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ON THE AUDIT OF THE FLOOD CONTROL PREPAREDNESS IN THE UPPER TISZA REGION

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REPORT

on Auditing the Flood Control Preparedness in the Upper Tisza Region

INTRODUCTION

The area of the basin of the Upper Tisza is one of Europe's wettest regions, at high risk from floods. The fundamental cause of the frequent and sizeable floods characteristic of the region, is the hydro-meteorological and synoptic situation, as well as the special location and structure of the beds of mountain rivers, soils and mountain rocks. Floods cause major damage to Ukraine and Hungary alike, and this determines to a large extent the parties' cooperation in preventing the damaging effects of water and averting the consequences of floods.

Observations over long years show that floods and inland water problems occur on 3 to 8 occasions per year, and in the past 60-year period there have been years when these events had an extreme character. The most serious disasters were observed in May 1970, October 1974, July 1980, November 1998 and March 2001. 73 % of Hungary's flood basins and 66 % of the flood-plains are to be found in the Tisza valley. With a rapid snow melt or after heavy rain the flood appears in the Hungarian river sections too, within 1 or 2 days, causing an elevation of the water level by as much as 8 to 10 metres.

Almost 30 percent of the total water output of the basin of the Tisza River is generated in the territory of Ukraine, and within that in the region of Sub-Carpathia. Therefore, there is an asymmetric interest situation in respect of the direction of the hydro-meteorological process in the Tisza River catchment area, characteristically due to the features headwater-low-water. In respect of the "low-water" countries the aim of international cooperation may only be to implement developments for common benefit, where possible, and in addition to reduce the disadvantageous consequences resulting from their situation. In the Hungary-Ukraine relationship there have been several examples in recent years of conducting developments serving mutual benefit, mainly to the debit of Hungarian grants, whose results appeared in the joint development of a flood forecast system and in the arrangement of joint programmes of planning and research.

The execution of a parallel audit covering the flood control preparedness in the Upper Tisza Region was preceded by an agreement signed in Budapest, on 4 March 2004, by the Presidents of the State Audit Office of Hungary and the Accounting Chamber of Ukraine. The programme of parallel audit appeared with both parties as part of the audit tasks envisaged in the annual audit plans of the Audit Offices in such a manner that, pursuant to the agreement, the parties defined the aspects of parallel audit on the basis of monitoring the implementation of the contents of the Transboundary Water Agreement (hereinafter: Agreement).

The Agreement entered into by the Government of the Republic of Hungary and the Government of Ukraine (issued in Hungary via Government Decree No. 117/1999 (VIII. 6.), on the Ukrainian side via the decree of execution defined in Decree No. 34 dated 20 May 1999 of the Cabinet of Ministers) serves as international legal basis for the cooperation between Hungary and Ukraine in respect of transboundary waters. The history of the conclusion of the Agreement in force between Hungary and Ukraine goes back several decades: during this period the works targeting flood safety were in progress, with varying success in respect of both the willingness to cooperate of the neighbouring countries and the professional contents. The important principle of reconciling the water management activity, planned (or implemented) in the catchment area of the Upper Tisza and affecting the watercourse of the transboundary waters, was laid down as early as 1981.

It was another speciality of water-related cooperation between Hungary and Ukraine (earlier the Soviet Union) that, in parallel with the inter-governmental cooperation related to transboundary waters, a technical and scientific cooperation was also in progress, which promoted the enlargement of the professional contents of the transboundary water relations. For example, in the framework of the

research and development cooperation entitled “*Information measurement system for flood control forecast and water management in the catchment areas*”, realised between 1986 and 1990, the parties elaborated the detailed plan of the automatic monitoring for unified flood forecasting for the Upper Tisza. The professional contents thereof are still correct even today, providing a framework for the implementation of developments in progress.

The Transboundary Water Agreement, which became effective through the parties’ exchange of notes on 16 April 1999, is relevant in each of its articles for the joint tasks of preparations for flood disasters, in respect of the provisions relating directly to the works of planning, protection against floods and inland water problems and exchange of information. The basic condition of the successful prevention of flood disaster is that the territorial scope of the Agreement covers, in respect of the effects, not only the sections and chainages of the waters neighbouring directly on the national border, but the totality of the Tisza River’s catchment area.

When evaluating in general the contents of the Agreement, we should not disregard the fact either that this is the first Transboundary Water Agreement after the change of regime in Central and Eastern Europe, which took into account the international recommendations too (UNO EGB Agreement “*On the Protection and Utilisation of Cross-border Watercourses and International Lakes*” 1992, Sophia Agreement „*On the Protection and Sustainable Use of the Danube*” 1994).

The cooperating parties undertook to firstly agree on all water management interventions having a cross-border effect and implemented in the catchment area. Thanks to this principle of cooperation, several important examinations and some agreements were made in connection with flood prevention between 2000 and 2004.

In connection with flood prevention it could be highlighted that the Agreement prescribes for the Contracting Parties not to allow any interventions in their own territories, which could cause a considerable rise in the agreed maximum water output values in the transboundary waters. The provisions relating to mutual assistance in flood control protection at the transboundary waters and to keeping available the required protection capacities (machines, materials, outfits), were aimed at securing the harmonisation of the preparations for flood protection.

It is an essential element of the Agreement that the parties undertook to reconcile the plans of water management activities affecting the transboundary waters, since agreement on the plans for flood prevention allows for the parties to plan the flood protection facilities along the national border taking into account identical safety rules, creating thereby a flood protection system with equal stability. These efforts are important, since the protection of the common flood basin bays along the national border can only be secured jointly by the facilities of flood protection and inland water protection located on both sides of the border. This is supported by the regrettable example of the Upper Tisza flood in 2001, when the dykes burst in Bereg on the Hungarian side and Ukrainian areas were inundated, while Hungarian areas were inundated due to the bursting of dykes on the left bank of the Tisza River on the Ukrainian side.

The parallel audit was integrated, in case of the Hungarian State Audit Office, in the performance audit task entitled “*Audit of Preparations for the Prevention of Natural Disasters*”, while in the case of the Accounting Chamber of Ukraine it was a part of the task entitled “*Analysis and Audit of the Execution of the State Programme Covering the Complex Flood Control Preparedness of the Catchment Area of the Tisza River and the Sub-Carpathian Region for the Period 2002 to 2006 and the Forecast until 2015*”. The audit offices submitted their respective reports to the legislative bodies of their countries. The joint report presents the summary of the findings made on the Hungarian and Ukrainian sides, as well as the details of the joint conclusions concerning the fields of cooperation, which cover the transboundary waters.

SUMMARY OF THE FINDINGS

In respect of the regulatory background of protection against disasters of a hydrological nature, the audit on the Hungarian side revealed that the desirable harmony in the terminology of provisions and in the management of protection had not been realised. In the case of the local governments there is a failure further on in providing for protective works and in prescribing a statutory obligation relating to the solution of the drainage of inland waters and rainwater in the settlements, despite the professional analyses made after the occurrence of floods and despite the signals of earlier audits carried out by the Audit Office. The preparedness of the leaders of administration and mayors, which is sometimes deficient, constitutes a risk factor in local decision-making on protection, which can be similarly attributed to the absence of the relevant statutory provisions regarding commitment.

The flood safety of the Tisza valley evolved in a contradictory manner on the Hungarian side. It is sure that the safety of settlements was increased by the dyke developments and flood control projects carried out on the basis of traditional flood protection concepts, but nevertheless around one-third of the protective facilities did not meet the requirement of the standard flood level. In recent years the construction of dykes has also slowed down, while new flood phenomena (which can be attributed to the changed river bed conditions, the extreme weather phenomena and human intervention into the environment) have made questionable the level of safety achieved.

In the framework of the Further Development of the Vásárhelyi Plan (VTT), the implementation of a programme setting as its goal the partial reactivation of the released flood basins through regulated drainage, was started for the first time in Hungary, which would simultaneously prepare a new type of agricultural management, and a change in the use of landscape, land and water. The audit considered the absence of efficient operative management and that of the harmony of technical and financial scheduling to be a risk factor affecting basically the success of the programme. (As of this year the creation of more favourable conditions for implementation was begun, by placing the cooperation on new foundations.)

In connection with the state direction of disaster protection, the State Audit Office stressed the necessity for the Government to take measures in order to create harmony between the conditions of power, organisation and operation of the inter-ministerial committees set up and the fulfilment of their tasks. With regard to what has been revealed in the field of protection against water damage, it could be stated that there was an increase in the importance of planning, based on the size of risk, which is acceptable at the social level. All this was reflected by the proposals which were worded on the basis of the respective competences of the Government and the various sectors.

The audit by the Ukrainian party stated that the situation had not, basically, improved in Ukraine's Sub-Carpathian region, in spite of the directives on the measures aimed at preventing flood disasters and avert the danger, which were issued at the highest state level.

