkhout and Hertin, 2002).

The scenarios are framed by two orthogonal axes, representing societal values (ranging from consumerist, self-interested market-based preferences to collectivist and conservationist social preferences) and level of effective governance (from local to global) respectively (**Fig. 2.2**).

[1] A scenario study on Europe's Rural Areas to support policy discussion.

Fig. 2.2. Four future scenarios.

World Markets Scenario (A1): A future in which a highly developed and integrated world trading system generates high levels of economic growth. Although average personal affluence rises, there is little concern for social equity. Emphasis is laid on independence, material wealth and mobility to the exclusion of wider social goals. Integrated global markets are presumed to best deliver these goals. Internationally coordinated policy sets framework conditions for the efficient functioning of markets. The provision of goods and services is privatized wherever possible under a principle of "minimal government'. Rights of individuals to personal freedoms are emphasized. Awareness and concern for the environment is low, particularly among the less well-off.

Regional Markets Scenario (A2): A future in which the nation state disengages from international and political and economic systems of governance. This is a low-growth, low-wage and low-investment scenario with little concern for social equity. Emphasis is laid on personal independence and material wealth within a nationally rooted cultural identity. Liberalized markets together with a commitment to build capabilities and resources to secure a high degree of national self-reliance and security are believed to best deliver these goals. Political and cultural institutions are strengthened to buttress national autonomy in a more fragmented world. The environment is perceived as a low-priority issue, despite the increased pressures placed on natural resources.

Global Cooperation Scenario (B1): Future where global institutions play a central role resolving social and environmental problems. High levels of welfare within communities with shared values, more equally distributed opportunities and a sound environment. There is a belief that these objectives are best achieved through active public policy and international cooperation within the European Union and at a global level. Social objectives are met through public provision, increasingly at an international level. Control of markets and people is achieved through a mixture of regulatory and norm-based mechanisms. High levels of investment in research and development result in the development of innovative clean technologies, which benefit the environment.

Regional Communities' Scenario (B2): A future dominated by regional and local systems of government. Emphasis lies on sustainable levels of welfare in local communities ('local stewardship'). Markets are subject to social regulation to ensure more equally distributed opportunities and a high-quality local environment. Active public policy aims to promote economic activities that are small-scale and regional in scope and acts to constrain large-scale markets and technologies. Local communities are strengthened to ensure participative and transparent governance in a complex world. Working at the local level, environmental problems are resolved through collective action.

Table 2.1. *Foresight scenarios characteristics.*

	World Markets (A1)	Regional Markets (A2)	Global Cooperation (B1)	Regional Communities (B2)
Values	Consumerist	Individualist	Conservationist	Conservationist
Governance structures	Weak Dispersed Consultative	Weak National Closed	Strong Coordinated Consultative	Strong Local Participative
International cooperation	multilateral	weak	limited	minimal
GDP (pa)	3%	1,5%	2%	1%
Equity	Declines	declines	Improves	Improves
Fast growing sectors	Health care, leisure, financial services	Private health care and education, maintenance services	Business services, IT, Household services	Small-scale intensive manufacturing, locally based financial and other services, small-scale agriculture
Declining sectors	Manufacturing, agriculture	High-tech specialized services, financial services	Resource intensive agriculture and manufacturing	Retailing, leisure and tourism
Technological development		Slow development due to lack of international cooperation	In some spheres	Slow development due to lack of international cooperation
Water demand	increases	stable	declines	declines
Environmental issues and priorities	Environmental improvement not a priority. Emphasis on issues which impact on the individual or local area	Low priority placed on the environment. Low levels of investments create significant environmental problems	Environmental protection is considered by government as a priority problem	High standards. Effective community action resolves local environmental problems.
Nature, biodiversity and cultural heritage	Protected sites maintained	Protected sites maintained	Protected sites extended	Protected sites extended

3. Current situation in the Volga basin

This chapter gives an overview of the current situation in the Volga basin with respect to the environment, socio-economic aspects and institutional framework and governance. It is based on the UNESCO Volga Vision, on report D2 ("Environmental Risk Management in the Volga Basin: Overview of present situation and challenges in Russia and the EU") and on report D3 ("Environmental Risk Management in Large River Basins: Overview of current practices in the EU and Russia").

3.1 Environment

3.1.1 Water pollution and quality

The numerous industries discharge their wastewaters – in various degrees of treatment – into the river and most cities do not clean their municipal wastewater. Accordingly, there are many environmental black spots in the basin. The main pollutants of the Volga and its tributaries are organic substances, oil, nutrients, phenols, detergents, and heavy metals. Research performed within the framework of the Target Federal Program "Revival of the Volga" (Naidenko, 2003) shows that only 10-30 percent of pollutants are being discharged by the point sources (municipal and industrial waste water discharges) and the bulk of pollutants enters the water bodies from the non-point sources (agricultural and urban runoff). The polluted water discharges in the Volga Basin have been reduced by about 29 percent during the second half of the nineties. This was mainly due to a decline in industrial production during the economic crisis in the 1990s.

Standards for water quality in the form of Maximum Allowable Concentration (MACs) are the same for the whole Russian Federation, and many are more stringent than corresponding standards in OECD countries. Hydro-chemical and hydro-biological parameters clearly indicate that water quality is not ideal, but certainly not poor. Comparison of pollutant concentrations in rivers of the Volga basin and Europe shows that the water quality in the Volga is even better than in the Rhine and the Elbe. Officially the Volga River has been classified as moderately polluted or polluted. However, according to Western Europe standards the river Volga would be classified as reasonably healthy.

Approximately 85 percent of water used for drinking water supply in the Volga basin is taken from surface water sources, including the Volga River itself. In contrast, rural areas rely mostly on groundwater. In 2000, municipal waterworks purified 64.3 percent of total water withdrawal, with 18 percent purified in the rural areas. In 1995 these figures were 56.6 and 14 percent respectively Drinking water quality is one of the Basin's main problems. 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. Data from the Ministry of Health of the Russian Federation show that microbiological quality is one of the main problems for water quality. The World Commission on Water for the 21st Century claimed that up to 97 percent of the surface water is considered unsafe as a source of drinking water. The major reasons for water quality problems are inefficient purification and disinfection systems and the poor state of the municipal drinking water network.

Between 1995 and 2002 the inorganic and organic pollutants in river sediments of the Volga River and some of its tributaries (Oka, Moscow, Sura, Klyazma, etc.) was assessed. The assessment was carried out in the framework of the Russian–German international projects "Oka–Elbe" and "Volga–Rhine". Heavy metals concentrations were generally higher in the upper Volga sediments than in the lower Volga sediments. The investigations showed that the Volga is quite healthy in terms of sediment quality. The Moscow and the Klyazma Rivers are the most polluted in terms of sediment load. The situation is directly related to activity of a large number of enterprises of Moscow and the Moscow region in the basins of these rivers. Reduction of waste water discharge in the 1990s reduced sediment contamination.

3.1.2 Ecology

Aquatic ecosystems

Before the dam constructions in the Volga, seventy-four fish species existed. During recent years up to eighty-eight fish species have been counted. Twenty-three species inhabit the Caspian Sea (sturgeon, herrings and carps) and spawn in the Volga River; the other species are full-time residents of water bodies in the Volga basin.

After construction of the dams, the populations of some permanent species, e.g. grayling, Volga carp, bullhead and others were reduced sharply; and currently there are small local

populations in some tributaries. Nevertheless, not a single fish species disappeared completely. Other populations became more numerous and extended their habitat zones. Populations of vendace (Coregonus albula) and draft smelts from Lake Beloe migrated to all reservoirs in the Volga system. Many fish species which disappeared from the main rivers survive in the tributaries. As a result of lower pollution levels in the basin during the 1990s, these populations increased and are still increasing (chars, dudgeons, minnows, riffle minnows).

The decline of the sturgeon population in the Caspian Sea was caused by the disappearance of 80 percent of the spawning areas upstream of the dams, the changes in the level of the Caspian Sea, the reduction, from 120 million to 70 million sturgeon fry through artificial reproduction, and above all poaching. The poaching also leads to damage to the fishes that escape capture. Moreover, the genetic diversity of the sturgeon species is declining due to the choice of standard fishes for artificial reproduction, the mass illness 1988-1989 and intensive fishing.
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.

Terrestrial ecosystems

Terrestrial ecosystems of the Volga basin include a vast variety of animal species. There are more than fifty species, which are used for hunting including furry animals (squirrel, marten, fox, ermine, polecat, hare, lynx, wolf, brown bear), and near water animals (musk-rat, beaver, mink and desman otter listed in the Red Book. Ten species of forest-inhabiting birds use the water for nesting, with approximately twice as many species inhabiting meadows, marshy plains, fields and steppes.

About 6 percent of the Volga basin area can be classified as special protected zone. The agricultural area covers 50-60 percent, while the rest is forests and pastures. The Agriculture is the principal factor of influence on natural systems in the area. The main threats to the terrestrial species are: decrease of habitat, decrease of food due to pest control, use of insecticides, habitat loss of the prey population, human disturbance, hunting, poaching and illegal capturing and accidents such as collisions with power lines.

3.2 Socio-economic aspects

3.2.1 Water use and availability

The cascade of reservoirs forms a large storage capacity enabling a stable water supply in the Volga basin. Currently, the water availability is sufficient for all human activities. The average annual discharge at the mouth is 254 km^3 per year, and the total water use amounts to 25 km^3, of which about 3 or 4 km^3 is not returned to the river. From 1995 to 2000, industrial and domestic water use did not change much. However, water use for irrigation decreased in the three regions (Upper, Middle and Lower Volga), particularly in the Lower Volga zone where irrigation is widely practiced. There it decreased from 3.4 km^3 in 1995 to 2 km^3 in 2000. So, this is less then 1 percent of the total annual discharge. Total water withdrawal from the natural water sources for public water supply in the Volga basin is 6,442 million m^3 per year.

Renewable groundwater resources in the Volga basin are about 40 km^3 per year. The total groundwater withdrawal amounts to 4.03 km^3 per year which is less than the approved groundwater exploitation (i.e. 7.86 km^3 per year).

The level of water per capita consumption in the basin is about 1.2-1.7 times higher than in the EU. The major reason for the inefficient water consumption is inadequate economic incentive mechanisms to provide for efficient water consumption and water savings both by households and industry.

3.2.2 Flood risk management

Although the Volga River is highly regulated by the cascade of dams and artificial reservoirs, floods are among the regularly occurring and destructive natural disasters in the Volga basin. About 400 thousand sq. km is considered flood prone area and about 4.7 million people in the basin are reported potentially vulnerable to floods. Reliable methodologies for systematic damage assessment from emergencies and their negative human and environmental impacts across the country do not yet exist. In 2004, the damage from floods in the Volga basin accounted for 958 million rubles or 45% of the total national damage from floods that year.

Currently, the levels of local preparedness and protection in the flood prone regions of the basin are poor. Many settlements in the basin do not have the necessary engineering protection because in many cases existing technical norms for the construction of houses in flood-prone areas are violated. Moreover, most of the existing hydro technical facilities are aged and worn out. About one third of dams and water reservoirs have been in operation for more than thirty years and urgently need renovation.

