

STRATEGY OF THE ASSOCIATION OF TOWNS AND COMMUNITIES OF SLOVAKIA (ZMOS) ON PREVENTION AND DEFENSE OF TOWNS AND VILLAGES AGAINST FLOODS¹

Introduction

Delegates of the 17th plenary session of ZMOS in 2006 approved 'Priorities of Local Territorial Self-administration' for the next election period. The 8th chapter of the priorities is devoted to crisis management (natural disasters). In this area, ZMOS requests **to promote creating an efficient system of tools for solving prevention measures to prevent floods and other similar extraordinary events. In addition, it seeks to introduce economic tools on the central level for solving or compensating costs related to eliminate consequences of extraordinary events (floods, natural disasters, etc).** Importance of this priority has been underlined by contributions to discussion and opening speeches at the 17th plenary session.

A common declaration, comprising of a proposal for cooperation in the area of prevention of natural crisis events has been adopted by members of Chamber of Villages (Czech Association of Towns and Municipalities) and the Chamber of Villages (Association of Towns and Communities of Slovakia) at the joint meeting on August 7-8, 2006 in Brusno, Slovakia. Representatives of both Chambers request:

- to increase financial support from the state for prevention measures to prevent crises events
- to set up a state reserve fund for eliminating consequences of crisis events and to provide financial resources for voluntarily fire brigades
- to shift focus of state prevention measures also to small streams

In addition, the Chambers also request:

- to promote solving anti-erosion measures in local action groups
- to cooperate in prevention, assessment of flood risks, floods management, flood plans and to participate at legislation making on the European level

Given the above mention reasons, ZMOS Office has prepared an analysis of the baseline situation, defined principles of efficient and sustainable protection against floods and prepared a proposal for 'Strategy of ZMOS on the Prevention and Defence of Towns and Villages Against Floods'.

1. Analysis of baseline situation

1.1. Analysis of floods causes

A flood is caused by extremely intensive rain or by a sudden melting of snow combined with significantly decreased ability, or a total failure, of the land to retain rainwater (caused by damage to the land – ploughed abuttal's, destroyed tufts, dried up wetland or drained agriculture land). Large concrete and asphalt areas in towns contribute to quick draining of rainwater and drying up of soil bellow build up areas, including decrease of groundwater levels and climate change in towns. These factors cause changes in

¹On April 26, 2007 the 17th General Assembly of ZMOS approved in Article II.8 of the Final Resolution the draft Strategy as a basis for expert discussion and further steps of the Association of Towns and Communities of Slovakia in this field.

flow conditions and increase risk of local floods. Dried land without anti-erosion measures (e.g. large agricultural land with an area of several tenths of hectares without any vegetation cover or anti-erosion measures) has a limited capacity to absorb water. In the dried land, a flood wave can easily arise that can increase stream level from 20 to 30 cm up to 3 to 4 meters during several few tenth of minutes or hours, respectively. During flash floods, sluices and bridges are posing a certain risk due to possibility of their congestion. However, the main problems in a watershed are not sluices and bridges but damaged land which is no longer able to retain rainwater. There is a direct relation between cause of floods and ongoing climate change. Climate change causes other extreme weather events – storms, extraordinary warm summers and longer period without precipitation. Present technological practices and approaches to water management, used for a long time, are causing progressive and permanent decrease of precipitation and increase of water runoff from the territory of Slovakia. This is a common denominator of floods cause as well as continually stronger extreme weather events including warming up of the land surface. Finally, we can say that today's floods are to a large extent caused by a way we manage surface and rain water in the landscape.

A concept of water management of Slovakia until 2015 states that the current state of majority of water courses and their river basins, can be described as follows:

- natural retention capacity of river basins has been significantly reduced and at the same time, surface water run off in the landscape increased which raised risk and frequency of flood events,
- natural self cleaning capacity of water courses has been decreased which subsequently influenced quality of ground and surface water,
- yield (quantity) of drinking water sources has been reduced and their quality decreased,
- soil fertility has been reduced due to erosion (especially in mountainous and sub-mountainous areas),
- ecological functions of water courses have been significantly limited, leading to further degradation of natural water and wetland ecosystems.

Currently, representatives of governmental institutions, professional public and non-governmental organisations agree on cause of floods. However, reality is somewhat different and negative factors in the landscape have not been solved yet. On the contrary, traditional approaches are applied which further deteriorate the situation.