“The Complex Flood Protection Programme for the Basin of the Tisza River in the Sub-Carpathian region 2002-2006 and Forecast until 2015” (hereinafter: Complex Programme) set as its goal the complex treatment of the flood waves of the Tisza Basin, the protection of settlements, facilities and fields against water damage, and the minimisation of the destructive impact of floods and inland water problems. However, the results of the audit proved that in the period 2002-2004 the Complex Programme was not implemented at the scheduled pace, and a number of planned measures were not taken due to the lack of the required organisational and financial background.

The audit of the implementation of the Complex Programme revealed that the Government had failed to coordinate the activities of the ministries and the central and local executive organs responsible for the execution of the Act. It was stated that the ministries, authorities and local organs of power realised the measures at local level and irregularly, and therefore these measures did not secure any efficient, complex flood protection. The Government did not ensure any legal support for the Complex Programme. The absence of legal rules relating to the management of protection against water damage

and to cooperation by the organisations of water management and service providers, to the operation thereof and to the investment mechanism of their activities realised on the lands with water stocks, endangers the provision of the requisite level of flood protection.

After the disastrous floods the Ukrainian party rebuilt a part of the defensive lines, which increased the safety of certain settlements, but the financing of protective works is reduced in 2004 and 2005, which will only increase the number of non-finished projects and the inefficient use of assets and reduce the level of flood protection. The Accounting Chamber of Ukraine draws the Government's attention to the fact that the mechanism of financing the Complex Programme is not perfect. Consequently, the works related to flood protection are not aimed at the fulfilment of the measures determined in the programme. As a result, the treatment of the flood waves subsiding in the basin of the Tisza River and the protection of the settlements against the destructive impact of floods are not secured.

The proposals of the Accounting Chamber of Ukraine stressed that the Inter-Ministerial Cooperation Board set up to regulate the issues of water management and to implement the Complex Programme should carry out much more effective activity. Furthermore, they draw the attention to the point that the Board should audit more strictly the ministries and authorities involved in the Programme, particularly the appropriate preparation of the fulfilment of the measures in all phases of implementation (planning, reconciliation, contracting, etc.), and it should provide the appropriate financial support.

With regard to the deficiencies of a systematic nature which have appeared in the course of the implementation of the Complex Programme, it seems expedient to correct a number of provisions of the Complex Programme, with particular regard to those in the case of which the appropriate scientific and technical foundations are lacking. The Audit Office sent the relevant proposals to the Government, and therein the Audit Office mentioned that important scientific organisations, experts, and scientists from the Academy of Sciences should be involved in the work, the legal rules should be amended and complemented, and concrete obligations were to be determined in respect of each participant of the programme.

On the occasion of the examinations carried out on the Hungarian and Ukrainian sides giving a framework to the parallel audit relating to the flood control preparedness of the Upper Tisza Region, the parties basically came to conclusions which were quite similar. According to these the cooperation is in general well regulated, and in certain fields (such as, e.g., the operation of the constructed systems) it can be supplemented and thereby made more specific.

The statutory conditions for the movement beyond the national border of persons involved in the execution of the Transboundary Water Agreement, have been created by inter-governmental agreements. These do not need any amendment even after Hungary's EU accession in respect of providing the persons concerned with documents; moreover, the contents of the regulations must be enforced both in the provision of cards and in the practice of the audits of border policing, mainly with regard to the deficiencies and document handling experienced on the Ukrainian side. At the same time a review of the justified cases of border crossing out of turn can provide a basis for deciding whether it is necessary to specify or complement the agreements in force between the parties, in order to ensure the operational nature of movements along the state border.

Both parties characterised the situation of the construction of the flood control systems, supporting this with data (the condition on the Ukrainian side has less favourable parameters). In general, the flood protection dykes built several decades ago with the techniques of that time and in the dimensions then prescribed do not meet today's modern demands: their crown is narrow, the inclination of their slopes is steep, they are composed of heterogeneous materials, and they are low. (The requirements relating to locks were also different from today's.) This is equally true for Hungary and Ukraine.

In the Hungarian territory the prescriptions changed after 1970, and the flood control facilities built since then in Hungary (e.g. the dyke along the right bank of the Tisza River, the section between Jánd-

Tarpa and the national border, the dyke along the left bank of the Tisza River, the section between Olcsvaapáti-Tiszabecs, the dyke along the right and left banks of the Szamos River) meet the modern requirements (their height too is adjusted to the standard flood level of today). In the sections which still fail to meet modern requirements, defence against the governing load can only be secured with considerable defensive works.

According to the findings of the Ukrainian party, the existing dyke system does not constitute a reliable flood control complex. There are serious deficiencies in the provision of the Sub-Carpathian mountains with flood protection facilities at Rahó, Ökörmező and Técső. The Ukrainian party does not have unified protection plans for its existing defensive facilities, therefore there is no technical basis for judging the defensive capacity of the facilities.

The joint Ukrainian-Hungarian intention to endeavour to construct, on an identical scale, the dyke system at the Upper Tisza is not sufficient in itself; the programmes of dyke development must also be harmonised in the interest of success, for the purpose of implementation at a nearly identical pace. The fact has to be reckoned with that in consequence of the implementation of dyke development programmes, the number and probability of dykes bursting will be reduced. The execution of joint research programmes and impact studies will be an expedient tool for the evaluation of factors which increase the flood level at the sections which have become safer, which are to be taken into consideration upon the further planning of the flood-related emergency storage lake programme on both the Ukrainian and Hungarian sides.

The development concepts of flood protection have been agreed – on the Hungarian side in the case of the VTT programme, while on the Ukrainian side in respect of the complex flood control programmes, the short-term one (2002-2006) planned for the Sub-Carpathian catchment area of the Tisza River and the long-term one (until 2015) – only superficially, in extract form with sketches. It is evident that the success, efficiency, and last but not least the rentability of the steps aiming at improving the flood control preparations are highly dependent on complete compliance with the obligations of mutual information and agreement covering the planning, which have been included in the Transboundary Water Agreement.

The Hungarian party should not fail to indicate that the developments at the Upper Tisza, to be implemented in the first phase of the VTT, will improve the flood control safety of the areas along the Ukrainian border too, therefore they will also be beneficial for Ukraine. The revitalisation of the merits of the disclosure of information on the evolution of the short- and long-term programmes on the Ukrainian side, suspended since 2003, as well as the putting on the agenda of the missing discussion of the Hungarian opinion given on the sketchy plan of flood protection relating to the Sub-Carpathian catchment area of the Tisza River, could result in steps which will give an appropriate direction to the cooperation, living up to the expectations of the Agreement.

The new localisation plan, which considers the dyked marsh of flood and inland water protection of Bereg and Beregszász to be a unified system, has been elaborated, but the parties' official approval shall also be required, since the dyked marsh is divided by national borders. It would be expedient to involve the elected bodies and protection committees of the counties, regions and settlements in the elaboration of the method of enforcing the rights. It is also expedient to keep in mind that the localisation plan can play its role efficiently besides a continuous maintenance, for the ensuring of which the parties should make provisions in a so-called localisation cooperation regulation, based on the Hungarian position.

The services of the observation and forecast system developed from 1999 on a continuous basis are useful for both parties in the Upper Tisza catchment area, which is covered by the territorial scope of the Agreement. The observation and forecast system established with the contribution of the Hungarian party cannot be considered, even in its condition today, to be fully developed. The Ukrainian party received and commissioned, with US support, six automated satellite hydro-

meteorological stations. The positive results confirmed the need for the further development of the system.

A number of joint studies and plans proved that the parties had made efforts, within the limits of possibility, to utilise the opportunities of cooperation provided by the Transboundary Water Agreement, in the field of scientific research. The results achieved cast light on the hydrological role of forests and on reasonable attention being paid to the aspects of flood prevention in silviculture. With regard to the geographical location the correlations discovered concern primarily the silviculture of the Sub-Carpathian catchment area, which was also reflected by the steps of the Ukrainian party made in this direction. In the judgment of both sides it is justified to continue and enlarge the joint research relating to flood prevention.

Lots of projects with international funding were launched in the region covered by the territorial scope of the Transboundary Water Agreement between 2000 and 2004. The relevant information was on the agenda, with a weighting which varied according to its topicality, in the various forums of Hungarian-Ukrainian cooperation, but this was not followed in each case by an appropriate flow of information. The individual projects are also useful from the aspect of bilateral flood prevention activity; however, the cooperation of the work organisations of the forums and projects, operating on the basis of the inter-governmental agreements, cannot be considered as being regulated, which could ensure the appropriate coordination and harmony between the development programmes.

In order to enforce a basic principle which is accepted at the level of generality (according to which the success of the treatment of flood safety is independent of national borders), the bilateral cooperation was enlarged into a quinquelateral one at the Budapest meeting, which was organised upon a joint Hungarian-Ukrainian initiative in 2001. However, the quinquelateral Tisza Valley cooperation was characterised by a moderate progress in the past years, which was caused – among other things – by the absence of a joint working organisation and by the prevailing budgetary situation of the individual participating countries. Recently, the continuation of the quinquelateral cooperation within the operational framework of the ICPDR (International Commission for the Protection of the Danube River) came much nearer, based on the EU's practice in the treatment of tasks at the catchment area level.