3.2.3 Freight transport

The Volga is a part of diversified European water-way system which connects Volga-Don-Neva and their basins, as well as five seas in the north, south and in the west of the European Russia. The system of artificial reservoirs is of great significance for the national economy. The reservoirs provide water and head for the generation of electric power at low cost and cover the peak loads in the power systems. The high-capacity reservoirs on the rivers ensure flood control and safety of the population and natural areas. In addition, it enables regulation of water level during the navigation period.

The Volga is navigable for about 2,600 km, during 200 days in the north and during 260 days in the south. While in the EU countries the water way transport has seen a slight increase in transport volume over the last 15 years, a sharp decline has been observed in the Russian federation. Freight transport in the Volga-Caspian region mainly takes place by railroads which go along and cross the main rivers. Less than 4 percent (i.e. similar to the whole EU) of the total transport volume is carried by inland waterways, while freight transport by trucks accounts for 6.1% of all freight turnovers. Furthermore, oil and gas are transported by pipelines which intersect the Volga basin.

Inland water transport in the Volga Basin is poorly integrated into the transport systems of Russia and Europe. Transport water corridor Volga-Don-Danube which would connect the large inland waterways of the Rhine, the Main, the Danube, the Dneper, the Don is currently promoted.

3.3 Institutional framework and governance

3.3.1 Environmental protection

From the beginning of the nineties Russia started to develop new environmental policy. In 1991 the first framework environmental law was adopted, which was supplemented later by specific laws dealing with various aspects of environmental protection. This law was replaced in 2002 by the Federal Law "On environmental protection". The environmental management was reformed: authority was transferred from the national to the regional level, economic mechanisms were introduced (polluter-pay-principle) and also environmental impact assessment studies for all economic and industrial activities were carried out. Also public awareness was promoted with free access to ecological information. Furthermore, the Russian Federation participates in international environmental agreements.

Currently, the Ministry for Natural Resources (MNR) is mainly responsible for environmental protection. However, its primary focus is on control over the use of natural resources, especially for Earth's interior, and not on environmental protection. To separate resource-use and environmental protection 4 agencies within MNR have been established: The Federal Agency for Water Resources (FAWR), The Federal Agency for Forestry, The Federal Agency for Earth's interior and The Federal Service for Control over Environmental Uses.

With development of federalism in Russia during the last decade regions began to play a more important role in environmental policy. The Russian federation is divided into 16 large water basins, managed by the specially appointed Water Basin Administrations (WBA) under FAWR, of which 4 are present in the Volga area. Similar administrative structures have been developed with regard to the other 3 agencies. These administrations are responsible for protecting water and managing it in a sustainable manner. Where river basins are shared by several users within the Federation, basin agreements are signed, defining the rights and responsibilities of all regions with regard to water quality. These agreements also form the basis for joint environmental monitoring and data collection needed for joint water management. According to the legislation, agreements should be accompanied by the creation of basin councils representing all main stakeholders. So-called Schemes of Complex Use of Water Resources (which resemble river basin management, plans) should be created

for each river or lake basin. However, these measures are often not as efficient as they might be, for the following reasons:

- There is an absence of legislative framework for the work of basin councils
- Basin agreements have been signed, but their implementation is difficult due to problems with financing water protection measures
- The Schemes of Complex Use of Water Resources remain undeveloped because of economic constraints.

The Basin-level approach to water management that is underscored in the Water Framework Directive of the European Union (EU) is also the basis for Russian water management policy. The legal basis for river basin management in the RF forms the so-called Water Code, which is a national framework law. Recently, on the first of January 2007, a new Water Code came into force. The document describes the powers of federation, regional authorities and municipal councils in use of water objects. All natural water reservoirs remain federal property: rivers, lakes and other objects. Moreover, some types of water objects can become private property, for instance, ponds and flooded pits.

In addition, the new Water Code[2] gives an opportunity to sign use agreements for water objects. Under these contracts, the right of use requires payment. Water resources are divided into 20 areas, as well as river areas, sub areas and water protection areas. The law recognizes water use licenses given before the first of January 2007.

3.3.2 Flood Risk Reduction

National legislation of the Russian Federation in disaster risk reduction consists of the main national framework law "On protection of population and territories from natural and technological emergencies" adopted in 1994. This law forms the basis for a number of federal laws and acts regulating various aspects of disaster reduction, including flood risk reduction.

The Ministry of Civil Defense, Emergencies and Natural Disasters Mitigation (EMERCOM) is primarily responsible for *emergency* flood risk reduction for the Russian Federation,

[2] A more detailed digest of the Code is given in Issue 3-4 of the CABRI-Volga Brief, the project's newsletter, online at: http://cabri-volga.org/publications.html

including regions of the Volga basin. Horizontally, it coordinates its activities in the field with a number of government agencies. For flood *prevention* FAWR of MNR is primarily responsible. EMERCOM has a territorial network of regional bodies responsible for emergencies management, including flood mitigation. In the Volga basin, its activities are performed by its territorial affiliations, i.e. centers for civil defense and emergencies located within districts. The activities of these centers are coordinated by regional disaster management bodies.

FAWR has its own territorial affiliations dealing with water issues and flood prevention in the Volga basin. The 4 Water Basin Administrations are responsible for the maintenance of hydro-technical facilities and regulation of hydrological regimes in the basin and their coordination within the system of Volga water reservoirs.

3.3.3 Inland water transport

Governmental control over inland water transport consists of three layers. The Ministry of Transport develops national policy and lays down the legislative basis. The Federal Agency for Merchant Marine and Inland Shipping, together with its local branches, provide for navigational conditions, governs state properties and render state services in river transport. The Federal Service for Supervision in the Field of Transport performs overall control and supervision

4. Problems, constraints and opportunities

This chapter summarizes the priority issues ('most pressing problems'), challenges or opportunities and measures for improvement as discussed in the Expert Groups. The information available from these meeting has been analyzed. Furthermore, the drivers and constraints are discussed and a projection to the future is made using four existing scenarios.

4.1 Critical issues

Based on the outcomes of the expert meetings in Nizhny Novgorod and in Kazan a selection and ranking of problems in the Volga basin by importance could be made. **Table 4.1** gives an overview of the critical issues or priority problems. The table is based on the results of the discussions in the expert groups at the Kazan meeting (3-5 April 2006). **Annex V** gives an extensive inventory of issues mentioned by the different expert groups.

Table 4.1. Critical issues or priority problems in the Volga basin as selected by the expert groups at the Kazan meeting (3-5 April 2006).

Environment	**Social aspects**	**Economical aspects**	**Institutional aspects/ Governance**
• Drinking water quality (microbiological contamination) • Ecological problems • Degradation of natural resources	• Poverty • Life quality in Volga basin • Flood risk management	• Ineffective use and management of natural resources • Equitable use of water resources • Economic potential for water transport is not utilized	• Insufficient basin management • Lack of public awareness and participation • Lack of reliable data and information

Drinking water quality

Of the directly "water" related issues, the members of the expert groups considered the water quality of the Volga basin, especially of drinking water, by far the most important issue. In general the water quality has improved but microbiological pollution is still very high, particularly in urban areas. This can be attributed to problems with the capacity of sewage disposal system (overflows), the purification system, and water supply distribution.

Ecological problems

Biodiversity conservation in the Volga delta and protection of small rivers in the Volga basin are of a high-ranking priority on the basin agenda. Priority problems are the decrease of habitats, overexploitation (e.g. fisheries) and water quality issues leading to a deterioration of the biodiversity.

Poverty and life quality

The combat against poverty and the improvement of the life quality have top priority in the Volga Basin. The GDP per inhabitant in Russian federation in 2001 is much lower than in Western Europe. As far as the socio-economic situation in the Volga basin is concerned, the region is full of contrast and contradictions. There are regions with a sustainable industrial and agricultural growth potential, attracting Russian and foreign investors. Also regions with a stumbling economy and insignificant investment levels exist. WHO Health Statistics show that the health of the Russian population is worse than in many other countries in Europe. These issues were discussed rather implicitly in the expert groups, i.e. not as a separate, individual issue but as a factor compounding to the difficulties which policy and management face. The general opinion was that only improvement of these issues will make real progress in the sustainable development of the Volga river basin possible.

Flood risk management

Although the number of deaths due to natural disasters is relatively low, the number of people affected is certainly much higher, for example in the case of floods. Often, they result in severe social and economic damage to livelihoods, and require emergency evacuations. They also damage agricultural crops and destroy infrastructure and buildings. Currently, levels of preparedness and protection in the flood-prone areas of the basin are poor. In particular small towns and rivers are vulnerable. The infrastructure maintenance is poor – financial resources are required, the responsibilities need to be delineated.

Equitable use of water resources

Along the Volga, there is an increasing demand for water by different sectors. Examples include agriculture, energy production, municipal and industrial water uses, navigation and

recreation. At present, depending on location and season both excess and lack of water occurs in the Volga basin. The allocation of water to the different consumers is a problem because of a lack of knowledge on the quantities needed. Moreover, attempts to map this are frustrated by trading between different consumers due to price differences.

Ineffective use of natural resources

Ineffective water use is a serious problem. In the household sector the system of water metering has been introduced. The system is not effective, however, owing to institutional limitations. Ineffective use of water resources is also observed in the energy sector, in the agriculture, in the fish industry and in the transport sector. The reservoirs of the Volga basin form a network of hydropower plants operated by a central agency. There are operational problems because in most cases the water level does not reach the optimum water level for energy production. In addition, a number of reservoirs need reconstruction and renovation. For agricultural needs about 300.000 ha are irrigated annually, and it accounts for about 50% of lands irrigated during the Soviet period. However, the irrigation system is in a poor state due to lack of maintenance. In addition, a serious salination of the soil is taking place.

The water consumption per capita in the basin is significantly higher than in the EU, pointing to losses during water distribution and/or wasteful ways of handling.

Economic potential for water transport is not utilized

Over the last 15 years a sharp decline in the total transport volume by inland waterway transport has been registered, from 580 million tons in 1988 to 100 million tons in the middle of 1990s. At the end of the 1990s inland water transport started to increase and in 2004 already 136 million tons of goods were transported. At present, less than 4 percent of the total volume is carried by inland waterways. However, it should be noted that the rivers in the Volga basin are frozen and hardly usable for transportation during several months of the year. It is predicted that the transport volume will further increase to 230 millions tons in 2010. The waterways and their infrastructure are in a bad state and the different transport modes are not linked.

Public awareness

The strong interest in social and economic development during the last decennium has gone at the expense of environmental issues. These have a low priority by policy makers. The same is true for the public. Public polls show that people has more worries about wages, prices, education, crime and social insecurity than about environmental issues (see *report D2*). Improvements in environment are considered as a 'luxury' that cannot be afforded as long as the economic situation has not improved.