1.2. Analysis of damages and costs

Causes of floods are extremely damaging and extensive. Damages, caused by floods between 1997 and 2006 are mounting up to 17 billion of Slovak crowns (503 million EUR). Among the most damaged was a transport infrastructure and water streams itself, counting for around 80 to 90 % of the total damage. In the landscape, floods (regular and irregular) are causing a permanent decrease of competitiveness of human settlements. Since 1997, Slovakia experienced rather "lower" scale floods compared to those in 2002 in Czech Republic and Germany. However, if no systematic and material flood prevention measures are implemented, **projection of damages for the upcoming seven years period range from 35 to 100 billion of Slovak crowns.** Occurrence of large floods in Slovakia, which stroke Czech Republic and Germany in 2002 is only a question of time. Existing data on historical floods in Slovakia confirm this. Other damage, quite substantial in scale, will arise as a consequence of extreme weather events – storms, extreme draughts, heat waves, snow falls, etc.

Regarding competitiveness, its decrease negatively influences not only individual settlement but regions as a whole. Larger towns and cities are prone to damage as well. Ignoring the situation cause that insurance companies are not willing to insure a large part of public infrastructure and private property in risky areas, banks are willing to provide loans and guarantees and subsequently, projects from these areas disqualify from structural funds support. Also, one of denominators for economic development of a certain landscape is a sufficient supply of water sources.

1.3. Analysis of problems and shortcomings of traditional approach / policy

Overall goal of flood risk management is to decrease probability of floods and their consequences. In the practice, flood management comprises of:

- **Prevention** - flood prevention measures are as follows:
 - Engineering, bio-engineering and administrative (focused on removal and elimination of causes of floods) – these generally fall under responsibility of land owners, administrators and local municipalities
 - Management and control activities / measures - these measures and above mentioned measures fall under responsibility of state flood protection administration where local municipalities play a certain role, due to transfer of state administration from a central to local level.
- **Protection** - these measures are focused on decrease of floods probability and/or their consequences on a certain area through landscape management, applied in case of a flood event (it means management of flood and its consequences). In Slovakia, Slovak Water management Enterprise through its branches (i.e. river basin authorities) is managing existing flood defense infrastructure
- **Preparedness** - in case of flood events, informing public on floods risks and measures that have to be taken during floods
- **Rescue action** - coordination of rescue activities in river basins and human settlements during flood events
- **Restoration and exchange of experiences** - goal of this phase is to return an area, damaged by flood, into normal conditions as soon as possible and thus to reduce social and economic consequences on general public.

A concept of water management policy of Slovakia until 2015 states that until 2010, the total need of financial resources for the implementation of flood protection programme of the Slovak Republic is 20.766 billion of Slovak crowns. **However, these resources are neither provide not guaranteed.** In the policy, some investment measures are in contradiction. On the one hand, it underlines importance of integrated river basin management and overall protection of landscape, but on the other hand, it proposes investment measures that as a partial solution can serve local needs, however, contribute to increased flood risk in river basins as a whole (e.g. stream regulation, restoration of pumping stations, etc). It is necessary to reassess implementation of these measures in the context of their overall impact on increase or respectively on decrease of river basins ability to retain water. **Proposed measures are not solving elimination of floods causes.**

Some examples of current flood defense policy in Slovakia which are not sustainable are as follows:

- delayed reimbursement of costs for rescue and maintenance works during floods and therefore blocking budgets of local municipalities
- orientation of RTD projects and research on flood prevention to areas which are solving actual problems of towns and villages only to a limited extent
- evident contradictions among declared floods causes, competence limitations of river basin authorities and adjustment of investment activities in the flood protection part of the concept of water management of Slovakia
- missing control mechanisms for checking and keeping ecosystem linkages during investment activities in the frame of flood defense

The current water management policy solves protection of landscape against floods in an isolated way from floods causes. It focuses on solving and elimination of flood consequences. It spends resources needed to eliminate floods causes, i.e. implementation of long term flood prevention measures. Also, there is a conflict between protection and management of water within Ministry of Environment. On the central governmental level, two independent units should take care of water protection and

management. Public administration is also lacking a complex approach to river basin restoration as a system. It can be expected that integrated river basin management plans (required under EU Water Framework Directive) will be oriented towards elimination of floods causes. In this respect, state administration expects proactive approach from the side of local municipalities in implementation of flood protection measures on their territory. However, local municipalities lack clear division of responsibilities, motivation, systematic support tool including sustainable model of financing.