RECOMMENDATIONS

Following their examinations, the Hungarian State Audit Office and the Accounting Chamber of Ukraine conceived proposals for the Governments and responsible organs of their respective countries in order to utilise their findings and conclusions. In order to improve the flood protection situation of the Upper Tisza Region we recommend, based specifically on the experiences of the transboundary water cooperation, that the following be taken into consideration:

- in the framework of updating the regulation of transboundary water cooperation we propose complementing the regulation of the cooperation in water damage prevention by provisions relating to the treatment of situations caused by dykes bursting, as well as the regulation of hydro-meteorological and water management cooperation by provisions relating to the operation of the implemented monitoring system; since the powers of the Government delegates are laid down in the Transboundary Water Agreement, the contracting parties (Governments) have to ensure the enforceability of the obligations according to their own legal systems;
- we draw the attention of the Government delegates of the Hungarian-Ukrainian Transboundary Water Agreement to the necessity of providing for the conditions of a border-crossing practice which meets the prescriptions, by initiating governmental measures on behalf of their respective countries, if necessary, and to that of initiating the specification and supplementation of the international treaties, depending on the justified cases of border-crossing out of turn;

- in the interest of the success of the positive joint intention to make efforts, in connection with the construction of the flood control systems, for the construction to an identical extent of the dyke system, we also propose harmonising the schedule of implementation; besides the developments on the Hungarian side, the maintenance of the flood control systems also requires the provision of appropriate financial conditions; on the Ukrainian side we consider the survey of the protective facilities and the preparation of protection plans to be urgent tasks (e.g. they should be included in the objectives of the projects, which are to be implemented by grants won in international tenders);
- the prescription of the Agreement relating to the obligation of information and agreement should be kept in mind by both parties in the elaboration of the concepts of flood control developments, in the further development of the joint systems for inland water protection, in the application of unified localisation plans, as well as in the projects implemented on their own or with international assistance; they should urge, furthermore, joint investigations analysing the cumulative effect of the planned Ukrainian and Hungarian interventions (e.g. by the elaboration of a joint programme of modelling and planning), with particular regard to the area of the flood and inland water protection dyked marsh of Bereg and Beregszász and to the area of the Szőlős District;
- both parties judged as important joint research relating to flood prevention; the audit, too, found it justified to implement the objectives of research resolved at the XIth meeting of the transboundary water delegates of the Governments; it would be expedient to disclose, in the framework of cooperation, the opportunities for EU grants serving such objectives;
- in order to achieve higher-standard services through the flood observation, alarm and forecast system we deem it justified to further develop the system in the following fields: increasing the number of stations in the higher regions, joint processing of the data from meteorological radar and terrestrial stations, development of forecasting models, execution of cartographic and geodesic works required for the forecasts; we propose integrating the satellite tachometers constructed with US assistance into the joint Ukrainian-Hungarian system; furthermore, we deem it expedient to combine the IT systems of the Upper Tisza organisations of flood and disaster protection of Hungary and Ukraine;
- to increase the efficiency of bilateral and multilateral cooperation we propose that the Government delegates monitor the execution of the provisions of the international agreements, and to provide thereby for a coordinated contribution by the sectors and responsible organs involved in the territories of their respective countries, and, if necessary, to initiate steps requiring governmental intervention in order to enforce the national and joint interests.

FINDINGS

1. Main Experiences of the Hungarian Audit Relating to the Prevention of Natural Disasters

The development of the regulatory, directional and institutional conditions governing the prevention of disasters of a hydrological nature, and (with high priority) the efficiency of the measures taken for the flood safety of the Tisza Valley were evaluated by the State Audit Office using the method of performance audit, overviewing the tasks of disaster protection assigned to the various levels of the Government and the different sectors.

The statutory regulation of disaster protection – which simultaneously transferred the management of protection, the harmonisation of prevention and execution and the execution of the Government-level tasks of planning into the competence of the Government – was a considerable step forward regarding

both the EU's process of legal harmonisation and the organisational regulation of domestic disaster protection. With regard to the pre-eminence of disasters of a hydrological nature, the Act on Water Management and the legal rules relating to protection against water damage and defence are authoritative in the Hungarian regulation of the prevention of natural disasters.

In relation to natural (hydrological) disasters, the government decrees implementing the Acts prescribed the execution of the action and audit tasks relating to prevention and preparation, regulated the scope of tasks and powers of the central organisations and regional organs of water management, and provided for the rules of protection against the damage caused by water. A KHVM [Ministry of Transport, Communications and Water] Decree regulated the protection against flood and internal water. The review of the sectors' regulations resulted in the recognition of the fact that no appropriate harmony had been created in respect of the terminology of the provisions on disaster protection and in that of the management of protection.

The Governmental Coordination Committee (KKB) set up for the successful coordination, between the ministries, of tasks related to disaster protection provided successfully for the tasks of protection, but it could not entirely fulfil its tasks defined for the periods of preparation for protection and of prevention. (Despite several trials, the National Disaster Protection Strategy has not been finalised, coordination was less successful in the tasks of prevention, and the basic requirements of the establishment of a national anti-disaster information system could not be clarified).

The Further Development of the Vásárhelyi Plan (VTT), which started as a flood protection programme and blossomed out, as of 2003, as a complex programme of regional and rural development, as well as the complex programme of the Tisza Region, require both governmental management and coordination, while the connection of these to the statutory tasks prescribed for KKB (or the independent treatment thereof) has not yet been subject to analysis or decision-making. Therefore, the audit drew the attention of the Government to the necessity of harmonising the operations of the committees which were set up from various aspects (on the basis of the viewpoints of general disaster protection and/or in respect of flood protection developments), based on the reports of such committees, in order to enforce the principle of unified management by the state, as declared by law.

It is the obligation of the state, the local governments, and of the entities interested in the prevention or elimination of the damage to provide for the tasks required in the interest of protection against the damage caused by water. The organs of water direction - the sector ministry, as well as the central organs set up for this purpose and the regional organs thereof - provide for the state tasks connected with the elimination of water damage as referred to the competence of the Minister responsible for water management, on the basis of their competences as defined in Government Decrees and the decrees of ministers. The situation has not been simplified at all by the fact that the water management was operating within the organisations of three ministries during the four years under review.

The audit did not consider as efficient enough the contribution of the organs with nationwide competence, involved in the protection against disasters of a hydrological nature, although they had cooperation agreements. Consequently, no cooperation on the merits has been developed in the planning of disaster protection and in the execution of the international agreements. Information systems are operating with sectoral jurisdiction, adjusted to the character of the disaster, but it is true that such systems are constructed depending on the development possibilities of the given ministry. The water sector's monitoring system, the construction of evaluation centres, the operation thereof and the regulatory order of data flow ensure the information required for prevention and for the planning of prevention. Nevertheless, the harmonisation of the development of systems could not be implemented due to the absence of a direct link between the information systems.

As of the year 2000, a complex sectoral strategy of water damage prevention provided the basis for annual planning in the field of protection against water damage, which strategy could not be entirely enforced. The main individual directions of development were supported by individual and ad hoc

government resolutions, while the other objectives of water management (among other things the acceptance of normative rules) have not been recognised. With regard to the high demand for resources of the tasks of prevention, the harmony of needs and resources was not created in the budgetary management of the water sector in the period under review, in spite of the fact that the budgetary allocations of the institutions increased from year to year. The instances of flooding which having occurred in the meanwhile only worsened the situation that had come into being.

The reductions of redundancies enforced in the water sector became a factor jeopardising safety in respect of both the technical management of protection and in that of the activity of certain divisions of protection providing for special tasks. The success of prevention was unfavourably affected primarily by the insufficient funding of the maintenance tasks. There was no possibility to purchase the tangible assets required for the reliable survey of risks, thus the deterioration of engineering structures resulting potentially in dykes bursting might remain hidden.

It was also pointed out by the materials of the analysts' reports following the flood events that, according to the subsequent evaluation, certain decisions made in respect of the distribution of resources in the given budgetary conditions, in the interest of flood protection, proved to be inexpedient and/or resulted in an uneconomical solution. The deferral of the tasks of heightening and maintaining the dykes, to be carried out at a cost of several billion Forints, resulted in damage amounting to billions due to the flood damage in the years 2000 – 2001, while the “saving” of expenses for maintaining the system of inland water channels, expressible in an order of magnitude of millions, caused damage of an order of magnitude of billions after the inland water disasters in the years 1999 – 2000.

The flood risk analysis, which takes into consideration, over and above the probability of the disaster event, the extent of the anticipated damage, has not become a generally applied method of planning in disaster prevention. With regard to all this the audit urged planning which was based on the extent of risk acceptable at the social level.