Basin management

Despite efforts to use basin management approaches, experts emphasized that they are still not sufficiently used in the Volga basin and many coordination and cooperation problems still exist. In this respect, the Volga basin is not unique, because the same is true for many other large river basins in and outside Europe. As compared to the EU countries, public participation in environmental decision-making is low. There is insufficient coordination between stakeholders and their interests which hinders decision-making and implementation and enforcement of legislation. **Fig. 4.1** gives an overview of the relative influence and interest of stakeholders in the Volga river basin with respect of sustainable development. The figure is based on an enquiry held under experts at the Kazan meeting in April 2006. It shows e.g. that big business and small enterprises have a relatively large influence on a sustainable development of the Volga river basin, but a relatively low commitment. The reverse is true for households.

Lack of reliable data and information

In many cases data exchange between various bodies in the RF is hampered by a variety of problems, the requirement to pay for data being one of them. The different enterprises and agencies use different methods for data collection and different formats for presentation. The lack of a clear and coherent strategy for the collection (e.g. monitoring programs), storage and exchange of data results in a poor and fragmented information supply, which does not form a good basis for effective management of water and land resources. Furthermore, the information is not easy accessible for the general public and not presented in a form that can be easily understood.

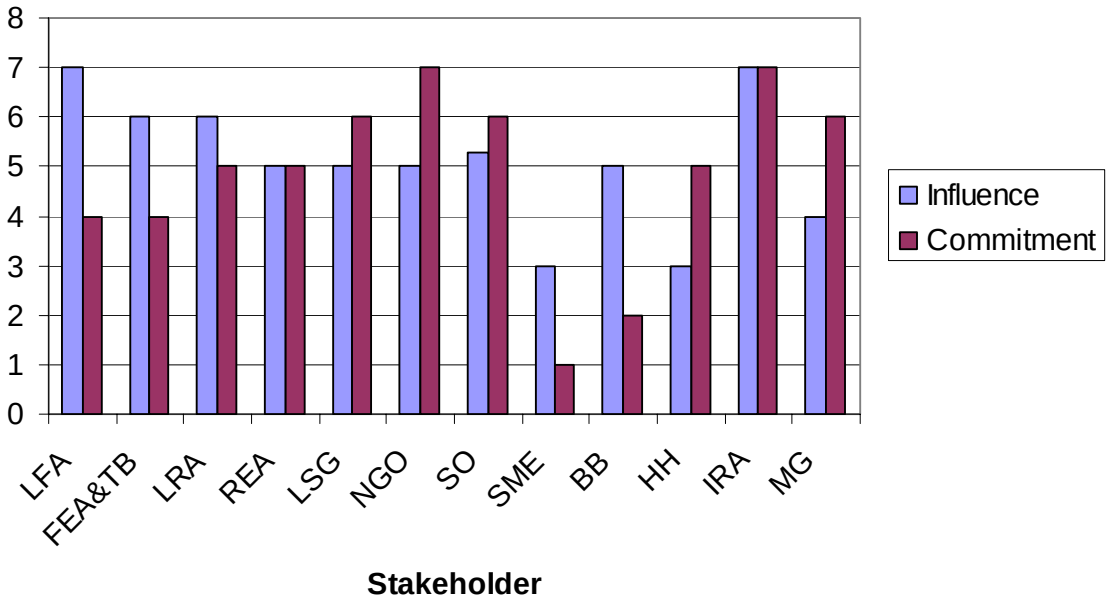

Fig. 4.1. *Influence and commitment of stakeholders in the Volga river basin as assessed by Experts at the Kazan meeting (April 3-5). For an explanation of the abbreviations is referred to table 4.2. The bars represent the averages of ratings given by the individual experts, where zero is no influence or commitment and 10 is complete influence or commitment.*

Table 4.2. *Stakeholders in the Volga river basin*

Abbreviation	Stakeholder
LFA	Legislative federal authorities
FEA & TB	Federal executive authorities and their territorial bodies
LRA	Legislative regional authorities
REA	Regional executive authorities
LSG	Local Self-governance
NGO	Non governmental organization
SO	Scientific organizations
SME	Small and medium size enterprises
BB	Big business
HH	Households
IRA	Inter-regional associations
MG	Minority groups

Table 4.3. Main challenges in the Volga basin.

Critical issue	Challenge
Poor drinking water quality, including microbiological contamination	• To improve drinking water quality to WHO standards, • access to safe water for all in habitants in 2030
Water pollution	• To determine realistic new environmental quality standards • Design of a process for implementation and enforcement of water pollution measures which enable achievement of both investments in clean technologies and economic viability.
Ecological problems	• Avoid further loss of biodiversity and degradation of natural resources
Ineffective use of water resources	• Reduction of water consumption per capita • equitable use of water resources • improvement of operation of hydropower plants
Levels of preparedness and protection in flood-prone regions of the basin are low	• To reduce the risks of floods
Waterborne transport on Volga has a relatively small share in total transport	• To improve economic potential for water borne transport
Insufficient basin management	• To improve coordination of activities among and within different layers of Government in the Volga basin • To strengthen the enforcement of law • Increase of participation of important stakeholders (e.g. industry)
Lack of public awareness and participation	• To strengthen public awareness and participation in decision making

4.2 Major challenges

The formulated critical issues can be linked to challenges. **Table 4.3** gives an overview of the major challenges identified.

Summing up the results of the meetings in Nizhny Novgorod and in Kazan, as well as the results of the project's midterm validation workshop in Karlsruhe it can be concluded that the main three challenges lie in the area of:

- Water quality
- Public awareness and participation
- Basin management

Water pollution and quality

Experience in the EU shows a strong correlation between the state of the economy and water quality. The economy in Russia is rapidly growing. Without any measures, water pollution may evolve into a significantly more widespread problem affecting both human health and ecosystem services and goods. This issue has been discussed in almost all expert groups. The general conclusion is that measures to contain water pollution should be given a high priority. Thus, development of law and legislation, introduction of water treatment plants and effective enforcement are the challenges faced. As the quality of raw water is, in vast majority of cases, more or less acceptable, priority should be given to improve the microbiological quality of drinking water. It should be possible, in a space of time of 30 years, to ensure that all cities in the basin have access to safe water and that all inhabitants are properly connected.

Public awareness and participation

For a sustainable development, public awareness and participation is as important as the scientific and technological development level of society. The need to increase public awareness of environmental issues and public participation has been identified as a major challenge. To strengthen public awareness continues efforts are necessary, to improve public access to environmental information and participation in decision-making. Awareness and participation are not objectives in themselves – they serve the higher objective of sustainable development by making decision processes better informed and by strengthening the implementation process through increased support. The issue of public awareness and participation are relatively new. In the EU, only in the last years structural attention is given to these issues, for instance in the context of the EU Water Framework Directive. Many authorities in the EU are struggling to implement these new practices in environmental management. The authorities in the Volga Basin stand for a task which is far more demanding, given the socio-economic conditions and size of the basin. An important challenge lies in changing the perception of the environment from a threatening factor limiting economic development to a precious resource providing important goods and services which has to be used respectfully.

Basin management

Participation and public awareness are elements of the larger issue of institutional development. The changes which have been brought about in Russia have gone at the expense of coherence in policy and management. Institutional structures exist, but are not always effective owing to a multitude of reasons, the economic situation being one of the important factors. The need for improvement of (the effectiveness of) institutional structures has been strongly emphasized in all expert groups. In particular, the need has been identified to strongly improve coordination of the activities among and within different layers of Government in the Volga basin and strengthen the enforcement of law. This will be one of the major challenges in the Volga basin.

Also it is important that industry becomes an active partner in the development of realistic new environmental quality standards that will allow both profit-making and investment in new clean technologies and pollution-preventing techniques.

Finding the appropriate balance between the economy, environment and social system

Many discussions in the expert groups touch directly or indirectly the conditions which facilitate a balanced, sustainable development within the basin. It was clear that social and economic issues have the highest priority, implying thus that environmental issues will (have to) be given lower weight in the trade-offs, which are made in the coming years (and perhaps decades) between economy, society and environment. The environment provides essential ecological goods and services. Examples include drinking water, irrigation water, food (e.g. fish), minerals, energy for the production of electricity and the ability to process waste waters. Policy makers will seek for the limits of resource use. A lower environmental quality is acceptable but irreversible changes and damage should be avoided. A healthy environment contributes to the well-being of people – a healthy environment does not have merely an economic or environmental importance – it appeals to cultural and esthetical values and is thus important for a balanced societal development too.

Thus, a major challenge will be to find the appropriate balance between the economy, environment and social system optimizing economic and social benefits without irreversible damage to ecosystems or unsustainable exploitation of resources.

4.3 External driving forces and constraints

A variety of external factors may have a promoting or inhibiting effect on actions aimed to achieve the objectives discussed in **section 4.2.** Some of these factors such as climate change and globalization are difficult to influence, while other factors - the most important of which are basic human needs - are internal to the country and can be influenced, at least to a certain extent. Important external factors are:

- Economic development
- Climate change
- Globalization
- Political and social processes
- Technological changes

Economic development

Economic development is an important driving force for sustainable development, since environmental measures should be financed and this requires a healthy, taxable economy. However, the Russian Federation is part of the global process. It can influence the course of events, but not determine them. This implies that the global situation will influence the pace of economic growth in the economy of the Volga basin.

Climate change

Climate change has been extensively studied in the RF. During the last twenty years, a climate change has been observed throughout the whole Volga basin. A trend towards rising land air temperature, accompanied by higher annual precipitation, was clearly noted. These changes would lead to higher water availability in the basin which requires conceptual changes in the system of flow control by the reservoirs. Severe winters will affect 40-50 percent less of the basin, which would create more favorable conditions for agriculture. In contrast, there may be more severe floods in the wet areas and more frequent droughts and higher aridity in the dry areas.

Globalization

Globalization may cause a change in governance, in particular to a strong role and responsibility at regional and local levels. In addition, dissemination of information facilitates the formation of interest groups and NGOs, and may enhance their political influence.

Political and social processes

The transition towards new economic and political systems in the RF has led to new challenges and opportunities. However, the transition process gives also rise to uncertainties and problems. The difficulties which are faced and the transitions which are brought about require time for adaptation. The general opinion is that the transition towards new economic and political systems in the country in general, and in the regions of the Volga basin in particular, has imposed additional constraints on sustainable development. With the urgent needs for social and economic reforms and measures, environmental issues got lower priority. The public had more concern about social issues and problems of immediate survival than about environmental issues.

Besides positive effects decentralization of the institutional framework had also important negative effects. It made the RF less cohesive and governance weaker at all levels which made it more difficult to enforce regulations and standards for environmental protection.

Technological changes

Technological innovations in general in industry and transport, and technological improvements related to handling of waste products in particular, may also lead to substantial improvements in air, soil and water quality.

The relatively low technological level of industry in the RF has led in many cases to increased contamination of waters. The state of technological knowledge as such is not an important constraint, but rather the lack of finances and maintenance. The situation has often been paradoxical: production level have decreased due to the economic recession in the 1990s while the pollution level has in some instances, increased. Technological improvements of systems treating industrial waste water may lead to less water pollution. The same is true for systems treating municipal waste water.