In 2006, Ministry of Environment and Slovak Water Management Enterprise organized the largest event on importance of floods entitled "Defense against Floods" on December 4-7 in Podbanske, Slovakia. Among others, the conference pointed out to several evident contradictions and connections:

1. **Contradictions between existing knowledge on flood causes and real possibilities of Ministry of Environment and Slovak Water Management Enterprise.** Elimination of flood causes has a spatial and surface perspective, not a point and line perspective. Due to competence and budgetary limits, river basin management authorities are limited to solve consequences of floods only through a set of line and point measures on water courses and in flood prone areas. Representatives of Ministry of Agriculture were not invited to the conference. The following proposal of ZMOS representative, who participated at the conference, was not accepted by the conference programme committee:

"Support mutual cooperation among river basin management authorities, land owners and administrators of land on the level of local municipality's cadastres, with the goal to gradually reduce erosion process and to increase water retention capacity of sub-basins. To achieve this goal, it is necessary to support development of intergovernmental (Ministry of Environment, Ministry of Agriculture, Ministry of Construction and Regional Development and Ministry of Finance) and cross-sectional cooperation (especially with local self administration). The above mentioned goal should have a synergic effect on elimination of flood risk and protection of land against floods".

2. **Financial resources, requested by Ministry of Environment of the Slovak Republic from the state budget, are not directed towards elimination of flood causes.** Therefore, they do not improve the situation with regards to frequency and size of floods, even though they will be eventually budgeted. Some proposed measures on the contrary directly support deepening of floods.
3. **There is a direct relation between flood events and ongoing climate change.** Data of climatologists from Slovak Hydrometeorological Institute confirm this. So far, world expert community have not presented a comprehensive model of what is a cause of climate change, only fragmented information with different scenarios. Existing global climate change scenarios do not provide solutions to manage the change on the local level. However, we can contribute to reduction of climate change and extreme weather events through implementation of preventive anti-flood measures and proper management of the landscape.

After fall of communism in 1989, a reform of water management policy in the area of runoff conditions from the landscape, has not been implemented yet. This is one reason behind today's situation of flood prevention and protection of the landscape against floods. Adoption and implementation of the policy could start a process of abovementioned reform and at the same time, to reassess efficiency of river basin management and management of streams, including a proposal for its optimization.

1.4. Analysis of possible solutions

So far, local municipalities solved mostly consequences of floods

It shows that without self mobilization and establishment of new approach to flood prevention, we can hardly expect changes that change flood frequency and magnitude of damages. Without the change of existing approach, we can expect increase of frequency and scale of floods as well as increase of economic and social damages. A key starting point of the proposed strategy is a description of flood causes and systematic measures from an expert point of view. This can enable to save financial resources and to maintain sustainability of measures, resulting from implementation of the strategy. We can say that today's competencies of towns and villages (including flood defense of their territory), after agreement with land owners, enable them to implement most measures in their area. However, these competencies have not been complexly used mainly due to unclear expert definition of flood causes and ongoing climate change as well as a lack of support tools for towns and villages in this area.

Proposal of a new approach

The new approach is based on restoring of water retention capacity of sub-basin and decreasing erosion processes in the territory of municipality. We propose local municipalities to prepare 'A Project to Increase Water Retention Capacity and Decrease Erosion Processes in the Cadastre of Local Municipality' (hereafter referred to as **project**), which will solve the problems in a complex manner inside and outside municipality cadastres. Implementation of these measures will enable to eliminate floods events in a town or a village to a minimum and, at the same time, to significantly reduce erosion process in the landscape. We have to change exiting rain and surface water management in the landscape to respect the following steps:

1. **retain rain and surface water in the landscape (in situ) to the largest possible extent through:**
 - implementation of area anti-erosion measures and
 - implementation of systematic area measures to increase river basin water retention capacity,
2. **from the landscape, surface streams can take away only surplus water.**

Two above mentioned logical steps are the substance of flood prevention and river basin restoration which contribute to mitigation of adverse effects of climate change and cooling down the landscape. With the approach described above, water balance in the territory of local municipality will be stable and better off. To secure organizational and systematic measures in the landscape, it would be necessary to create a better system of river basin management with a stronger participation of local municipalities. **The proposal is not in a contradiction with any economic and social needs of territorial development.** The proposed strategy is a systematic measure which, in a complex way, solves problems related to water management and water cycle in the landscape. So far, importance of this measure has been overlooked; however, it started to pose serious changes to climate on the global level. It is the only feasible, sustainable and long term solution of the problem that can be achieved within given budgetary and time limits. The first results will come out almost instantly (from several months up to 2-3 years), other positive results on an annual basis, after introducing an optimal system for management and monitoring of implemented measures in the landscape.