Based on the professional analyses made after the occurrence of the floods (and repeating the signals of the earlier audits by the Audit Office), the audit also considered it to be a regulatory deficiency on this occasion that no statutory obligation had been prescribed, in the case of the local governments, relating to the provision of protective works and to the solution of the drainage of the settlements' internal water and rainwater. It could also be stated that the preparedness of administration executives and mayors, which was sometimes deficient, meant a risk factor in the decision-making on protection at local level, which was similarly to be attributed to the absence of the prescription of the relevant statutory obligations. These repeatedly caused difficulties in protection.

It is true that in the circumstances given, the flood safety of the Tisza Valley has been increased by the development of dykes constructed on the basis of traditional concepts of flood protection and by other flood control investment projects, but in the past years the construction of dykes has slowed down and the safety level achieved has been made questionable by newer flood phenomena, which may be deduced from the changed river bed conditions, the extreme weather phenomena and human intervention into the environment.

The evaluation of the experiences of a series of floods and appropriate professional investigations led to the elaboration of the programme “Further Development of the Vásárhelyi Plan” (VTT), which was first ordered by a government resolution and then, in 2004, confirmed by an Act. In November 2004 a new situation was produced through the classification of the VTT as a high-priority complex programme of flood protection and regional development, when the primary responsibility for the governmental coordination in the implementation was assigned to the minister without portfolio responsible for regional development and catching up. As witnessed by the documents prepared in the new structure, these take account of the difficult areas of implementation and the (institutional, communication, resource) conditions of successful governmental coordination. (The agreement relating to this latter issue was signed by the heads of the ministries involved in February this year.)

2. Main Experiences of the Ukrainian Audit Relating to the Complex Flood Control Preparedness in the Catchment Area of the Tisza River and the Sub-Carpathian Region

With regard to the fact that in Ukraine the solution of issues relating to flood protection has been implemented, since 1994, on the basis of complex programmes adopted by the Government, the Accounting Chamber of Ukraine based its audit on the implementation of the programmes, the efficiency of the measures defined therein and the effects exercised by the measures on the results of the Agreement on the common Hungarian-Ukrainian transboundary waters.

The deficient construction of flood protection dykes and bank reinforcements, the minor water throughput capacity of the hydraulic engineering facilities (particularly of the bridges), mainly in critical situations, the overloading of the river valleys (with various main transport routes), and the unsatisfactory condition of a number of beds and rivers and areas along watercourses are categorised by the studies as being among the main causes, with respect to water management, which result in disastrous floods in the Sub-Carpathian part of the Tisza River basin. The situation is further worsened by the building up of areas along the rivers, endangered potentially by inland waters. The social and economic consequences of floods would not be so grave, if the norms were strictly complied with upon the designation of plots (for housing and economic construction), and if the violation of the rules of settlement construction were not allowed in areas endangered by floods and inland waters. The floods in 1998 and 2001 caused damage amounting to 1.1 bn Hrivnas. The damage would have been much less, if the budget had granted the amount of 207 mn Hrivnas fixed in the flood control programme (which is five times less than the damage caused).

The adoption of the complex programmes presupposes a complex approach in the solution of flood protection programmes, e.g.: regulation of the development of flood waves with the help of special emergency basins and polders, with the simultaneous reinforcement and development of flood control dykes, regulation of the river bed and construction of regulatory hydraulic engineering facilities, afforestation, and measures against soil erosion and landslides.

To secure a complex approach to the treatment of flood, to protect the settlements, facilities and lands located in the Tisza Basin against water damage, and to minimise the destructive effect of floods and inland waters in Sub-Carpathia, the Cabinet of Ministers of Ukraine accepted, by Decree No. 1388 dated 24 October 2001, "The Complex Flood Protection Programme in the Tisza Basin of Sub-Carpathia for 2002-2006 and Forecast until 2015" (hereinafter: "Complex Programme"), which forms part of the State Programme for the Development of Water Management, adopted by Act No. 2988 dated 17 January 2002 of Ukraine. The programme defines the fundamental steps for achieving the goal, including: the establishment of flood control facilities based on totally new principles; and reconstruction of existing hydraulic engineering facilities to increase stability and reliability. All this, together with the special flood control emergency basins, will be able to ensure the technical protection of the population and facilities in the case of flood peak.

It is a characteristic feature of the Complex Programme that the following institutions participate therein, besides the State Water Management Commission: Ministry of Transport and Telecommunications (planning and construction of bridges, roads and engineering (civil engineering) structures), Ministry of Environmental Protection (construction and reconstruction of water indicator, observation and forecast systems), Ministry of Agricultural Policy (anti-erosion programmes), State Office of Sylviculture (afforestation and plantation of water protection forest belts). The ministries and state offices listed above were also entrusted with the calculation of the required moneys, within the framework of the expenses, which are allocated to them in the course of the preparation of Ukraine's budget for the given year. In addition, it was necessary to provide for the involvement of complementary financial assets, including foreign investments, in order to implement the measures defined in the Programme.

In its Decree No. 1388 the Cabinet of Ministers of Ukraine entrusted the State Water Management Office (having a proportion of 88% in the works planned for 2002-2006) with the coordination of the fulfilment of the Complex Programme. However, the audit found that the functions of coordination vested in the Office had not been supported by appropriate complementary powers and rights worthy of such a role. Therefore the Office is unable to provide appropriately for the coordination and for the audit of the fulfilment of the Complex Programme.

In order to implement the Complex Programme, the Inter-Ministerial Coordination Board has been set up. Its members are the representatives of the interested ministries and executive organs of power, important scientific organisations, experts and members of the National Academy of Sciences and the Academy of Agrarian Sciences of Ukraine. The audit revealed that due to the disorganised nature of its work the Board had been unable to fulfill its function, it had not monitored the status of the execution of the programme and had failed to prepare the resolutions to be adopted in order to implement the measures which had been defined in the programme.

The mechanism of funding the programme from the state budget and other sources is not perfect. The Government violated an Act in force by failing to provide for the Programme the funding defined by law. Certain entities executing the Programme (Ministry of Transport, Ministry of Agricultural Policy, State Land Office and State Office of Sylviculture) voluntarily remained in the background in the period of the compilation of the budget, and in violation of the Budget Act they did not prepare and submit in the usual course of business the budgetary demands required for the fulfilment of the measures decided on.

The failure of the funding intended for the development of the network of engineering structures (commissioning of the observation system) on the rivers of the Sub-Carpathian region and defined by law will not allow, in 2002-2004, the operation with maximum efficiency of the systems serving to protect the population in periods endangered by floods. The insufficient financing does not allow the formation of emergency financial reserves to prevent and eliminate extraordinary situations of a technological and natural character and the consequences thereof.

The results of the audit attest that a number of the provisions of the Complex Programme are in need of being changed and updated. This applies particularly to the provisions which do not ensure the establishment of a flood protection system based on new principles, including the reconstruction of hydraulic engineering facilities and water throughput, bridges and passages, do not prohibit the construction of dwelling houses and industrial facilities in areas endangered by floods, do not urge the introduction of activities of water management, agriculture and sylviculture causing no ecological harm, taking into consideration the provisions of the Water Act, the Land Act and the Forest Act and other legal rules, and hinder the efficient complex flood protection and the prevention of water damage.

The absence of a systematic approach in the execution of the programme and the lack of a reliable audit over the execution, as well as insufficient funding, resulted in the fact that the basic goals of the Programme regarding the treatment of development of floods in the Tisza Basin, the protection of settlements, facilities of national economy and lands against water damage and the protection of Sub-Carpathia against the destructive impact of floods and inland waters are not secured. On the basis of the investigation, the Accounting Chamber of Ukraine emphatically drew the attention of Parliament and the Government to this fact.

3. Findings of the Parallel Audit Aimed at the Implementation of the Contents of the Transboundary Water Agreement

3.1. Levels and Level of Regulation of Transboundary Water Cooperation

The conditions of execution of the contents of the Agreement have been created, meetings of the Government delegates were held annually and duly documented (this was only omitted in the year

2004 due to a change in the person of the Hungarian government delegate and his deputy and the protraction of their appointment), and at the same time extraordinary meetings were also held in 2001 and 2002. In issues of flood protection *meetings at expert level* were organised on 2 to 3 occasions annually, and the contents and the method of execution of the operative tasks connected to the Agreement were laid down in cooperation regulations.

The performance of the contents of the *cooperation regulations* can be well monitored, and it could be stated in general that they provided an appropriate basis for the ongoing daily exchange of operative data and information both in the periods of flood protection and without flood protection. At the same time the audit considered it necessary to update the regulations on a regular basis, both in respect of the various situations emerging in the course of joint activity and in respect of the EU requirements of legislation on nature preservation.