4.4 Measures and strategies

A major part of the discussions resulted in suggestions for measures and strategies. **Table 4.4** presents the proposed measures and strategies to cope with the critical issues. In addition, the promoting, impeding or blocking factors are given. The table is an extract from an extensive inventory table made on basis of the results of the Kazan meeting (see **Annex V**).

Table 4.4. *Proposed measures and promoting and inhibiting factors mentioned by the expert groups at the Kazan meeting (3-5 April 2006).*

Critical issue	Measures	Promoting factors	Inhibiting factors
Water quality	• Assessment (inventory of hot spots), monitoring and planning • Application of new technologies • Implementation of water treatment facilities for small scale industries and households • Improvement of the control of waste water discharge at origin. • Improvement of licensing legislation • taxation changes	• Inventory of existing technologies • Investments • Increase in payments for discharges of wastes ('polluter pays principle')	• Lack of institutional cooperation, transparency and approachability • Lack of finances (particularly of small and medium scale industries) • High water quality standards
Loss of habitats and biodiversity	• Increase of protected areas up to 3 times (from 43 to 120 km^2) • Raise of government awareness about ecological problems • Application of environmental discharges • Introduction of payments for use of natural resources an damage of the environment	• Decrease of rural population • Increase of agricultural productivity • Multipurpose use of lands and engineering structures • Balance of interests (economy vs. ecology) • Development and application of basin modeling	• Poverty of rural population • Purposes of economic development • Development of oil-gas industry • Policy of the Ministry of Energy • Lack of information (monitoring, forecasts) • Absence of institutional coordination • Conflicts of interests and lobbies • Lack of governmental

			support of environmental protection' • Inefficient taxation • Absence of methodology for assessments of costs of natural resources and of damages to the environment
Inefficient use of natural resources (including water resources)	• Improved monitoring and forecasting system • Improved operation of hydropower reservoirs • Rehabilitation and improved maintenance of irrigation structures	• Better communication and cooperation between the energy sector, the environmental agencies and the representatives of the water consumers	• Lack of knowledge of how much the different users need • The legal status of a lot of water bodies is not identified
Flood risk management	• To improve monitoring and reliability of forecasts • To establish effective early warning systems • Data acquisition on how many people are affected and to what extent	• guidelines on risk assessment • methodology for flood risk assessment	• Lack of coordination between federal, regional, national and international level
Water transport	• Develop an integrative transport strategy • Link transport modes • Gradually improve infrastructure	• stimulate private-public partnerships • stimulate private companies • service guarantee (continuity, water level)	
Public awareness and participation	• Public access to environmental information on the state of the Volga basin • Involvement of local population in decision making by creating River Basin Councils	• Information of the public through mass-media • Non governmental organizations (NGOs) • Clear and meaningful indicators (sturgeon, etc.) • Education of public and organizations	• Low priority of environmental issues • Low level of ecological education of people. • Absence of accountability of local authorities towards people
Basin management	• Strong governmental regulation of implementation of environmental	• Cooperation and coordination between all levels of governance	• Lack of realism on the governmental level • Conflicts of Federal and regional interests,

	measures • Strengthen and unify the environmental monitoring system • The development of an unified environmental regulatory framework (standards, permits, charges) • Review legislation to eliminate inconsistencies and gaps	• Stepwise approach to business responsibility and image • Core set of indicators • Discussions and cooperation between the government and the environmental organizations	of goals pursued by government and business, • Lack of transparency in relations between government and business and society • Strong business lobby • Lack of environmental lobby

Water pollution and quality

A complicating factor is that the emission source has become more diffuse and that nowadays small and medium size industries and households are the most important polluters. They cannot afford to invest in purification systems, or to provide the necessary maintenance of these systems. The experts suggested the following strategies and measures to improve water quality:

- Facilitation of acquisition and exchange of data and information, including monitoring and communication of results
- Application of purification works and new technologies.
- Incentives for installing water treatment facilities for small industries and households.
- Improvement of water quality standards
- Development of more effective legislation
- Improvement of the control of waste water discharge at the origin. This control system should be unified for the whole Volga basin.
- Allocation of financial provisions at governmental level (budgeting, vertical transfer mechanism).
- Spatial planning is important. There should be additional assessments related to special protected areas, nature reserves and national parks.

Ecological problems

A better protection of the aquatic ecosystems in the Volga basin requires a combination of measures. Improvement (or prevention of deterioration) of water quality is one important element. Experts present in Kazan estimated that a threefold increase of protected areas is desirable. It was emphasized that opportunities are present to increase the surface area for nature protection. For example, land along rivers may be needed for flood prevention/retention. Such land can be designated as nature protection area. This multifunctional use of land also may bring the creation of nature protection areas financially into reach. Another example pointed to the developments in the agricultural sector. It was mentioned that increase in agricultural productivity may be expected along with a decrease of the area under cultivation. The operation of the hydropower plants should be optimized in both an economic and ecological sense – at present, only economic considerations are being made. The health of the sturgeon population is of great importance both as a symbol how nature should be dealt with and for obvious economic reasons. As it is not expected that dams and reservoirs will disappear, other solutions will have to be applied to bring the sturgeon population above its 1990 level. Among these is the increase in spawning area in the Volga Delta. Experts from the delta research institutions believe that 700,000 ha would be sufficient.

Flood risk management

At the meeting in Kazan the need was expressed to improve monitoring and the reliability of forecasts, and to establish effective early warning systems. There is a lack on data on how many people are affected and to what extent. Cooperation with respect to data-acquisition and exchange of information needs to be improved in order to have a good information base available accessible for all actors. Furthermore, flood risk has to be included in spatial planning. In particular, the coordination between regional, provincial and local authorities for land development plans, especially in residential areas needs attention.

Equitable use of water resources

Measures need to be taken to ensure an appropriate and equitable allocation of water to the different sectors. To this end, improved monitoring and forecasting systems need to be

implemented and coupled to decision support systems. The operation of hydropower reservoirs needs to be improved respecting maximum water-level regulations.
Both supply management and management of water demand should be undertaken to reduce water losses. Rehabilitation and improved maintenance of irrigation structures are required to increase water productivity.

Economic potential of waterborne transport

The transport volume by shipping has declined since the end of the Soviet era. At the meeting in Kazan the possibilities to revive this way of transport were discussed. Waterborne transport may have a valuable contribution to the growing economy of the RF. However, its competitiveness depends to a large extent on the availability of appropriate interchange facilities at strategic locations. Under the keyword 'intermodality', the planning, financing and operating of such facilities and the corresponding transport services were discussed in light of (inter)regional and local logistic patterns, including connecting transport (ferries substituting bridges). To increase the contribution of waterborne transport the following three priority areas of taking measures were identified:

1. The development of an integrative transport strategy
2. The establishment of intermodal (freight) ports strategically positioned at key trade nodes. It was suggested to build such intermodal (freight) ports on emerging logistic centers in the Volga basin.
3. Gradual improvement of infrastructure

Basin management

Discussions on measures in the expert groups focused to a large extent on the development of institutions and legislation to improve water basin management. In Russia there is no unified system for environmental management among federal, regional and municipal authorities because of the diversity of legislation.
A unified system for environmental management and law enforcement is needed. The situation of existing hierarchical levels in Russia is much the same as in the Rhine region. But in the EU a greater responsibility is given to the municipalities than in Russia. A central governmental support exists and municipalities have a chance to represent public opinion

and to address the issues. Therefore, it is recommended to strengthen the executive role of the municipalities.

Financing structure ("Polluter Pays" principle)

Funds are needed to put the proper management practices into place and to create and maintain the appropriate infrastructure. At present the Volga river basin generates a considerable income, but little of this is fed back into the system for maintenance and development. This goes at the expense of the river basin and this will endanger in the long term the ecosystem and the economic benefits arising from use of ecosystem services and goods. It was recommended to introduce economic instruments to mobilize funds, for instance the "Polluter Pays" principle and economic instruments for other users of the services and goods provided by the Volga, and to develop mechanisms for the allocation of funds to the water sector.

It was suggested that the hydropower production in the Volga basin should contribute to the maintenance and development of the infrastructure required including the ecosystem. The introduction of financial instruments can make already in the present funds available for a sustainable development of the Volga. The effective allocation of these funds requires an improved coordination among governmental bodies as discussed previously. The development of the Volga basin is severely hampered as long as structural funding and improved coordination are not put into place.

Stakeholder participation

For policy making in practice it will be essential to increase the participation of stakeholders. It is important that the stakeholders in RF "take ownership" of the issues. Besides municipalities, industry should play a more important role in implementation. It is important that industry becomes an active partner in the determination of realistic new environmental quality standards which will allow both profit-making and investment in clean technologies and pollution preventing techniques. However, the quality of the stakeholders' contribution depends on the quality of the information available to them. Real participation requires a high degree of transparency of information.

The new Water Code of the RF has been recently endorsed. This should become a major reference point for defining future measures and strategies.

4.5 Future developments

The future of the Volga basin is subject to many uncertainties making prediction difficult. Therefore, we sketch images of conceivable rather than probable futures. The four scenarios used in this study relate to different world visions defined by two axes: a free world market versus a much higher level of intervention and regulation by governments (horizontal axis: A versus B). The vertical axis symbolizes a global approach versus a more regional approach of problems and strategies (1 vs. 2).

The experts at the Kazan meeting were asked to provide their opinion on each critical issue in view of the four scenarios. They were asked to say whether an issue will worsen, improve or remain unchanged for the next decades and to what extent measures are necessary. The results are shown in **Table 4.5**. It is based on the outcome of the survey (**Annex VII**) and the discussions following on it (see *meeting report*).

Table 4.5. *Results of a survey held under experts at the Kazan meeting. Their opinion was asked on whether a critical issue will worsen, improve or remain unchanged in the next decades in view of the four scenarios presented in section 2.4. Minus symbol: worsening. Plus symbol: improvement. NC: no change.*

	World Markets (A1)	Regional Markets (A2)	Global Cooperation (B1)	Regional Communities (B2)
Water quality	- -	-	++	+
Loss of habitats and biodiversity	- -	- -	+	+
Inefficient use of natural resources (including water resources)	-	-	+	-
Human security (flood risk)	-	-	+	-
Water transport	+	+	+	-
Public awareness and participation	- -	- -	+	+
Basin management	+	+	+	-

The general opinion is that economic growth in the RF will increase the burden on the environment in the next decades. Without appropriate measures water pollution may evolve into a significantly more widespread problem affecting both human health and ecosystem services and goods. Particularly for the 'world market' scenario, the increase in water pollution will be large, as in this scenario environmental issues are expected to be given less priority. The same holds for regional markets scenario, though to a less extent owing to a lower economic growth. In the 'global cooperation' (B1) and 'regional communities' (B2) scenarios, less decline of the water quality is expected, because of a greater environmental concern of governments. Similar future developments are foreseen with respect to ecological problems and the equitable use of natural resources, including water resources. The experts agreed that the challenges identified need to be tackled with high urgency and that the measures proposed (see **table 4.4** and **annex V**) constitute a robust, minimum strategy in all scenarios studied.