Practical examples and experiences

The beginning of a new approach of towns and villages to flood prevention started after re-introduction of local self-government in 1990. Since administration of water courses has been in hands of state institutions, lacking support tools, coordination and cooperation in flood prevention; local municipalities initiated only a few isolated activities. In this respect, the most important was a public administration reform and a process of competence decentralization from central to local level. Later in 90's and beginning of 21st century, an important role has been played by various national and international institutions, dealing with complex issues related to water and river basin protection. In 2004, a need to solve flood defense in the

territory of Kosice city resulted into adoption of a strategic document entitled 'Flood Prevention Programme on the Hornad, Bodrog and Poprad River Basins', as a starting point for solving Kosice city water management problems. As a result, Kosice self-government parliament adopted a document 'Kosice Protocol for Water in 21st Century' in 2005.

Through pilot projects, some local municipalities implemented flood defense measures on their own land or, after agreement with land owners, on agricultural or forest land. The total number of realized projects is small and therefore, we can not say ground plane implementation. Also, we can find successful examples of flood prevention measures abroad. In Slovakia, NGO People and Water consulted flood prevention issues with more than 100 villages, especially on the Upper Torysa, Svinka and Olsava river basins. In addition, People and Water implemented a unique project 'Water Forest', focused on a support to quick restoration of an ecosystem on pilot micro-basins in the forest on the territory of High Tatra town. So far, the project is implemented on approximately 65 hectares.

2. Principles for sustainable protection of towns and villages cadastre territories against floods

2.1. Principles

A key to ensure preparation and implementation of flood defense measures is a role of local municipality and cooperation of all social and economic partners in the river basin. Through implementation of simple and investment not demanding **technical and biotechnical** measures in individual towns and villages, we can improve surface of the landscape and to revitalize ability of the river basin to retain water **without compromising development needs and economic activities in territory.** We can therefore reverse a trend of a negative water balance to a positive water balance in the landscape and to achieve equilibrium after some time. With this approach, we have to adhere to the following principles:

- **area water protection principle** – it is necessary to support protection of landscape surface against soil and wind erosion and to promote measures for increasing river basin retention capacity in the territory of towns and villages. Also, it is necessary to propose surface technical and biotechnical practices that improve water balance and prevent quick water runoff from the landscape.
- **solidarity principle** – in proposing and implementing of activities which have an impact on runoff characteristics of a certain area, it is necessary to take into consideration the whole river basin. This means that measures implemented on one area can not worsen situation in downstream or upstream areas.
- **partnership principle** – analysis of runoff characteristics in a certain territory (village, town, region, river basin, etc) as well as important decisions for measures to increase water retention capacity and to decrease erosion processes, have to be adopted after consultation and mutual agreement of all relevant stakeholders in the river basin – water courses administration, farmers, foresters, representatives of towns and villages, land owners and experts. The partnership principle also means that technical and anti-erosion measures for retention capacity increase of the river basin on local municipality territory have to be prepared jointly in partnership.
- **subsidiary principle** – practical administration and protection of water sources should be guided by a principle that transfer competencies to most relevant level of public administration, capable of better and more efficient implementation. This principle suggests a need for effective decentralization of activities which can be in a better, faster and cheaper way secured by a local or a regional self administration. Financial resources, spent by local municipalities are under better control and are used more efficiently.

- **sustainability principle** – sustainable and tangible results in flood prevention and elimination of climate change can be achieved only through solving causes of these events. Implementation of measures that are focused on solving causes of floods, climate change and drying up landscape can sustain or even create better living conditions and environment for future generations. In the landscape, natural potential will not be further decreased, water will maintain its functions in ecosystems and river basin auto-regulation functions will be improved.
- **natural processes auto-regulation principle** – after implementation of measures for improving water balance, an effect of the first and one shot investment to revitalization of damaged landscape or part of the river basin, will show up each year with more synergic and complex effects.

2.2. Exemptions from application of the principles

Due to the fact that we do not have a direct possibility to influence flood prevention situation (surface, technical and biotechnical measures in the landscape) in neighboring states, from where Slovakia receives surface water from water courses, it is necessary, as a temporary solution, to employ traditional approaches to flood protection such as protection dikes, polders, etc. Anti-erosion protection and increase of water retention capacity of landscape should be taken into account during planning of these measures on flood prone areas in the period between floods. We can expect that implementation of surface flood prevention measures in neighboring counties will reduce occurrence of extreme flood waves, decrease or stop long-term rise of Q_{100} or Q_{1000} levels.

Dry polders are part of implementation of surface technical and biotechnical measures in the landscape which, through line and point constructions, regulate flooding of certain, predefined area. Construction of dry polders, as an additional water construction, is appropriate upstream from larger settlements or in conjunction with line constructions which enable direct water drain (with a possibility of regulation) to a wider flood area during a period of higher flood activity levels.