For example the regulation on cooperation in the prevention of water damage successfully passed the examination at the time of the flood waves subsiding between 2000 and 2004, but the lack of joint provisions relating to the treatment of situations caused by burst dykes was also perceptible. Joint plans for flood localisation as the basis for disaster prevention could have assisted the harmonisation of the tasks of localisation and rescue carried out at the time of the 2001 flood inundations in Bereg; however, no such plans were then available.

Based on the contents of the regulation of hydro-meteorological and water management cooperation, the competent organs carry out continuous hydrological observations on the transboundary waters, they make joint water output and other measurements according to the agreement, and they define the water outputs of transboundary waters; however, it would be expedient to complement the regulation by the rules of operation of the monitoring system implemented.

The scope of rights and powers and the tasks of the government delegates and their deputies are regulated by the provisions of the Agreement. In Hungary, the government decree promulgating the Agreement provides – with regard to the operational mechanism of the execution of statutory instruments – a sufficient legal basis for the government delegate to act before other ministries, if required. In the judgment of the audit on the Ukrainian side the rights and obligations of the government delegates and their deputies are, however, not defined exactly; in the case of cooperation with other organs of power there is no provision for their decision-making authority and for the proceedings related to the reconciliation of important issues of national economy arising in the course of the performance of the Agreement, particularly in acute situations.

In addition to the fact that Article 11 of the Hungarian-Ukrainian Transboundary Water Agreement deals with the crossing of the state border, the statutory conditions of the crossing of the state border by the persons involved in the execution of tasks resulting from the Agreement, for service purposes, have been created, on the one hand, by the Agreement on the Unification of Documents Required for Border Crossing for Service Purposes, signed on 6 February 2002, and, on the other hand, by the Agreement Regulating the Travel of Citizens, signed on 9 October 2003 by Ukraine's Cabinet of Ministers and the Government of the Republic of Hungary. However, the water crossing practice of neither party has become smooth in recent years, due to various reasons.

The collaborators of the Hungarian water organs disposed over the bilingual Border Crossing Certificate for service purposes which was required for moving and staying in Ukrainian territory; however, as indicated by them, such a certificate was not accepted according to the regulations by the Ukrainian organs of border policing (they used their passports for border crossing). The lack of border crossing certificates for persons involved on the Ukrainian side made difficult the operative cooperation of the parties.

Hungary's EU accession resulted in no change in respect of the border crossing documents; however, after this, the form of authorising border crossing out of turn, which prevailed earlier on the Hungarian side, ceased to exist. While prior to accession the Border Guards could, in case of circumstances

deserving exceptional judgment and upon written request, license border crossing for one occasion, or for several occasions for the duration of no more than six months, with control out of turn, according to the prescription of the legal rule amended with effect from 1 May 2004, the control of border traffic of persons, vehicles and shipments is effected basically according to the sequence of arrival at the border station. At the same time, the regulation on the Hungarian side provides crossing opportunities out of turn in certain cases, although not in the earlier form. If a person or the driver of a vehicle entitled to border crossing with control out of turn on the basis of an international treaty or a statutory provision signals his or her border crossing intention to the border guard, or this is perceived by the border guard, the control of border traffic has to be executed out of turn.

In the rules of crossing out of turn based on the earlier authorisation, the definition of such cases was not relevant among the provisions relating to the crossing of the state border of the Transboundary Water Agreement; it was sufficient to demonstrate its justification together with the request for licensing. However, in the new border crossing order it would be expedient to make clear the justification for crossing out of turn, to be secured on the basis of an international treaty or a legal rule.

3.2. Construction of the Flood Protection System

The flood control dyke system in the Tisza Valley, constructed over nearly one and a half centuries, continues to be, together with its accessories, one of the most important tools of protection against floods. The reinforcement and heightening of dykes was carried out almost on a continuous basis. In the Hungarian territory the dykes are to be developed, based on the national strategy of flood protection, taking into account the flood levels as prevailing from time to time. The prevailing flood levels of Hungarian rivers have been revised several times (for the last time in 1990; the values defined then were only confirmed by the subsequent regulations). The Hungarian water management did not consider the modifications to be sufficiently justified, but at the same time this has not yet been replaced by a safety concept with a new approach, based on the appropriate evaluation of risks.

In Hungary, in the area of operation of the Directorate of Environmental Protection and Water of the Upper Tisza Region, a total of 544.1 km defensive line is located, of which 541.0 km are earth dykes, 111 metres flood protection walls and 3.0 km high banks. The sections of Hungarian-Ukrainian joint interest, as well as the characteristics thereof, have been laid down in the Schedules to the Regulation on the Prevention of Water Damage in an itemised manner. The length of the sections located in Hungarian territory is 71.2 km, and the length of the sections in Ukrainian territory is 34.7 km.

In the year 1997 a new programme for flood control development was started according to the concept of flood protection development, which was based on the comprehensive review, in 1996, on the Hungarian side, of the dyke system of the Upper Tisza and within that of the dykes along the Hungarian-Ukrainian transboundary waters. In the year following the start of the programme a flood wave developed on the Tisza River, almost causing a disaster, which exceeded the maximum water levels measured so far on a number of water meters in the Hungarian and Ukrainian sections of the Upper Tisza. The concept of flood protection development was revised and amended accordingly, making use of the experience of this event, and the developments made after 1998 on the Hungarian side and the current projects were also based on such development concept.

As a result of the development works started from 1997 on, the condition of the flood protection system has improved. By 2004 a total of 90 km of dykes had been reinforced, nevertheless, a further 44 km can be highlighted as being among the dykes to be urgently constructed. (A dyke of 130 km is in need of reinforcement with a somewhat lower priority.) According to the 2004 data, around one third of the flood protection dykes located on the Hungarian side of the Upper Tisza did not meet the safety requirements. The length of dyke developments implemented between 2000 and 2004 in the sections of joint Hungarian-Ukrainian interest is 18.5 km.

The development of the dykes on the right and left banks of the Tisza River's domestic section with the strongest watercourse has been finished between Tiszabecs and Olcsvaapáti and between Tarpa

and Jánd. The construction, commenced 30 years ago, of the Szamos River's defensive lines was completed in 2004. The dyke sections of the Túr River and the Palád stream, which were exceeded by the flood in 2001 or at which a dyke burst occurred, were constructed in the same year, while they were heightened along the lower section of the Túr River.

To improve the accessibility of the dykes a solid pavement was prepared with a total length of 50 km on the crown of the constructed dyke sections by 2004. Upon protection the protection lines can be easily approached on the paved crown, thus the necessary protective interventions can be made in due time and with less expense. A solid dyke crown pavement was built on the left bank dyke of the Tisza River in the region of Tarpa and Gulács. Consequently, the dyke crown between the state border and Jánd will be able to be travelled with motor vehicles even during flood protection.

The condition of the 144 engineering structures along the dykes is for the most part satisfactory, but the total refurbishment of some of them is becoming more and more urgent, and any potential delay may involve a considerable increase of risk. The reconstruction of the lock at Nagyecsed and Tiszakőröd was completed last year.

The flood protection system operating in the Sub-Carpathian region currently comprises the following: flood protection dykes, reinforced banks, regulated river sections, main and side channels with structures, pump stations for soil improvement systems, water basins and trenches. The total length of dykes is 824 km, of which 690 km are located along the main river network, while 134 km are to be found along the side rivers and the channels along the drained lands. Facilities reinforcing the bank and modifying the bed serve as protection along a length of 275 km, in the form of supporting walls, with structures from quarry-stone concrete, encrusted with stones, mattresses (wire baskets) filled with stones, etc.

In consequence of the 1998 and 2002 floods, the reinforced banks were damaged at many points, therefore they require restoration and reinforcement. The regulated sections of the main river network amount to a total of 82 kilometres. The total length of the main channels under the bed is 1344 kilometres, and 1107 pieces of hydraulic structures are to be found thereon. 49 pump stations have been constructed for draining the superfluous waters of the water drainage system out of the areas along the dyke. In the area of the region 9 pieces of water basins with a total capacity of 1 million cubic metres and 49 storage basins are to be found. The capacity of all water basins allows the reception of 60.5 million cubic metres of water.

In respect of the operational characteristics, the flood protection facilities constructed in earlier times met the technical requirements in force at the time of construction, and with regard to a number of parameters they do not meet today's demands. In addition, many of them are in need of reconstruction or overhaul. Most of the facilities were not damaged on the occasion of the 1998 and 2001 floods and they fulfilled their protective function. Of 646 km of flood protection dykes, 41.3 km were damaged or destroyed (6.4%); of the 1337 km of channels 17 km were damaged (1.3%), and of 1033 hydraulic facilities, 5 were damaged (0.5%).