The general feeling is that in a low regulated, market-economy dominated society human security gets a lower priority, as result of which this situation will not improve or even worsen. However, the same may be true in a more strongly regulated society. Particularly at the regional and local level, conflicting interests between different regions may hinder progress to be made on this issue, due to a lack of cooperation and coordination. The experts agreed that - also with respect to this issue - the measures proposed constitute a robust, minimum strategy in all scenarios studied.

The experts expected that in a market-economy dominated society the private sector is more willing to invest in the improvement of water borne transport, in order to fully utilize its economic potential. Consequently, less interference and incentives by governments will be necessary and governments will play a more facilitating role. The same was considered true for the 'regional markets' and 'global cooperation' scenarios. However, in contrast, in the 'regional communities' scenario local authorities and companies are expected to be more concerned with their own interests and therefore, more interference and coordination from higher governance levels will be necessary to make progress on this issue. Though less

urgent, the measures proposed on this issue can be considered necessary and are well in accordance with the developments foreseen in the scenarios.

In the market-economy dominated scenarios environmental and human security issues are expected to get less priority and therefore, strong efforts are necessary to increase public awareness and participation. In contrast, more emphasis is laid on active public policy in the global cooperation scenario and regional communities' scenario. Consequently, measures to increase public awareness and participation are less urgent according to these scenarios, as public information and participation are already incorporated in decision making processes. Nevertheless, continuous efforts to strengthen public awareness and participation will remain necessary. The same is true for basin management, although – with the exception of the "regional communities" scenario – administration efficiency is expected to improve.

5. Discussion

In this chapter the most important results of this study are highlighted. We evaluate and interpret their implications and, if possible, relate them to results of other programs or experiences gained in e.g. EU countries. For clearness, the conclusions are given separately, after the executive summary.

5.1 Drinking water quality

Improving the drinking water quality towards WHO standards will be a major challenge. This is in accordance with previous statements of other international platforms like the World Water Assessment Programme (WWAP) and the World Commission on Water for the 21st Century.

In principle, the state of technological knowledge as such is not an important constraint in efforts to improve water quality. All basic materials for construction and operation of water supply and sanitation systems are available in the Russian Federation for a rapid improvement of the present situation. Local industries are capable of providing all the equipment needed for the construction of water supply and sanitation. Biological treatment of water is feasible. The country has the technological know-how, there is sufficient space and energy is not expensive. Thus, a good technical basis exists to solve the problem of providing bacteriological safe drinking water to the public. It should be possible, within 30 years, to ensure that all cities in the basin have access to safe water and that all inhabitants are properly connected.

The main obstacles to be overcome have to do with legislation, water basin management, financing the implementation of water sanitation measures and last-but-not-least public awareness.

5.2 Legislation

Standards for water quality in the RF are more stringent than corresponding standards in the OECD countries. However, the standards are such that in the majority of cases, the industry and other important polluters like municipalities can not comply. High standards that cannot be implemented may take incentives to improve away and can be as such counterproductive. An effective approach entails realistic licensing schemes which are complied by industries and municipalities and enforced by government. A 'developmental approach' can be introduced: set high objectives, but give time, set out a path starting with less strict

objectives but ending at the level pursued. Such an approach incorporates economic incentives to clean technologies and pollution-preventing techniques. An example is given in the following box and supported by **Figure 5.1**.

Dutch taxation system for water pollution

In the seventies it was recognized that many industries emitted more pollutants into the Dutch water systems than was acceptable. In the Dutch law, stringent objectives for water quality were set and the "Polluter Pays" principle was introduced. Industries polluting surfaces water had to pay according to the amount of compounds emitted. The taxes incurred were put into a fund, which by law only could/can be used to improve water quality, for instance by giving subsidies to improve technology. In addition, industries were given time to bring their technology and environment management practices up to the standard required. A period of 10 years was chosen. It was communicated that in this period the taxes would increase significantly: quantitative details were given. Industries could calculate exactly what the increase in taxes would mean and could make cost-benefit analyses of investments in technology. This approach has been a great success (see **Fig. 5.1**).

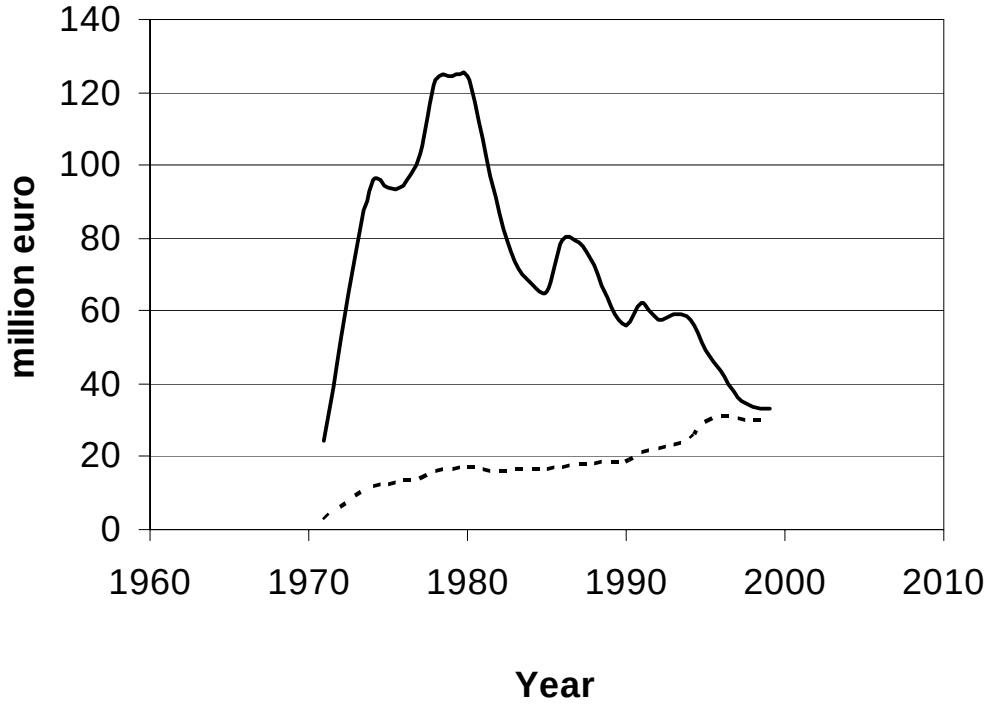

Fig. 5.1. *Graphical representation of Dutch taxation system for water pollution. Dotted line: level of taxation over time. Solid line: incurred tax revenues. The decrease follows from investments by industries to reduce pollution resulting in lower taxes paid and indicates the success of the approach (pers. comm.. Prof. dr. J. Leentvaar).*

5.3 Basin management

The changes which have been brought about in Russia have gone at the expense of coherence in policy and management. Institutional structures exist, but are not always effective owing to a multitude of reasons; the economic situation being one of the important factors.

In the Volga basin three River Basin Management Administrations are present that fall under the responsibility of the Russian Federation Ministry for Natural Resources. The RBM approach in Russia in general, and that in the Volga area in particular, are in conflict with the existing administrative system and particularly with the system of federal districts (Volga, Central, South, North-West). Each federal district of the Volga Basin has representatives responsible for coordination of environmental management. It also overlaps with another "layer of administration", i.e. with the 39 federation subjects of the Volga Basin with their own environmental and disaster risk reduction authorities, each responsible for management of their particular segment of the Volga Basin. The lack of effective vertical coordination between local-regional-federal levels as well as other constraints hinders the application of the RBM principle. Existing uncertainties in division of responsibilities between authorities of various scales are reasons to avoid responsibilities in practice.

The need for improvement of the effectiveness of institutional structures has been emphasized in all expert groups. In particular, the need has been identified to strongly improve coordination of activities among and within different layers of Government in the Volga basin and strengthen the enforcement of law. The new water code of the RF that recently came into force may be an important step in the right direction. It has a number of innovative approaches to improve water governance. For example, there are provisions for cross-relationships among stakeholders. However, the Volga basin is still not treated as an administrative unity, but divided into sub-basins. So, it does not follow the basin-level approach to water management that is underscored in the water framework directive of the European Union. Nevertheless the water code forms an important framework for further legislation and institutional development which requires time and entails 'trial and error'. It can be very beneficial to look into the positive and negative experiences in e.g. the EU countries (see also *report D3*).

5.4 Implementation of measures

After years of recession, the economy in the RF is growing. In principle, this makes it easier in the near future to introduce financial instruments to generate funds to implement measures. At present, the Volga river basin generates a considerable income, but little of this is fed back into the system for maintenance and development. As a matter of principle users of the water resources should contribute to funding of river basin management. For instance, the hydropower production should contribute to the maintenance and development of infrastructure required including the ecosystem.

The application of the "Polluter Pays" principle to influence water use behavior has already been discussed in section 5.2.

5.5 Stakeholder participation and public awareness

For policy making in practice it will be essential to increase participation of stakeholders, including the local population, businesses, Nongovernmental Organizations (NGOs), scientific communities. A variety of issues related to coordination and interaction between the government and various stakeholders have been discussed in detail at the Nihzny Novgorod and Kazan meetings. The main question is: How to establish effective interactions between authorities at various levels, on the one hand, and business and civil society on the other hand? Lessons learned from practices in the RF and in the Volga basin as well as from practices in the EU and the US have been explored. For a more detailed overview is referred to *report D3*.

Transparency of information and the possibility to call local authorities to account were considered to be of crucial importance for a proper management. An environment in a modern state can only be properly managed if stakeholders understand the problems and knowingly supports the necessary measures and restrictions. The quality of stakeholders' participation depends to a large extent on the quality of the provided information. The knowledge about the natural environment and water resources exists, although it is not always as freely available to the services as needed. Often this information is hidden in one of the numerous scientific institutes. The secrecy surrounding information collected by public institutions, relying on taxpayers' money, should disappear.

Although increase in public awareness has been among the priority directions of environmental reforms initiated in Russia during the last decade, public environmental awareness is still weak. NGOs may play an important role in mobilizing the public on environmental issues. For example, although "Dront" is regarded as oppositional to the government (due to its campaigns in civil rights protection) it developed cooperation with authorities, and particularly, with the regional environmental agency in performing a number of joint projects.

The new version the Water Code of the Russian Federation contains the establishment of River Basin Councils (RBC). However, it is uncertain so far how the voice of the public will get to the council: who will represent them and how they will be represented? The general idea is that the representation will be selected through some kind of a democratic process. Being a body on which the general public gets to have a voice on how water is managed; the river basin council may evolve according to the needs of the people within the basin.