3. Solution strategy – instruments, measures, and substance of related structural reform

Through implementing and establishing surface measures, local municipalities can significantly contribute to elimination of frequency and size of floods on their own territory. They have competences to play a decisive role in setting up conditions and slowing ground and surface water runoff from their territory.

A **structural reform** of state water management administration, change of central state administration and local municipalities as well as implementation of technical and bio-technical measures, lay in the heart of ZMOS strategy and related organizational, technical and legislative measures for flood prevention and protection of towns and villages territory against floods. The reform, based on surface based river basin and water balance protection, naturally includes measures related to forestry, agriculture, waste or rain water drainage in towns and villages as well as nature protection.

3.1. A substance of structural reform

Water management policy (water management service in the area of flood defense and revitalization of water courses) in the area of runoff conditions should be reformed as follows:

- **focus on a protection of landscape surface** with an aim to improve water balance (i.e. restoration of small water cycle and landscape watering) through implementation of measures for increase of river basin water retention capacity and decrease of erosion processes.

- introduce an **assessment of investment activities in the landscape from the point of view of their possible impact on water balance** of a certain territory or a settlement
- **reassess efficiency of water courses administration** (and especially small water courses) and to preserve a current state river basin administration system as well as coordination mechanisms to carry out common tasks resulted from EU Water framework directive and prepared Directive on the assessment and management of flood risks.
- **reassess existing engineering and technical measures, influencing runoff conditions in the landscape**

Therefore, local municipalities should proactively solve problem of floods to decrease future damages and losses and also to secure their competitiveness. ZMOS can provide towns and villages methodological and expert support, as well as information system and coordination. More than ever, close cooperation with water courses administrations and Ministry of Agriculture and Ministry of Environment will be necessary in implementation of the proposed strategy.

3.2. Tools

There are four main tools to implement the strategy in practice:

1. **Local municipality's project** which serves as a tool for preparation and implementation of flood prevention measures on the territory of a municipality.

This refers to the project for **increasing water retention capacity of river basins and decreasing erosion processes in the area of municipality.**

Preparation of the project comprises of the following steps:

- analysis of runoff conditions and water balance of municipality area – morphology, soil fund, its fertility and use (build up area, agriculture land, actual and historical water bodies and other areas), including analysis of build up landscape in floods area
- description of past flood events – analysis of most recent and historical floods
- analysis of the area from older aerial photographs and maps (before year 1948) to identify landscape damage (cultural land and historical landscape structures)
- analysis of present impacts of water courses regulation, drainage systems and other measures, influencing runoff conditions in the landscape from the point of view of flood risk increase in the area of municipality as well as on the river basin as a whole
- analysis of landscape planning documentation and a programme of municipality economic and social development
- identification of main local risks for floods formation
- analysis of opportunities for revitalization of so called “cut off” river network and natural flood areas such as original meanders, wetlands, areas along water courses which are suitable for regulated flooding during high water flows – in cooperation with water course administration
- synthesis of the analysis and the proposal of technical and biotechnical measures to increase water retention capacity in the river basin and to decrease erosion – definition of utility and associated constructions and necessary land reforms
- analysis of the landscape and the proposal of measures will be done in a partnership of the local municipality with respective land owners (measures of landscape surface protection) as well as with river basin administration (revitalization of water courses and management of water bodies)
- development of a project proposal which will be consulted with river basin administration
- self administration of river basin will give a recommendation for the project approval, followed by the approval process from the side of relevant authorities

Implementation of the project:

- after securing proper financing resources, local municipality can implemented approved project in once or in several phases
- consistent revitalization of sub-basins in towns and villages will be spatially coordinated in a way to keep logical sequence of implemented measures in individual local municipalities, situated in one river basin
- with regards to innovative character of the strategy, it will be necessary to meet the following steps during implementation phase:
 - firstly, to implement pilot projects of a complex river basin revitalization on the territory of several local municipalities
 - secondly, to apply the approach broadly on the local municipality level (the lowest level of self-administration), learning from experiences of the pilot phase and especially from application of new organizational, technical and budgetary mechanisms

2. **ZMOS competence centre**, supporting preparation and implementation of local municipalities flood prevention projects.

The competence centre should be created through merging financial resources and know how of various organizations. It will establish a necessary institutional framework and expert capacity to support local municipality in preparing and implementing projects on area of each and every town or a village. The competence centre will be independent from state administration and therefore can generate a positive pressure for the sake of water management structural reform implementation, especially in the field of runoff conditions. The competence centre will provide the following:

- capacity building:
 - office and working places of the competence centre – administration and coordination
 - methodological office of the competence centre, support to research and development
 - investment and landscape analysis office for support of projects, developed by local municipalities
- information system building and quality evaluation:
 - monitoring and information system and documentation centre
 - evaluation of measures on the territory of towns and villages
- coalition building:
 - public and media relations building and awareness raising activities
 - support to partnerships in the river basin and development of river basins self administration

3. **„Self administration of river basins“** as a mean of local municipality cooperation in river basins hydrological boundaries.