From among all the facilities located along the common Ukrainian-Hungarian border sections, 5 dykes are to be found in Ukrainian territory, of which 3 are on the Tisza River, with a length of 43.2 km, one on the Borsa River with a length of 3 km and one on the Túr River with a length of 5 km; and 7 channels are to be found here with a total length of 56.7 km. The works relating to the reconstruction of the Beregszász system for inland water drainage are currently in progress. A lock with a throughput capacity of 68 cubic metres/second constructed at the mouth of the Csaronda-Latorca channel, as well as 16 pump stations with a capacity of 52.9 cubic metres/second, ensured the passage of disastrous flood waves without particularly heavy damage.

A major part of the flood protecting dykes constructed according to various technologies and planned for different flood waves does not correspond to the standards in force today, and, therefore, the existing dyke system does not constitute a reliable flood control complex. The protective facilities

located in the mountains of the county (Rahó, Ökörmező, Técső) must be considered as seriously deficient. A dyke of 93 km, a section of 230 km of the main channels of the Beregszász drainage system, and the Új and Öregbatár channels are in need of reconstruction.

Between 2000 and 2004 the reconstruction of 116 km of protective dykes was implemented on the joint Hungarian-Ukrainian section of the Tisza River, while work relating to the refurbishment of pump station HC-21 of the Beregszász drainage system is in progress. In order to maintain the appropriate condition of, and to modernise, the inland water systems, particular attention was paid, on the occasion of the joint examination of hydraulic facilities (22-23 December 2000) along the Ukrainian-Hungarian state border, to the audit of objects of strategic importance, like the pump stations (pump station 1 in Krasnoye village and pump station 13 of the Beregszász drainage system in Eszeny), and the condition of the right bank dyke of the Tisza River at the section near Csap in Ungvár District, at the section near Vári and Csetfalva in Beregszász District and at the section near Újlak in Szőlősi District. The team of experts examined very thoroughly the Tiszaszalka pump station and the flood protection centres located in the Tisza River catchment area in Hungarian territory. Those conducting the examination found that all facilities were in a technically operational condition and were suitable for draining a flood wave. The prevention of the consequences of the flood in March 2001 showed that such a condition of the facilities, located at this section of the state border, allowed a considerable mitigation of the injurious effects of floods.

The *regulation of rivers* is also considered important from the aspect of flood protection in Hungarian territory. The river regulation structures to be found in a total length of around 160 km on the Tisza and Szamos Rivers displayed considerable variation picture. The big floods of last years continued to increase the earlier damage, which was in some cases several decades old. The highest risk is caused by the river bends located in the proximity of the flood protection dyke. There are 26 river sections on the Tisza and 4 on the Szamos where urgent intervention is required for the construction or reconstruction of the bank protection. (In the last 6 years 18 elbows were regulated, and in 2004 river regulation works were carried out at 4 sites.)

The high number and frequency of dyke bursts occurring due to floods, which happened between 1998 and 2001, can be attributed to the condition to the dykes. Both parties keep in mind the importance of the development of the Upper Tisza dyke system; however, it must be understood that this process cannot be really successful without the harmonisation of the development programmes and without joint analyses, research and impact studies.

According to the sketchy plan presented in 2001 the Ukrainian party planned a refurbishment of the dyke system, with a total length of 824.7 km, together with dykes and revetments, dimensioned for a standard 1% flood, and the construction of a further 132 km of new dykes. In the absence of the required budgetary allocations a total of 27.9 km of dykes were constructed or reconstructed in the period between 2002 and 2004, i.e. 26.1% of the quantity planned for such period in the material entitled "*Complex Flood Protection Programme relating to the Years Between 2002 and 2006 for the Tisza River's Sub-Carpathian Catchment Area and Forecast Until 2015*".

To continue the construction of the flood protection systems, the Hungarian party planned further developments also affecting the Hungarian-Ukrainian joint diked marshes, like the full construction of the flood protection system of the Bereg diked marsh between Jánd and Lónya (38 km), the development of the Túr River's flood protection system with the construction of the mouth section of the defensive lines and the implementation of the Upper Túr flood basin, the modernisation of the elements of the flood control infrastructure (locks, protection centres, information system, bank protection). In addition, the preparation of a development study for the flood protection section between Zsurk and Vásárosnamény is also included in the future plans.

The joint Hungarian-Ukrainian efforts aimed at the construction on an identical scale of the dyke system at the sections of joint interest reflect an expedient guideline. The parties informed each other very grandly of their concept plans; however, no exchange of information or reconciliation on the

merits, covering even the details which are indispensable for the success of further tasks, have yet taken place, and no joint examinations have been carried out to analyse the joint effect of the planned Ukrainian and Hungarian interventions.

3.3. *Development Concepts in Flood Protection*

The extended flood control dyke system in the Tisza Valley continues to be an important tool for the defence against floods. At the same time both parties recognised that successful prevention could not be based on the development of the dyke systems only. Alongside the traditional protection, the construction of protective works allowing a freer space for the rivers and based on flood basins means a *new type of flood protection concept*. With this in mind the programme entitled Further Development of the Vásárhelyi Plan (VTT) has been elaborated on the Hungarian side and the “*Complex Flood Protection Programme in the Tisza River’s Sub-Carpathian Catchment Area for the Years 2002 to 2006 and Forecast Until 2005*” has been prepared on the Ukrainian side, which forms part of the “*State Development Programme of Water Management*” enacted in Ukraine in 2002.

The reduction to one third of the flood risk was forecast through the complete implementation of the VTT programme. However, the complex professional approach was not accompanied, in the planning, by a similar approach in the preparation of the cost budget of implementation. While the development objectives and the persons responsible for them have been detailed in a government resolution, the resources were not assigned to them: only the framework amounts available annually in order to implement Phase I of the VTT programme have been provided. Thus the executable developments had to be defined bearing in mind the resources available in the given budgetary year. With regard to the correlations of VTT with agrarian and rural development, there was a lack of clarity over whether the various development objectives would be financed by the budget of which of the ministries and when. The planned EU resources were secured in 2004.

The efficiency of direction and management at the executive level is particularly important in the case of such a high volume, complex project. It is true that the Hungarian government ordered in 2003 the setting up of an inter-ministerial committee (for the coordination of the implementation of flood protection developments and other related development tasks of the special fields), but the operation thereof did not replace the operative direction. Neither did a project controlling or a corresponding system support the monitoring of the process of implementation and the development of the utilisation of resources.

Recognising that the conditions of funding might be narrowed down depending on the load bearing capacity of the national economy, the Hungarian-side audit judged, nevertheless, as extremely risky from the aspect of expediency and rentability the fact that the modifications were enforced alongside the lack, to the extent experienced, of the harmony of tasks and resources, in such a manner that the merits of the manifold effects of the changes were left unanalysed. It evaluated in an affirmative manner the intention for a desire at governmental level as well to highlight the control of the utilisation of resources, but it indicated that in case of the absence of risk analyses this was in itself insufficient for the implementation of the VTT programme in a manner which was expedient and at the same time economical.

The “*Complex Flood Protection Programme*” of the Ukrainian side defined the most important directions of the action to be followed in order to protect settlements, facilities of national economy and lands in the Tisza River’s catchment area against the harmful effects of water and to reduce the losses caused by the destructive effect of floods and inland waters. They set as an objective the development of flood protection facilities which were new in terms of their principles, as well as the reconstruction of the operating water facilities in order to increase their stability and operational safety, which would, together with the flood protection basins of special designation, secure the protection of facilities and population in case of the development of high flood waves. They planned to organise the circular drainage of catchment areas; to reconstruct bridges, passages and culverts on public roads and railways; to prohibit the construction of houses and factories in the flood areas; and

to introduce ecologically safe techniques into water management, supposing compliance with the requirements of the Water Act, the Land Act, the Forest Act and other normative legal rules in agriculture and silviculture.

The implementation of the programme was divided into three phases. I In the first phase (2002-2006), the most urgent works related to the implementation of complexes serving the prevention of accidents have to be carried out. In the second phase (2007-2001) the implementation of the unified flood protection system in the Tisza River catchment area must be completed. In the third phase (2012-2015) long-term perspective measures are to be taken. The full-range realisation of the aforementioned measures would ensure flood protection for 500 settlements, 2600 industrial facilities and 200 thousand hectares of arable land.

It was planned to finance the works related to the flood protection of the Upper Tisza River basically from the state budget, a smaller portion from the financial support of foreign states and from other revenues (local budget, revenues from economic activities). In the years between 2002 and 2004 the measures defined in the programme were not executed, due to the missing allocations, and, therefore, the most important aims of the programme - protecting the settlements, industrial facilities and arable lands under agricultural cultivation against the damaging effect of waters, as well as ensuring the safety of the population - were not realised.

In addition to handing over the extract from the VTT concept plan to the Ukrainian party in 2002, the Hungarian party made no further efforts for information and reconciliation, and it did not press for the presentation of the effects, which would also be beneficial to Ukraine, of the Upper Tisza developments. The parties commenced, between 2000 and 2004, the reconciliation of two Ukrainian concept plans with a determining importance from the aspect of flood prevention: the concept of flood protection developments planned in Sub-Carpathia (study plan), and the technical tasks of the automatic flood protection information system planned in Sub-Carpathia (study).