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List of abbreviations

EU	European Union
FSCEU	The Federal Service for Control over Environmental Uses
EG	Expert Group
EMERCOM	Ministry of Civil Defence, Emergencies and Natural Disasters Mitigation
FAE	The Federal Agency for Earth's interior
FAF	The Federal Agency for Forestry
FAWR	The Federal Agency for Water Resource
GDP	Gross Domestic Product
MAC	Maximum Allowable Concentration
MNR	Ministry for Natural Resources
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
RF	Russian Federation
RBC	River Basin Councils
RBM	River Basin Management
RIVM	National Institute for Public Health and the Environment in the Netherlands
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBA	Water Basin Administration
WHO	World Health Organization
WP3	Work Package 3 of the project
WWAP	World Water Assessment Programme

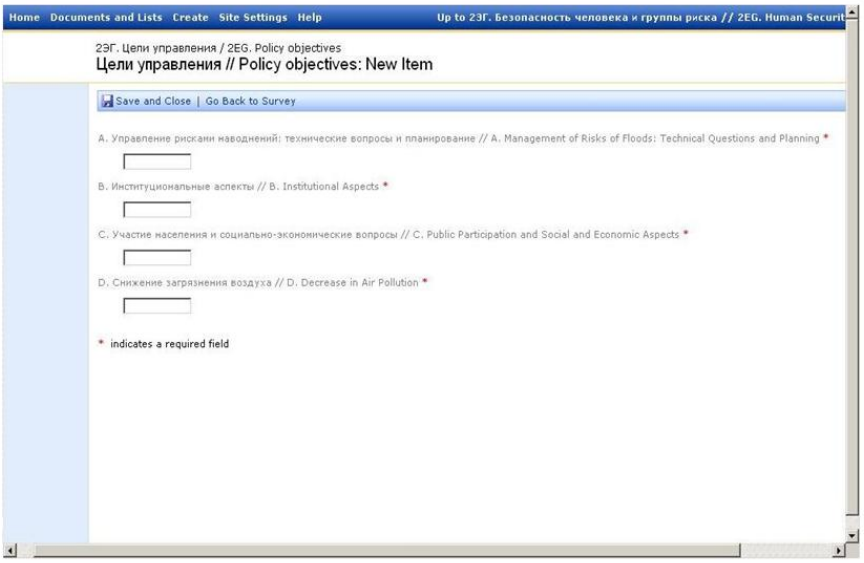
Annex I. Interactive web site

EG2, Surveys

EG2, Surveys

5 – 7 April, 2006 https://portal.wur.nl/sites/CABRI/default.aspx e-mail: Alexander.Okopny@wur.nl 4

EG2, Ranking



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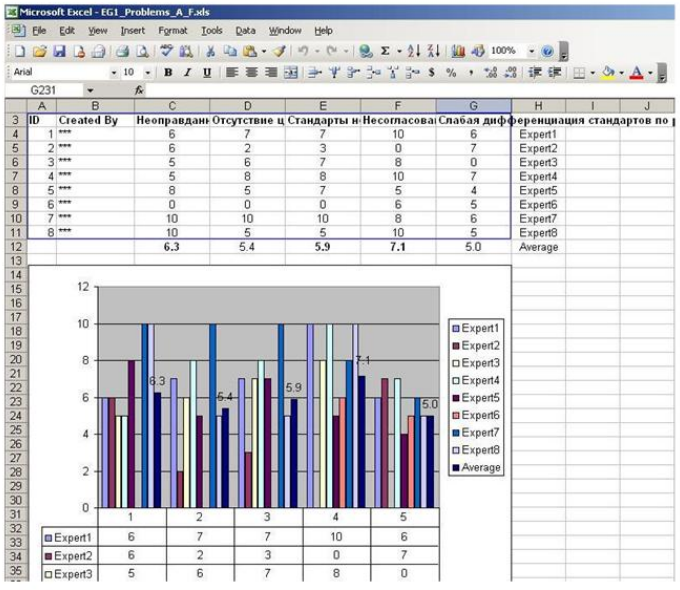
Export Results to a Spreadsheet



Annex II. Results of the interactive website survey: Ranking of critical issues. The selected main critical issues are in bold.

Expert Group 1 "River and Environmental Rehabilitation"

.	Policy objectives	Ranking		Problems
A	Improvement of the Water Quality Standards	4	1	Disagreement of indices used for the water quality evaluation (e.g. for surface waters and for sewages).
			2	Unjustified rigidity (to the point of unassailability) of a number of the water quality indices.
			3	Standards are not directed to solving of the priority problems.
			4	Deficiency of the specific-purpose standards.
			5	Standards are not differentiated well towards different methods of water usage.
B	**Decrease in Water Pollution**	**2**	**1**	**Low efficiency of the system that regulates payments for pollution of water bodies.**
			1	**Low stimulating efficiency of the system that regulates measures aimed to protect the water bodies (e.g. unassailability of certain water quality standards, absence of approaches, which allow a step-by-step decreasing of the pollutants discharge).**
			1	**Pollution of water bodies by industrial plants, municipal (domestic) sewages, agriculture, melted snow and storm flow incoming from cities, towns and other settlements, roads, etc., watercraft.**
			2	Commitment of ecological infractions by the owners of watercrafts.
C	**Integrated Water Management**	**1**		**Unsatisfactory coordination between stakeholders and different state institutions**
D	**Improvement of Monitoring Quality**	**3**	**1**	**The relationships between parameters of monitoring and the process of decision-making used in environmental management are weak.**
			2	**Absence of the unified system of multilevel monitoring, which meets modern requirements.**
			2	**Reduction of programs of gauging within the frames of monitoring works (e.g. reduction of parameters and observation stations) because of financial constraints.**
			2	**Complexities in receiving and using data obtained by means of monitoring works performed at industrial plants.**
			3	Loss of the branched and well equipped infrastructure of monitoring developed in the Soviet period.
E	Improvement of Data Exchange	5	1	The fragmentariness and incomparability of parameters due to application of different techniques for data collection and analysis as well as due to differences in the formats of data presentation
			2	Absence of free data exchange between all stakeholders
			3	Centers of the Federal Hydrometereological and Environmental Monitoring do not have all required information (some data have been received during contract works for private institutions)
			4	Official institutions evolved in water management are restrained in getting data

F	Improvement of Public Participation in the River Basin Water Management	6	1	Indifference of the public and its disinterestedness in getting information (misunderstanding of seriousness of the water quality problems as well as of the problems related to natural disasters).
			2	Insufficient cooperation with mass media.
			2	Prejudiced character of information when it reflects approaches of a specific group of interests
			3	Complexities in perception of the environmental information by people due to their insufficient professional skills in the subject.

Expert Group 2 "Human Security and Vulnerability"

	Policy objectives	Ranking		Problems
A	**Management of Floods: Technical Questions and Planning**	**2**	1	**Risks of floods is insufficiently considered while planning and implementing different economic activities**
			2	**Insufficient effectiveness of a system of floods monitoring**
			3	**Climatic changes increase risk of floods**
			4	High vulnerability of small and average towns, rural settlements (in comparison with large cities) to floods
			5	Insufficient observance of existing normative documents
			6	Insufficient operational readiness of the public to floods
B	**Institutional Aspects**	**3**	1	**Weak institutional coordination related to prevention of threats of floods**
			2	**Late warning or absence of warning announcements as well as false alarms prevent effective functioning of the rescue services**
			3	**Insufficient cooperation and exchange of information interchange between institutes**
			4	Insufficiently quick responses to the upcoming floods and ineffective reaction the floods
C	**Public Participation and Social and Economic Aspects**	**1**	1	**Problems with infrastructure maintenance**
			2	**Both primary and secondary consequences of damages caused by floods are underestimated**
			3	**Difficulties with application of foreign experience accumulated in the sphere of struggling against floods**
D	Decrease in Air Pollution	4	1	Low stimulating efficiency of the system that regulates measures aimed to protect the air
			2	Low efficiency of the system that regulates payments for pollution of the atmosphere
			3	Air pollution by stationary and mobile sources of pollution

Expert Group 3 "Natural Resources and their Sustainable Use"

	Policy objectives	Ranking		Problems
A	**Increase of Ecological Data Availability**	**2**	**1**	**Restricted databases (e.g. information is available through the internet and Google search engines but cannot be received from Russian state institutions)**
			2	**State institutions are not ready to give information for free. This also concerns the information, which is necessary for municipalities to perform municipal functions, and also includes the information, which is necessary to disseminate among the public**
			3	**Absence of such institutions that investigate biological influence of polluted water on environment and its habitats (e.g. the influence of polluted water on fish)**
B	**Solution of Institutional problems**	**2**	1	**Insufficient realization of the basin principles and of the integrated water management in the Volga basin**
			1	**Incompleteness of the administrative and legislative reforms**
			1	**Insufficient legislative support of coordination and partnership between municipal and regional authorities aimed to prevent their possible conflicts**
			2	Insufficient role of city administrations in environmental management and particularly in water management
			3	Violation of the property rights (e.g. uncoordinated settlements, etc.)
			4	Disintegration of disciplines
C	**Strengthening of Partnerships between Stakeholders**	**2**	1	**Interested parties and stakeholders have their own specific interests, which often contradict with the ecological purposes**
			2	**Conflicts of water users**
			3	**Many of the stakeholders are not used to work together, moreover they do not consider that necessary**
			4	Insufficient ecological education of people, the necessity of measures aimed to increase an interest of the public to environmental problems
			5	Insufficient understanding of importance of the environmental issues by the local public and absence of public experience in solving these issues
D	**Integration of Economical and Ecological Priorities**	**1**	1	**Disintegration of economic values and environmental concerns**
			1	**Environmental problems have a low priority in comparison with economic goals**
			2	**Underestimation of natural resources and ecosystems while economic decision-making**
			2	Estimations of natural resources including water as a multi-purpose good are not carried out while making economic decisions
			3	Deficit of financial and human resources for environmental protection in local administrations and communities
			4	Irrationally low price of water when it is used for economic activities
			4	Methods used for the estimation of damages inflicted on water and biological resources by economic activities do not completely meet the modern requirements

Expert group 4 “Connecting Goods and People”

	Policy objectives	Ranking		Problems
A	**Improvement of urban mobility situation**	**3**	**1**	**Transport routs in cities do not meet the modern requirements in mobility**
			2	**Low level of innovations put in development of the transport infrastructure**
			3	**Overcrowded public transport and poor quality of city transportation**
			4	Insufficient integration of waterways into the system of public municipal transportation
B	**Development of the united Master Plan “Volga Mobility 2010”**	**1**	**1**	**Insufficient coordination between policies of specific transport orientations and those of local administrative authorities**
			2	**Difficulties with choosing an institution / organization that could develop the united Master Plan “Volga Mobility 2010”**
C	**Establishment of the Coordination Mechanism for Passenger and Freight transport**	**2**	**1**	**Absence of a coordination mechanism for passenger and freight transport (possibly within the limits of a larger official organ, e.g. the Volga Basin Council)**
			2	**Weak cooperation between councils functioning in the Volga Basin This reduces efficiency of tools and methods applied in the Basin**
D	Reduced Water Pollution	4	1.	Pollution of water by big vessels, small cutters and boats
			2.	Ecological standards are often neglected by owners of vehicles

Expert group 5 "Institutional Cooperation and Coordination"