To solve flood prevention issues, it is very important to maintain an independent status of local municipality apart from government department approaches. Local municipality should provide the following:

- control over keeping principles of sustainable protection of cadastre areas of towns and villages against floods before and during implementation of individual local municipality projects
- independent control over preparation and implementation of integrated river basins management plans
- support to partnership development in micro-basins and education on water resources management
- independent control over water courses management and maintenance

4. **Paradigm formulation.** For the purpose of the strategy, paradigm is an expert text describing mechanism of flood cause, floods radicalization and also a need for changing existing approach to rain and surface water protection in the river basin which in turn, will eliminate floods and related damages.

3.3. Measures

Legislative measures:

- to adopt legislation, defining protection of rainwater and water balance of landscape on local, regional and national levels. In the permission process for buildings, owners should be obliged to retain rainwater on their own land or on surrounding land, after agreement with neighboring land owners and local municipality office.
- to supplement environmental objectives of Water Act with more precise formulation with regards to flood prevention, monitoring and protection of landscape water balance
- to amend Act on Flood Protection and its executive bylaws which would simplify mean and speed up a process of reimbursement of invoices for maintenance and rescue works made in connection with flood prevention measures
- to coordinate preparation and implementation of activities for increase of water retention capacity in river basins and decrease of erosion in the area of local municipalities through approved and legally binding (generally binding regulation) local projects which should be then projected into landscape planning documentation and the plan of economic and social development of town or a village
- to create legislative provisions for effective water courses administration (especially small water courses)

Technical measures:

- a need to prepare projects for increase of water retention capacity in the river basins and decrease of erosion in the territory of each municipality
- There are following basic technical, biotechnical and management preventive measures:
 - **technical:** infiltration strips along contour lines (longitudinal shallow gutters), construction of depressions and infiltration pits for rain water retention and infiltration in the territory of towns and villages, water reservoirs, small locks or respectively steps on water courses, rapids, gorges or coomb's, construction and maintenance of dry reservoirs – polders, constructions on line protection dikes for discharge of water to controlled flood area, construction of small flow reservoirs and ponds, etc.
 - **biotechnical:** to create natural obstacles to surface water runoff, e.g. barks, grass strips, tree and bushes, soil steps, wetlands, optimal composition and quality of forests, grassing and planting trees on unused land, maintaining and using meanders and blind river shoulders, planting windbreaks and use of slope depressions as water infiltration and retention areas, etc.
 - **management measures:** application of appropriate approaches to farming (e.g. plugging along a contour line) use of lowlands for construction of ponds and development of fishery, creation of small flow and rain water retention reservoirs, catching rainwater from build up areas which could be used as water reservoirs for firemen, recreational purposes and to replenish water in areas, from where it was drained. Other management measures include reduction of soil compaction in build up areas, construction of dikes as far as possible from water course axis, etc.
 - a prerequisite of efficiency and functionality of the measures, equipment and constructions is their proper maintenance and accurate implementation in practice and in local conditions. These measures and equipment together with use of existing anti-flood constructions and other constructions, influencing runoff conditions in the landscape (mainly administered by water courses administration) which efficiency and need has to be reassessed according to the proposed strategy, will finally enable more efficient protection of the landscape against floods, elimination of the occurrence and scope of floods impact.

Organizational measures:

- to adopt a reasonable model for mutual cooperation and coordination among state administration, self-administration and social and economic partners, in the context of preparation and implementation of integrated river basins management plans
- to ensure support of information and educational activities for local municipalities, public and stakeholders. To publish informational materials on flood prevention and protection for towns, villages, firms and general public
- to propose a suitable organizational model for self administration of river basins
- in relation to preparation of the competence centre, it will be necessary to make the necessary steps:
 - to prepare a feasibility study for creation of the competence centre
 - prepare implementation project for creation of the competence centre
 - to establish and activate the competence centre
- formulation and publishing of paradigm on change of approach to protection of water in river basin and in water cycle
- to promote including a new approach to water into long term strategy for development of the Slovak Republic, which has been initiated by Prime Minister and prepared by Slovak Academy of Sciences for a period of 20 to 30 years as well as its incorporation into other strategic development documents
- to prepare the document on runoff conditions and a system of flood prevention of local municipalities for a discussion of the government on updating official water management policy
- actively participate in updating of the Program for Flood Defense of the Slovak Republic and in preparing integrated river basin management plans
- to prepare a methodology for self administration of river basins and development of partnerships for preparation of projects, aiming at restoration of water retention capacity and decrease of erosion processes in towns and villages