The Ukrainian party handed over in as early as 2001 the material of the “*Complex Flood Protection Sketches relating to the Tisza River’s Sub-Carpathian Catchment Area*”, but the Hungarian position disclosed in connection therewith, which was basically in agreement although it also contained reservations, was not discussed. The disclosure of information by government delegates was also narrowed down, in the year 2003, to the communication of the fact that the State Water Management Committee of Ukraine carried out work, jointly with the Sub-Carpathian executive organs, to execute the *short-term and long-term (lasting until 2015) complex flood protection programmes of the Tisza River’s Sub-Carpathian catchment area*, taking into account the realistic financial possibilities. Furthermore, on the Hungarian side it was considered necessary to further examine in detail the joint flood peak reducing effect of complex interventions, to examine the occurrence of composite flood waves and the coincidence of flood waves, as well as to implement as soon as possible the hydrological observation network.

Based on the Hungarian party’s proposal it would be expedient to carry out joint examinations for the implementation of an emergency flood basin in Bereg. The EU grants can be successfully tendered for by the elaboration of well-grounded programmes of harmonised landscape management, rural development and nature preservation.

3.4. *Further Development of Joint Systems of Inland Water Protection, Application of Unified Localisation Plans*

The Bereg internal water system is located in the territories of Hungary and Ukraine, therefore a successful water management may only be carried out if the system is regarded as a unified whole. On the occasion of the extraordinary inland water of 1999 and of the extraordinary flood in 2001, considerable areas (including central areas of settlements) were inundated both in Hungary and in Ukraine. The joint recognition based on the experiences thereof is reflected in the documents of the meetings of the prime ministers and sectoral ministers in spring 2001 and of the meetings of

government delegates held subsequently, which documents were also taken into consideration when resolving the preparation of various development and localisation plans.

After having approved the inland water protection development plan at the transboundary water government delegates' meeting and having set the deadline of the preparation of the *detailed drawings* covering the most urgent works (30 July 2002), the Hungarian party started obtaining the environmental licences required for the projects of planning and execution. After the approval of the Hungarian plans by the Ukrainian party, the execution works started on the Hungarian side, although at a slow pace. The Hungarian water bodies received no information on the start of the works on the Ukrainian side.

The elaboration of the region's localisation plan, as part of a system handling the Bereg and Beregszász diked marsh for unified flood and inland water protection, regardless of it being divided by the national border, was carried out under the supervision of the deputy delegates and the heads of specialised groups of water damage prevention, accompanied by repeated agreement at the level of planners. The *localisation plan* was prepared by the deadline (in 2002), with joint funding. The practical applicability of the unified localisation plan with relation to Hungary was confirmed by the local control of the Hungarian party. The software requirements of the applicability of the plan on the Ukrainian side and the contents of the works of adaptation were also defined by the parties' experts, however, the software has not been handed over or adapted.

The plan, elaborated jointly in this spirit for the development of the inland water protection system, is thorough and detailed. The joint tasks of the prevention of an inland water disaster were defined taking into consideration the hydrological features and natural assets of the region. It would be expedient to harmonise the further works of planning with the planning preparation work of the Bereg emergency flood basin and the related landscape management and nature preservation. At the same time the backlogs experienced with work being carried out draw attention, with regard to the importance of the developments recognised by both parties, to the need to start work on the Ukrainian side as soon as possible, while to the necessity of the acceleration thereof on the Hungarian side.

3.5. *The Flood Monitoring, Alarm and Forecasting System*

The Hungarian offer of assistance, by which the Hungarian party contributed to the development of the Sub-Carpathia automated information measurement system of flood forecasting and water management (AIMR-“Tisza”), was based on the Hungarian-Ukrainian *cooperation agreement* entered into at the level of ministries, which took into account the recommendations of the quadrilateral (Hungarian-Ukrainian-Romanian-Slovak) meeting of government delegates held in 1999. The IT, data transmission and monitoring developments implemented between 1999 and 2003, for the most part from Hungarian government grants, created the basis for a flood monitoring and forecasting system which is modern even by international standards. The AIAIMR-“Tisza” system was assessed as being a good basis by the international expert team operating in the framework of the Joint Flood Preparedness and Response Project of Ukraine and NATO, and the team made concrete proposals for the further development thereof and for expanding it to the whole Tisza Valley above Tokaj. The Parties' obligations of maintenance and operation have also been elaborated at expert level; however, it was not approved by the government delegates and thus it was not included in a regulation.

The AIAIMR-“Tisza” system helped the work of protection even in its 2001 level of development, at the time of the flood protection at the Upper Tisza River. At the same time it also became clear that the number of stations had to be considerably increased.

On the basis of the 2001 experiences and taking into consideration the technical concept elaborated by the Ukrainian party, a decision was made to continue the development of the Upper Tisza flood forecasting system. Another Hungarian-Ukrainian cooperation agreement entered into at the level of ministries in 2002 provided for the relevant Hungarian assistance.

Upon the planning of the AIAIMR-“Tisza” system the medium term development programmes prepared earlier by the Hungarian and Ukrainian sides were taken into consideration. The hardware and software elements of the IT system, integrated in the course of execution, are up to date and standardised. The detailed *rules of maintenance and operation* relating to the regulation of operation have been elaborated. Due to the cancellation of the 2004 meeting this has not been approved by the government delegates, and, therefore, compliance with the obligations could not yet be enforced, although this is a factor which is at least as important from the aspect of the efficiency of the system as, for example, the up-to-dateness of the built-in instruments.

In the area of Sub-Carpathia the network of automated measurement stations consists of 14 hydro-meteorological stations and one water quality control station. In addition, AAIMR-“Tisza” will be enlarged with the help of international financial aid. Pursuant to a Cooperation Memorandum between the Government of Ukraine and the Government of the USA, Ukraine received and commissioned six automated satellite hydro-meteorological stations in June 2003 and in October 2004. At the last Ukrainian-Hungarian meeting of experts a joint agreement was made that the satellite tachometers built with US assistance were to be made a part of the joint Ukrainian-Hungarian system.

3.6. Joint Research Relating to Flood Prevention

According to the Agreement the government delegates provide assistance to each other on the basis of a separate agreement or treaty in the execution of the scientific, research, planning and execution work affecting the transboundary waters. Joint examinations were carried out as early as the 1990s, e.g. close to the settlements of Vári-Badaló, then in the region of Csap, to assess the stability of the dykes, and the results of these were analysed and discussed at an international Ukrainian-Hungarian seminar. The results of the examinations carried out were subsequently used by the Ukrainian party when planning the reconstruction of the flood control dykes located on the right bank of the Tisza River, in order to protect the settlements of Csetovo-Vári-Újlak and Szalóka-Tizasalamon (Sholomonove) against flooding.

Between 2000 and 2004 a joint research team, first on a trilateral basis (Hungary, Ukraine, Romania), and then on a bilateral Hungarian-Ukrainian basis, dealt with the *effect exercised on the flow of the rising water by the Upper Tisza sylviculture*. The designation of tasks based on the evaluation of, and conclusions from, the results of research can be well traced in the documents of the meetings of the government delegates. Based on the research they came to the conclusion that the forests constituted only one of the factors in the development of floods, and afforestation in itself was not to be considered a way of hindering the development of flood waves; at the same time, the forests’ ability to retain precipitation was undisputable. Not only is an increase in the magnitude of area covered by forests required, but it would also be expedient to improve the qualitative composition of forests by planting indigenous species. The justification of the research is based essentially on these facts.

The coverage of Sub-Carpathia by forests has been reduced from a value of 95 to 98% to a value of 51%, mainly in the last 300 years. Relying on the results of the research, a value of 65 to 70% was found for the coverage by forests of Sub-Carpathia as the optimum from the aspect of water management. On the basis of the scientific work, the General Assembly of the Council of Sub-Carpathia County adopted a resolution to considerably reduce the felling of trees and to make stricter the audits in sylviculture. According to information from the Office of Sylviculture of Sub-Carpathia County, felling remained within the planned production data in the county during the period of validity of the Agreement. In recent years the coverage by forests of the area has been increasing.

Recently, the further tasks related to the utilisation of the results achieved, to the transmission of information and to the topics still to be examined, have been designated, taking into consideration the plan which was approved at the 2003 meeting of the transboundary water government delegates. According to this, the research work will aim at finding out, by the preparation of watercourse examinations relating to the catchment area, how the development of the big spring floods of recent

years was influenced by the changes in meteorological characteristics, in the characteristics of surface watercourse and in the coverage by forests.

It was determined among other things, in the scope of further tasks, to examine the effect exercised on the development of floods by the spatial, age and condition structure of the forested areas of Eastern Carpathia, the optimum water retention capacity of the forests in case of a given age distribution and the felling ages applied, the alternative possibilities related to forest use (highlighting the restoration of the upper limit of grass-covered alps – Polonine – forest, the reduction of erosion), the change in the downflow factor depending on precipitation, etc.