	Policy objectives	Ranking		Problems
A	**Coordination Mechanisms within Integrated River Basin Management**	**1**	**1**	**Absence of effective differentiation in responsibilities between authorities from various departments participating in water management**
			2	**Absence of effective management coordination at different levels (local - regional - federal)**
			3	**Insufficient financing of planned measures and actions**
			4	Contradictions between federal and regional authorities as to distribution of finances
			5	Insufficiently strict control over the finances, insufficient answerability of persons responsible for the use of finances; lack of transparency in operations carried out during the program realization
			6	Creation of the Volga Basin Council
			7	The Federal Target Program «Revival of Volga» was closed. The Federal Target Program «Revival of Volga»

				played an important positive role as a mechanism of investing money into solution of problems accumulated in the Volga basin
B	**Partnership and Cooperation between Stakeholders**	**2**	**1**	**Weak interest in keeping the ecological standards by the public utility companies and by the enterprises of housing and communal services**
			2	**Many plants and factories are not interested in keeping the ecological standards especially those of average and small size**
			3	**Absence of state privileges and rebates for the enterprises that have positive environmental image as well as for those who support ecological organizations**
			4	Most of Charity funds created by large Russian companies are not focused on environmental issues
			5	Creation and establishment of cooperation in the Volga basin
			6	Insufficient public participation in solving of problems of the Volga basin
			7	Absence of accountability of local authorities towards people, lack of transparency in governmental activities related to environmental issues
			8	Insufficient coordination of public work in the Volga basin
			9	Insufficient development and weakness of existing mechanisms of coordination
			10	Low level of ecological education of people. Environmental problems stay at the bottom of lists of priorities of local communities
C	**Cooperation between the European Union and the Russian Federation**	**3**	**1**	**Road maps for cooperation between the European Union and the Russian Federation**
			1	**Transfer of positive experience, practices, mechanisms and tools**
			1	**Enhancement of cooperation between the Russian Federation and European Union in the sphere of common environmental space. Development and realization of programs and actions for its implementation (road maps)**
			1	**Transformation of foreign experience in integrated water management to that one of Russia. Application of basin approach to water management taking into consideration local and regional features**

Annex III Delphi method

The modern renaissance of futures research began with the Delphi technique at RAND, the Santa Monica, California, "think tank" in the early 1960s. The questions of Rand thinkers, at the time, primarily dealt with the military potential of future technology and potential political issues and their resolution. The forecasting approaches that could be used in such applications were quite limited and included simulation gaming (individuals acting out the parts of nations or political factions) and genius forecasting (a single expert or expert panel addressing the issues of concern). Quantitative simulation modeling was quite primitive, and computers, which would ultimately make such quantitative techniques practical, were a decade away.

One of the little known in-house research projects undertaken by RAND at the time involved combining opinions of horse-racing handicappers. These people, after all, are supposedly experts in their field. Furthermore, their opinions about the future (the outcome of horse races) are published daily and can be checked against reality within 24 hours. So a project was implemented to determine just how to combine horse-race forecasts by different experts to improve the likelihood that the composite opinion was better than any single expert.

The work on the Delphi method followed. Olaf Helmer, Nicholas Rescher, Norman Dalkey, and others at RAND developed the Delphi method, which was designed to remove conference room impediments to a true expert consensus. The name, of course, was drawn (humorously, they thought) from the site of the Greek oracle at Delphi where necromancers foretold the future using hallucinogenic vapors and animal entrails. They began from a philosophical base and asked initially, "just how much could be known about the future?" (Helmer and Rescher, 1959)

Helmer, Olaf and Rescher, Nicholas, "On the Epistemology of the Inexact Sciences," Management Sciences, Vol. 6, No.1 (1959).
The Delphi method, Theodore Jay Gordon, AC/UNU Millennium Project, 1994. 30 p.

The Delphi process exists in two distinct forms. The most common is the paper-and-pencil version which is commonly referred to as a "Delphi Exercise." In this situation a small monitor team designs a questionnaire which is sent to a larger respondent group. After the questionnaire is returned the monitor team summarizes the results and, based upon the results, develops a new questionnaire for the respondent group. The respondent group is usually given at least one opportunity to reevaluate its original answers based upon examination of the group response. To a degree, this form of Delphi is a combination of a polling procedure and a conference procedure which attempts to shift a significant portion of the effort needed for individuals to communicate from the larger respondent group to the smaller monitor team). This form is called *conventional Delphi*.
A newer form called a "Delphi Conference," replaces the monitor team) to a large degree by a computer which has been programmed to carry out the compilation of the group results. This latter approach has the advantage of eliminating the delay caused in summarizing each round of Delphi, thereby turning the process into a real-time

communications system. However, it does require that the characteristics of the communication be well defined before Delphi is undertaken, whereas in a paper-and-pencil Delphi exercise the monitor team can adjust these characteristics as a function of the group responses. This form is called *a real-tune Delphi*.

Delphi, whether it is conventional or real-tune, undergoes four distinct phases. The first phase is characterized by exploration of the subject under discussion, wherein each individual contributes additional information he feels is pertinent to the issue. The second phase involves the process of reaching an understanding of how the group views the issue. If there is significant disagreement, then that disagreement is explored in the third phase to bring out the underlying reasons for the differences and possibly to evaluate them. The last phase, a final evaluation, occurs when all previously gathered information has been initially analyzed and the evaluations have been fed back for consideration [The Delphi Method. Techniques and Applications. Harold A. Linstone, Murray Turoff. ©2002 Murray Turoff and Harold A. Linstone. 618 p.].

Annex IV

Briefing Note

Introduction to Second Expert Group Meeting

Goals of the Meeting

The 2nd Expert Group Meeting of the CABRI-Volga project brings together about sixty distinguished experts from Russia and the EU countries to determine major directions of coordination and cooperation between stakeholders in large river basins with the main focus of the Volga river. The Expert Group Meeting in Kazan builds upon the discussion that started at the 1st Expert Group Meeting (September 28-30 2005, Nizhny Novgorod) and will see of mixture of experts who participated already in Nizhny Novgorod and new experts.

Introduction to Discussion Topics

CABRI-Volga

Cooperation Along a Big River:
Institutional coordination among stakeholders for environmental risk management in the Volga basin

Second Expert Group Meeting

Kazan, Russia
5-7 April 2006

The 2nd Expert Group Meeting takes place in the framework of the CABRI-Volga "Scenario of Development" phase. Objectives of this phase are:

- To identify challenges, opportunities and constraints for coordination and cooperation between stakeholders in environmental risk management in large river basins in the EU and Russia, including the Volga basin

- To forecast the dynamics of the problems, and short-term, mid-term and long-term changes in the challenges, opportunities and constraints in environmental risk management in large river basins
- To develop strategies of environmental risk management in the Volga basin that are directed towards solving of the problems already identified and towards enhancing effectiveness of management actions
- To develop actions for improving environmental risk management in the Volga basin.

The results of this phase will lay down the basis for the following CABRI-Volga phase "Recommendations and Future Actions".

During the Expert Group Meeting the discussion and brainstorming sessions with participation of experts from various fields is organized in five Expert Groups (EGs) according to their thematic areas:

EG1: River and Environmental Rehabilitation

EG2: Human Security and Vulnerability

EG3: Natural Resources and their Sustainable Use

EG4: Connecting Goods and People

EG5: Institutional Coordination and Cooperation

The experts may bring relevant materials and results of their activities and present them at the special poster session organized during the Meeting.

A detailed list of key questions and discussion topics within each EG thematic area is presented below in "Outline of parallel EGs sessions".

Discussion Agenda

The three-day Expert Group Meeting opens with a plenary session and is followed by the parallel EGs discussion sessions. The meeting closes with another plenary. Both plenary sessions are professionally moderated by an external expert. The five parallel EGs discussion sessions are each lead and moderated by a project partner, i.e. the responsible EG leader within the CABRI-Volga. Discussions are documented by members of the CABRI-Volga consortium.

First Plenary Session
(5 April, 13:30 – 18:30)

The 2nd Expert Group Meeting starts with a plenary session. In addition to key-note speeches, introductions are given to the CABRI-Volga project (its main goals and challenges) and the Expert Group methodology and set up. The last hour of the plenary session will be dedicated to poster presentations.

EGs Discussion Session
(6 April, 9:00 – 13:00 and 14:00 – 18:00)

Five parallel discussion sessions are held in the morning and in the afternoon. It is the intention to allow – in a set up of a small group– more efficient brainstorming and exchanging of expert assessments in their specific fields. As a basic rule it is proposed that all statements made are considered as personal viewpoints of the experts, but not of

the institutions they represent. Documentation of all statements is made in a non-attributable form in order to enhance the openness of the debates and allow controversial assessments and opinions.

Second Plenary Session
(7 April, 9:00 – 13:00)

All participants once again get together in the second plenary session on the third day. The leaders of the five EGs report the respective results of their work to the plenary. The moderator summarizes the results of discussions and provides an outlook.

Synthesis of Results

Results of discussions and assessments within the five EGs are synthesized in the Expert Group Report. These results will be sent to all participants and will also be made available at the CABRI-Volga website – www.cabri-volga.org.

Methodology and Discussion Rules

The participants of the EGs have been selected and invited on the basis of their professional experiences within five thematic areas of the CABRI-Volga project. Each EG consists of representatives of different stakeholders including the civil society, business, scientific community and decision-makers. A neutral moderator is ensuring an organized interactive discussion process and independent expert assessments.

Annex V. Inventory of problems and 'critical issues' as selected by the expert groups at the Kazan meeting (3-5 April 2006)

Expertise group	List of problems	Critical issues
EG1 River and Environmental rehabilitation	• Water pollution • Insufficient water management • Ecological problems (loss of habitats and biodiversity) • Lack of public awareness and participation • Improper monitoring and information/data exchange	• Water pollution • Insufficient management • Ecological problems
EG2 Human security and vulnerability	*Technological concerns* • Safety of dams and hydro facilities • Technical disasters/failures • Poor quality of pipelines that cross the river *Environmental problems* • Flood impact on groundwater • Accumulation of pollutants in the Volga delta • Poor air quality in volga cities • River bank erosion • Increase of dangerous meteorological events and processes due to climate change • Water quality incl. microbiological contamination • Biodiversity and wetland losses • Floods within small tributaries *Institutional shortfalls* • Shortage of communication and coordination between authorities and public participation (incl. information exchange) • Lack of public education (schools) • Lack of ecological monitoring data in the delta • Inefficient control of flood processes • Insufficient monitoring of floods • Poor legal definition of flood prone areas • Poor implementation and enforcement of legal norms • Lack of capacity building on how to be prepared for,, and live with floods *Social, economic vulnerability* • No insurance system for damages	• Safety of dams and hydro facilities • Water quality incl. microbiological contamination • Lack of social, economic and environmental dimensions considered within risk assessment of flood prone areas