Financial measures:

- a proposal for investment measures in the Concept of Water Management Policy of the Slovak Republic until 2015 in the area of protection against floods has to be revised and reassessed
- to improve conditions for provision of grants from Envirofond and EU Structural Funds for assigned for local municipalities
- based on proposal of the strategy, it is necessary to proceed to setting up transparent financial and non-financial support and motivation tools for implementation of this strategy
- proposed measures (tasks and competences) can not put heavy burden on local municipalities and higher claims for financial resources should be taken into consideration in the system of flood defense financing mainly from the central level of public administration

3.4. Costs of strategy implementation and their financing

The following costs, related to strategy implementation can be divided as follows:

- costs for preparation of local municipalities projects
- costs for implementation of the measures on the territory of local municipality (invested in once or in several phases), according to approved projects
- maintenance of implemented measures with land owners, coordinated on the level of local municipality (as a minimum, municipal inspector or a patrolmen will be needed)
- costs for preparation, set up and running the competence centre
- costs for financing of river basin self-administration
- costs for preparation and presentation of paradigm

Local municipalities can rely on the following possibilities for funding preparation and implementation of flood prevention measures:

- EU structural funds in the programming period of 2007-2013 as well as funds supporting European agriculture policy, European territorial cooperation and technical assistance within some operation programs
- special opportunities for the support of local municipality projects
- possibilities to create a harmonized system of financial support for implementation of the strategy from EU Common Agriculture Policy (CAP) funds
- financial resources from Envirofond
- financial resources from budgets of ministries and especially Ministry of Environment, Ministry of Agriculture, Ministry of Construction and Regional Development and Ministry of Finance
- financial resources from projects supported by European Economic Area, Norwegian Kingdom and Swiss Federation
- financial resources matching funds from different sources and from public-private partnerships projects
- non-budgetary state resources, in case of their allocation and adoption of respective decision on the governmental level
- other complementary resources (e.g. bank loans, participation of insurance companies) and also own resources of towns and villages

3.5. Personal resources

With regards to personal resources for implementation of the strategy in the ZMOS Office and related institutional support (competence centre), they can be secured from project resources and through matching several above mentioned financial resources. From the side of local municipalities, it is necessary to select coordinators for the preparation and implementation of projects. After implementation of the proposed measures, stemming from the project or its part, local municipality should appoint an inspector or patrolmen for the purpose of maintenance and protection of flood prevention measures on the territory of a municipality.

3.6. Benefit from implementation of flood prevention measures

Implementation of flood prevention measures has a principal economic and social benefit in several areas. Thorough their implementation on the ground, a synergic effect will be created for a variety of subsystems – social and economic areas:

- for water utilities, farmers, and local households with their own wells – improvement of ground water supplies
- for the nature and forest – increase of biodiversity and ecological stability of the landscape, restoration of bio-corridors and historical landscape structures
- improvement of microclimate conditions of the landscape – a contribution to fighting global warming
- for the tourism – to make the landscape more attractive for tourists and its improvement for recreational purposes
- for farmers – decrease of erosion processes, increase of yields per hectare, reduction of potential losses, decrease of influence of unfavorable extreme weather and improvement of soil humidity
- in the centers of human settlements and build up areas – a contribution to lower temperature of build up areas and contribution to reduction of dust in urban environment
- for water constructions – decrease of extreme weather events and reduction of a damage, their controlled connection to a system of flood prevention measures in the landscape
- for water management community and institutions – use of existing engineering-technical equipment and research, technical and administrative capacities
- for the area with high unemployment – creation of new jobs during implementation and maintenance of technical and biotechnical anti-flood measures
- sufficient water sources has direct benefits for health and food safety

4. ZMOS role in the system of flood prevention of territorial self-government

4.1. ZMOS role

- to define efficient and sustainable strategy for flood prevention and protection of towns and villages against floods
- to promote legislative changes, related to strategy implementation
- to guarantee keeping principles of sustainable protection of cadastre areas of towns and villages against floods
- to initiate setting up an institutional support (reference centre) for towns and villages, focused on preparation of projects related to the strategy and implementation of proposed measures on the territory

4.2. Role of ZMOS bodies

- to promote structural reforms and proposed measures, as defined by the strategy
- to provide the support to ZMOS Office in preparing of action plan for the strategy implementation, setting up information and monitoring system and also providing institutional support to strategy implementation