At the meeting of the government delegates a decision was made on the preparation of a joint study plan on the bed regulation of the Tisza River's sections between Tiszabecs-Tarpa and Lónya-Tiszasalamon, which was prepared by the deadline, in April 2002. At the next meeting a further task was defined: a detailed geodesic survey of the Tisza section between Lónya-Tiszasalamon was to be carried out jointly, and based on this the required model examinations had to be made. The model examinations were prepared and handed over to the Ukrainian party for approval. In the meanwhile it was found that the model examinations were also to be carried out at the 719-722 km and 626-635 km segments in order to perform the newer task, i.e. to prepare the joint plan of bed regulation of the common river sections. The necessary steps were taken to carry out the model examination. Based on the modelling data, the preparation of a general bed regulation project (by 30 March 2005) was planned for the Lónya-Tiszasalamon (Sholomonove) section.

Both parties expressed their need for the elaboration of new forms of cooperation in the field of joint scientific research and common projects, with particular regard to the multilateral international and inter-governmental agreements. In the judgment of the Ukrainian side the possibilities to prepare projects of joint flood protection facilities (basins, polders) are not exploited sufficiently in the areas where floods develop, although they would considerably contribute to the accumulation of surface waterflows and they would reduce not only the risk of natural disasters but also the costs of liquidating the consequences.

The Hungarian party signalled that, on the one hand, it wished to involve Ukrainian experts in the implementation of its won tenders (entitled “*Modernisation of the Hungarian-Ukrainian Inland Water Protection Regulation*” in the framework of the PHARE-CBC project and “*Complex Forecasting of the Floods and Waterflow of the Upper Tisza River*” in the framework of the Operative Programme of Economic Competitiveness), and, on the other hand, that it wished to prepare joint INTERREG III tenders in several fields together with the water bodies in Ukraine, in the interest of funding specific planning work.

3.7. *Internationally Financed Projects, Bilateral and Multilateral Cooperation*

In the framework of international cooperation realised in the field of transboundary waters, the Ukrainian Government concluded, alongside the Agreement entered into with the Hungarian Government, similar agreements with several countries neighbouring on the catchment area, for example with Slovakia (in 1994) and Romania (in 1997).

In the region covered by the territorial scope of the Hungarian-Ukrainian Transboundary Water Agreement, a number of internationally financed projects were launched between 2000 and 2004 and are in progress (Ukraine's and NATO's joint project in the area of Sub-Carpathia; within the cooperation project carried out jointly with the Danish agency: the DANCEE Project based on the programme package MIKE 11, on the subject of the hydro-dynamic and precipitation and water output modelling of the Ung and Latorca Rivers (Ukraine); within the TACIS CBC SPF programme: support in the framework of the implementation of the EU TACIS programme entitled “*Flood Protection Management in the Tisza Basin*”; the TACIS Project entitled “*Flood Risk Evaluation and Flood Management in the Area of Sub-Carpathia*”. The joint Ukrainian-Swiss project entitled “*Operation of the Mountain Rivers and Processes of the Sub-Carpathian Region*”

was implemented in the framework of a agreement on technical and financial cooperation between the Government of the Swiss Confederation and the Government of Ukraine.)

The aims of the first phase, set for 2002, of the joint Ukraine-NATO Flood Preparedness and Response Project which was started in 2001 at an official request by Ukraine in the framework of NATO's Piece Partnership Programme, have been achieved. The evaluation study by an expert team consisting of the representatives of the member and associated states analysed, with respect to the whole Tisza Valley, the tasks of flood and disaster protection, and worded proposals in connection with each important element of the prevention of flood disaster. (Under the leadership of Belgium a further 9 countries - the Czech Republic, Germany, Hungary, Sweden, Switzerland, the United States, Slovakia, Romania and, of course Ukraine, as an interested party - participated in the expert team of the project.)

Over and above defining the fields and the method of systematic approach, the expert team urged in its study a multilateral cooperation in order to reduce the effects resulting from the fact that the Upper Tisza catchment area is divided by state borders, also describing the possible technical contents of regional cooperation. Furthermore, it proposed harmonising as soon as possible the EU and other international projects in different sources of funding and dealing with flood disaster protection.

The funding of the project also reflected an international cooperation worthy of recognition. The costs related to surveys, analyses and the preparation of studies were covered by the Civilian Budget of NATO and also by the voluntary contributions of Canada, the Czech Republic, Hungary, Poland, Sweden and the Flemish Community of Belgium. In addition, by making available their experts, Hungary, Romania, Slovakia, Switzerland, Sweden, Belgium, the Czech Republic, the United States and Ukraine also provided a support in kind.

The utilisation of the project can already be qualified as more modest, something which was signalled by the findings of the audit by the Ukrainian side, together with the fact that they considered it expedient to solve the problems at a higher level of international cooperation (e.g. in such a manner that the direction and audit of the water management activity should be implemented according to an international river bed principle, with joint leadership, offices, technical tools and budget created by the interested parties, under the control of competent international bodies). In the judgment of the Ukrainian side the individual local projects (with reference to the joint Ukraine-NATO project) would not solve the question of the flood protection of the Upper Tisza River from the point of view of the expedient unification, with a systematic approach, of efforts and financial means.

The parallel audit came to a joint conclusion in that it would be expedient to conclude not only bilateral, but also multilateral agreements with the countries intersected by the Tisza River, in relation to the issues of nature preservation and flood protection of the Tisza River catchment area. This is justified by the necessity of regulating, on the basis of the river bed principle, the water stocks, of monitoring the ecological condition, and thereby by securing the complex nature of management, by the expedience of the creation of joint structures auditing the condition of potentially dangerous objects within the boundaries of the Tisza Basin.

On a Ukrainian initiative, a quadrilateral meeting was organised in Ungvár in 1999, then on a joint Hungarian-Ukrainian initiative a quinquelateral meeting was organised in Budapest in 2001, where the Budapest Declaration was adopted. Furthermore, a quinquelateral Tisza Valley Flood Protection Forum was created to coordinate the flood protection cooperation regarding the Tisza River and its catchment area, with the participation of Slovakia, Ukraine, Romania, Hungary and Yugoslavia (Serbia and Montenegro). The expert team of the joint Ukrainian-NATO project considered the quinquelateral Tisza Valley flood protection cooperation, launched on the basis of the Budapest Declaration, as constituting an appropriate institutional and legal framework for the implementation of the team's proposals.

After the adoption of the Budapest Declaration, the determination of the tasks resulting from the quinquelateral cooperation was dealt with by each meeting of government delegates of the Hungarian-Ukrainian bilateral transboundary water cooperation. The initiatives of both parties tried to contribute to giving the quinquelateral cooperation concrete contents. However, the information related to the internationally founded projects was not always of the requisite depth, or the flow of information on the merits was only realised belatedly (e.g. the delay in the reinterpretation of the prescribed task and in the transboundary water reconciliation in case of the work carried out in the framework of the TACIS project entitled “*Flood Risk Estimating and Management in Sub-Carpathia*”, started in 2003).

No continuous cooperation has yet been developed between the forums operating on the basis of inter-governmental agreements and the working organisations of the projects. Therefore, no coordination and harmony are secured in the development programmes. The will of the governments and regional bodies could not be directly enforced. The professional supervision of the projects was not provided for by the persons who were otherwise responsible for the flood safety of the region.

Recently a certain slackening has been experienced in the activity of the participants of the Tisza Valley Flood Protection Forum, which may be explained mainly by the absence of permanent bodies of organisation and management, but the budgetary possibilities of the countries involved have also had a role in this. The proposal of the International Danube Commission seems to be favourable: it initiated, late in 2004, an Integrated Management Plan of the Water Stocks of the Tisza River Catchment Area, and in order to carry this out it set up a special expert team, in which all countries affected by the Tisza River were represented. According to the plans this Integrated Plan will be a part of the Management Plan of the Catchment Area of the River Danube. They wish to solve the question of financing the works to be carried out by the non-EU member states (Ukraine, Romania, Serbia, Montenegro) from a grant of the international project of the UNO Development Programme and of the World Wildlife Fund. The technical task and the contents have been practically defined. The quinquelateral consent required for this purpose was expressed in December 2004, by signing the declaration of intent of the countries located along the Tisza River.

The first meeting of the ICPDR Ad Hoc Tisza Team was held on 9 February 2005 in Budapest, with the participation of all interested parties, including the non-governmental bodies, under an EU presidency. It was resolved that the situation report on the Tisza River catchment area management and flood management would be prepared with the help of the UNDP-GEF minor project by 2006, according to the standards of the EU and the ICPDR, and that they would define the further tasks to cover the period lasting until the 2009 reporting period. The flood management report will also integrate the results of the work carried out in the framework of the Tisza Forum

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