	• Residual risks due to uncertainty • Vulnerability of poor populations • Lack of social, economic and environmental dimensions considered within risk assessment of flood prone areas • Human health aspects	
EG3 Natural resources and their sustainable use	• Administrative problems • Decrease of biodiversity • Bad water quality • Inefficient use of natural resources • Life quality in the Volga basin needs to be improved • Quantity of water – water management • Degradation of natural resources	• Administrative problems[1] • Degradation of natural[2] resources (water quality) • Inefficient use of natural resources • Quantity of water – water management
EG4 Connecting goods & people	• Lack of integrative transport strategy • Transport modes are not linked. Mode competition is not fair • Waterways and infrastructure conditions are poor • There is no service guarantee (continuity, water levels) • Potential for recreational activities is not used (but would fulfill a social need) • Transport at low cost is no more available • Efficient cross-river/regional public transport is missing • Policies are not coordinated between federal, regional international levels	• Lack of integrative transport strategy • Transport modes are not linked. Mode competition is not fair • Waterways and infrastructure conditions are poor
EG5 Institutional coordination and cooperation	*Coordination mechanisms within integrated river basin management:* • Implementation of environmental programs • Insufficient allocation of funding for implementation • Basin management approaches not effectively applied • Contradictions between federal and regional authorities as to distribution of finances • Insufficiently strict control over the finances, insufficient answerability of persons responsible for the use of finances; lack of transparency in operations carried out during the program realization • Absence of effective management coordination at different levels (local - regional - federal) *Partnerships and cooperation between stakeholders* • Insufficient development and weakness of existing mechanisms of coordination • Insufficient public participation	• Insufficient basin management • Lack of a public awareness and participation • Lack of reliable data and information

	• Insufficient coordination of public work in • Many plants and factories are not interested in keeping the ecological standards especially those of average and small size (they prefer to pay penalties instead of investing money into purification systems. These systems are too expensive for small businesses) • Weak interest in keeping the ecological standards by the public utility companies and by the enterprises of housing and communal services • Absence of state privileges and rebates for the enterprises that have positive environmental image as well as for those who support ecological organizations • Most of Charity funds created by large Russian companies are not focused on environmental issues • Low level of ecological education of people. Environmental problems stay at the bottom of lists of priorities of local communities • Absence of accountability of local authorities towards people, lack of transparency in governmental activities related to environmental issues

[1]: this problem area was considered important for the purpose of EG3 but should be treated in an integrated manner in EG5. [2]: particularly the water quality was mentioned in their report.

Annex VI. Inventory of measures and promoting and inhibiting factors belonging to each critical issue as suggested by experts at the Kazan meeting (3-5 April 2006).

EG 1. River and Environmental rehabilitation

Critical issue	Measures	Promoting factors	Inhibiting factors
Water pollution	• Application of purification works and new technologies	• Investments • Image, priority valuables and guiding lines of business • Increase in payments for discharges of wastes • Inventories of existing technologies	• Lack of finances, • High prices of purification equipment • High water quality standards
	• Inventory of hot spots	• Studies and knowledge	• Lack of information • Lack of cooperation between science and decision makers
	• Improvement of the licensing legislation	• Enforcement	
	• Taxation changes	• Withdrawal of the environmental expenses from profit, • Use of the "pollutant pays" principle, • Annual increase in payments for pollution	
Insufficient basin management	• Strong governmental regulation of implementation of environmental measures	• Cooperation and coordination between all levels of governance, • Stepwise approach to business responsibility and image, • Balance between interests and responsibilities of the government, • Discussions and cooperation between the government and the environmental organizations	• Lack of realism on the governmental level, • Conflicts of Federal and regional interests, of goals pursued by government and business, • Lack of transparency in relations between government and business and society • Strong business lobby, • Lack of environmental lobby

	• Information on the state of the Volga basin	• Information of the public through mass-media, • Nongovernmental organizations (NGOs) • Coordination of researchers and policy makers, • Clear and meaningful indicators (sturgeon, etc.)	• Lack of internal criticism in scientific circles • Lack of openness of society, • Low priority of environmental issues
Ecological problems	• Increase of protected areas up to 3 times (from 43 to 120 km^2)	• Decrease of rural population, • Increase of agricultural productivity, • Multipurpose use of lands and engineering structures	• Poverty of rural population, • Purposes of economic development, • Development of oil-gas industry
	• Application of environmental discharges	• Balance of interests • Improvement of technical instruments, • Development and application of basin modeling	• Policy of the Ministry of Energetic, • Lack of information (monitoring, forecasts), • Absence of institutional coordination • Conflicts of interests and lobbies • Economic development, • Lack of governmental support of environmental protection
	• Introduction of payments for use of natural resources and damage of the environment	• Balance of interests,	• Inefficient taxation, • Absence of a methodology for assessment of costs of natural resources and of damages to the environment • Conflicts of interests and lobbies • Lack of governmental support

EG 2. Human security and vulnerability

Critical issue	Measures	Promoting factors	Inhibiting/blocking factors
Safety of dams and hydro facilities *(Technological Concern)*	• Inventory and Risk assessment • Planning • Financing and Implementation	• Economic development (in general but in light of the current situation) • New Water Code	• Lack of institutional cooperation, transparency and approachability
Poor Water quality, including microbiological contamination *(Environmental Problems)*	• Assessment, monitoring and planning • Waste water treatment stations and technologies, legislation • Natural wastewater treatment systems	• Economic development (in general but in light of the current situation) • New Water Code	• Lack of institutional cooperation, transparency and approachability
Risk assessment of flood prone areas omits social, economic and environmental dimensions *(Vulnerability*	• Integrated risk assessment and management • Tool building (e.g. technology development) • Institutional Improvement		• Russian guidelines on risk, assessment; • Russian methodology for flood risk assessment

EG 3. Natural resources and their sustainable use

Critical issue	Measures	Promoting factors	Inhibiting/blocking factors
Degradation of natural resources (water quality)	• Facilitation of acquisition of data and information, including monitoring and communication of results. • Implementation of water treatment facilities for small scale industries and households.. • Improvement of the control of waste water discharge at origin. This control system should be unified for the whole Volga basin. • Enforcement of legislation (water and environmental codes). • Allocation of financial provisions at governmental level (budgeting, transference-mechanism between capital and provinces). • Spatial planning is important. There should be investigations on possible room for protection of areas, nature reserves, national parks	• An attraction for installing waste water treatment facilities should be given e.g. tax benefits and increased penalties	• Small and medium scale industries and households have no financial means to invest into purification systems or provide maintenance • No approach for the whole Volga basin
Ineffective use of natural resources	• Improvement of operation of hydropower reservoirs. • The monitoring, the data and the forecast systems need to be improved. • Rehabilitation and maintenance of irrigation structures should reduce the losses. • A change of the legislation and a	• A better communication and cooperation between the energy sector, the environmental agencies and the representatives of the water consumers • Rehabilitation of housing-infrastructure and economical opportunities	• Lack of knowledge of how much the different users need • The legal status of a lot of water bodies is not identified

	prohibition of the trading would be needed		
Quantity of water	• A better acquisition of data and information including monitoring and communication. • Improving the prediction of hydrologic models could help to have a better forecast • Inclusion of the interest of different stakeholder groups.	• Linking all measures and programs with education of the public and organisations. This includes ecological education and knowledge exchange of behaviour during floods.	

EG 4. Connecting goods & people

Critical issue	Measures	Promoting factors	Inhibiting/blocking factors
Lack of integrative transport strategy	*Build an integrative transport strategy* • Build private-public partnerships • Ensure that the major rivers are fully navigable (uniform, "constant" water system which is well connected within basin and to outside) • Set-up a regional information database • Basin-wide consultation platform • Harmonization of regional / sectoral strategies • Redistribute powerplant income to waterway maintenance by unifying ownership	• stimulate private-public partnerships • stimulate private companies service guarantee (continuity, water level)	

Transport modes are not linked	*Link transport modes* • Create intermodal (freight) ports • Federal government to coordinate • All major actors and all modes to participate • Build on emerging logistics centers • Set up Private-Public Partnerships • Position "strategically" (key trade nodes)		
Waterways and infrastructure conditions are poor	*Gradually improve infrastructure:* • Customize existing ports for goods exchange • Stimulate private companies (tax breaks, subsidies) • Increase deep water (or guarantee water level) • Renew locks & gateways		

EG 5. Institutional coordination and cooperation

Critical issue	Measures	Promoting factors	Inhibiting/blocking factors
Insufficient basin management	Creation and establishment of cooperation in the Volga basin: • improvement of institutional cooperation, • development of specific organizational structures, • application of stimulating mechanisms, development of special programs, coordination of policies for distribution of financial resources,	Cooperation between the European Union and the Russian Federation • Transfer of positive experience, practices, mechanisms and tools • Enhancement of cooperation between the Russian Federation and European Union in the sphere of common environmental space. • Development and realization of programs and actions for its implementation (road	

	• creation of tools that can support partnerships	maps) • Transformation of foreign experience in integrated water management to that one of Russia. Application of basin approach to water management taking into consideration local and regional features	
Lack of public awareness and participation	• Involvement of local population in decision making by creating River Basin Councils • Information on the state of the Volga basin	• Information of the public through mass-media • Non governmental organizations (NGOs) • Clear and meaningful indicators (sturgeon, etc.) • Education of public and organizations	• Low priority of environmental issues • Low level of ecological education of people. • Absence of accountability of local authorities towards people
Lack of reliable data and information			

Annex VII. Future developments in view of scenarios.

Results of the survey held under experts at the Kazan meeting. Their judgment was asked on whether a critical issue will get worse, improve or remain unchanged in the next decade in view of the 4 scenarios (see section 2.4). Percentages are given.

Critical issue	Scenario[1]	*Critical issue will…*		
		Get worse	*remain unchanged*	*improve*
Water quality	A1	71	17	12
	B1	*15*	*12*	*73*
	A2	56	32	12
	B2	*22*	*22*	*56*
Effective management of resources (including water resources)	A1	46	27	27
	B1	*20*	*20*	*60*
	A2	39	39	22
	B2	*26*	*26*	*48*
Ecological value (number of habitats, species, biodiversity)	A1	62	24	14
	B1	*38*	*12*	*50*
	A2	70	13	17
	B2	*32*	*23*	*45*
Human security	A1	52	33	15
	B1	*26*	*22*	*52*
	A2	52	44	4
	B2	*42*	*33*	*25*
Information exchange and coordination on different levels	A1	58	17	25
	B1	*11*	*25*	*57*
	A2	46	18	36
	B2	*32*	*32*	*36*
Effective administration	A1	10	30	60
	B1	*8*	*33*	59
	A2	36	28	36
	B2	*40*	*30*	30
Effective usage of natural resources	A1	50	14	36
	B1	*15*	*31*	*54*
	A2	40	40	20
	B2	*50*	*40*	*10*
Water availability	A1	50	33	17
	B1	*23*	*39*	*38*
	A2	12	88	0
	B2	*25*	*50*	*25*
Transport strategy	A1	27	27	46
	B1	*22*	*14*	*64*
	A2	55	18	27
	B2	*46*	*27*	*27*
Cooperation between different kinds of transport	A1	40	0	60
	B1	*17*	*33*	*50*
	A2	40	50	10
	B2	*66*	*17*	*17*
State of waterways and their infrastructure	A1	17	17	66
	B1	*17*	17	66
	A2	46	18	36
	B2	*36*	46	18

[1]: A1: Global Markets, B1: Global Cooperation, A2: Regional Markets, B2: Regional Communities.