4.3. Role of ZMOS Office

- **to set up information and monitoring system** for the purpose of flood defense (using XML electronic forms, database, GIS and ZMOS website). It will use existing information systems, available for local municipality suitable which could be easily extended with new modules
- to participate on setting up and running of the **competence centre**, supporting towns and villages in preparation go projects and implementation of measures on the ground
- to formulate and after agreement with ZMOS bodies, to promote **legislative changes**, resulting from this strategy
- to put forward a long-term, sustainable **financing model** for the measures on flood prevention and protection of towns and villages territory against floods as well as smooth financing of maintenance and rescue works from the side of state institutions

Since the last session, ZMOS has achieved the following:

- employed an expert for the given topic (part time)
- prepared and published a baseline text in the publication 'Good Day, self-government! 2006-2010'
- carried out a baseline analysis of the current situation and possible solutions including economic calculations
- ensured participation at the major conference 'Protection against Floods' in Podbanske, Slovakia in December 2006, including publishing and official contribution to proceeding and giving a presentation during the conference
- consulted starting points of the strategy with various expert institutions and public administration representatives, including mayors of towns and villages, who have experience with floods in their respective local municipality
- prepared an electronic form in XML format for the purpose of preparation of monitoring report on flood prevention on the territory of local municipality. Currently, we are preparing to explore opportunities for use of EPOD information system for spatial coordination of flood prevention measures on the ground

The above mentioned tasks are too difficult to be solved without proper organizational and economic back up. In case of acceptance of ideas, presented in the strategy on the 17th ZMOS plenary session, ZMOS Office after adoption of an action plan for the strategy implementation and realization of individual projects could take over carrying out follow up steps.

Conclusions

On their own territory, towns and villages should proactively implement flood defense measures to protect their property, property of their citizens and business, to save lives and finally, to increase competitiveness of their local economies. Substance of the proposed strategy is based on implementation of structural reform of water management policy, specially related to runoff conditions in the landscape. Through this approach, it is possible to use in efficient and effective way a substantial part of budgeted financial resources for flood defense of the territory of Slovakia. Unfortunately, the above mentioned resources has not been earmarked yet from the state budget, mainly due to unclear policy and existing, quite vague measures in the Concept of water management policy of the Slovak republic until 2015.

By means of implementation of surface technical and biotechnical measures which will increase water retention capacity of the landscape and decrease soil erosion, towns and villages can significantly reduce floods risks. Also, it will significantly eliminate economic losses caused by floods on private and public property. This applies especially for the floods, started on the territory of Slovakia. In case of water courses, flowing from other states, it is necessary to apply, as a temporary solution, traditional technical measures to cope with each degree of floods activity and flood waves. In the future, when neighboring states start to protect their river basins using surface based principle of flood prevention, a capacity of traditional line and point construction and river beds would not need to be extended because the existing capacity should be sufficient in the long-term.

Flood prevention measures in the territory of local municipality have the following benefits:

- elimination of extreme flows, frequency and scope of floods, which could originate on the territory of a village or a town as well as elimination of soil erosion (soil fund protection)
- improvement quantity and quality of ground and surface water sources in the area of local municipality
- improvement of microclimate conditions and stability of the landscape against extreme weather events
- improvement of competitiveness of the land through elimination of potential risks, losses and threats

As stated in the proposed strategy, protection of the land against floods requires **holistic approach**, wider knowledge and finally knowledge of the territory. Because of its strong emphasis on knowledge, this issue is an integral part of **knowledge based society** building. Through implementation of the strategy, our economy can become more competitive and be better prepared for global challenges as well as threads. Today, protection of water and solving water related problems is not only an isolated part of the policy of water management sector. It becomes more and more a social and cultural issue and relates to existence of the human kind. Therefore, it involves more sectors, organizations and individuals on our territory.

The proposal of the strategy is fully in line with the following recommendations:

- Government of the Slovak Republic on the protection against floods in the frame of 'Program of the protection against floods in the Slovak Republic until 2010'
- EU Water Framework Directive from 2000 and a proposal for the Directive on the assessment and management of flood risks (to be adopted in 2007)
- Convention on cooperation on the protection and sustainable use of the Danube River (Danube Convention from 1994) and Carpathian Convention
- is fully in line with decisions of the 16th ZMOS session and the Chamber of Villages at ZMOS and Chamber of Villages of Czech Association of Towns and Municipalities (2006)

The Association of Towns and Communities of Slovakia thanks the Global Water Partnership Slovakia for the translation of this Strategy into the English language (September 2007)

A chart of processes related to preparation and implementation of ZMOS Strategy in the area of flood prevention

