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International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Journey to a Balanced Tisza Basin

An Introduction to the Integrated Tisza River Basin Management Plan

Foreword

The picturesque world of old oxbow-lakes, ancient riverine forests and idyllic mires in the Tisza River Basin is as unique as it is valuable in environmental, economic, historical and social terms. At the same time, the river basin is subject to increasing pressure and serious pollution from agriculture, industry and cities.

A river basin in balance

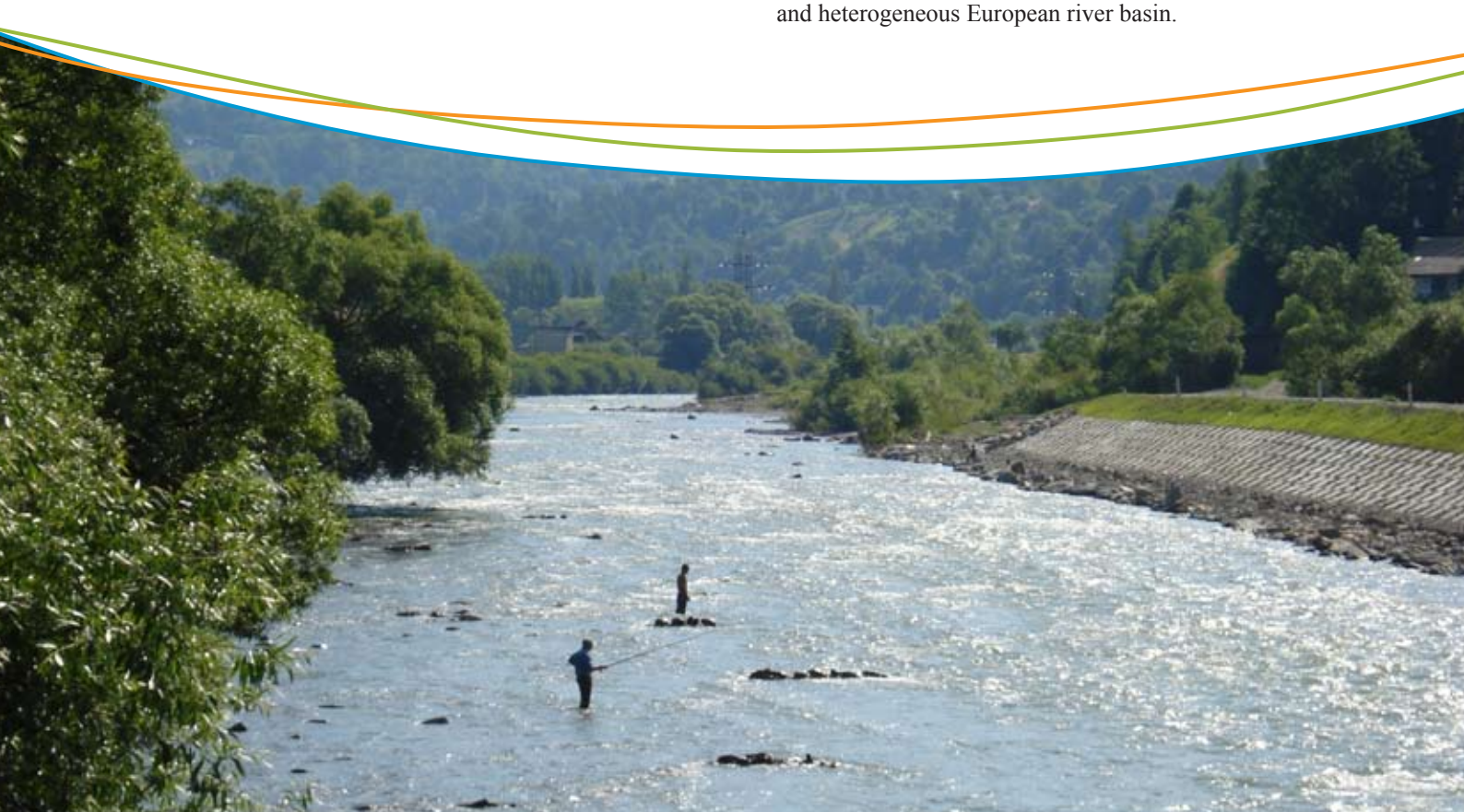
Just as the Tisza River has provided a basis of life to the people inhabiting the area for centuries, the five Tisza River Basin countries – Ukraine, Romania, Slovakia, Hungary and Serbia - now have a shared responsibility to protect the environment. Water does not follow political borders. Only a close cooperation between all countries within the river basin can lead to a shared achievement and success in protecting and managing the Tisza River Basin for generations to come.

The collaboration of the Tisza countries on the environmental issues of the Tisza River Basin over the last years laid the groundwork for the development of an Integrated Tisza River Basin Management Plan.

The Integrated Tisza River Basin Management Plan is a major step towards the requirements of the EU Water Framework Directive. It promotes public participation as one of the core principles in sustainable water management and ultimately enables the fair management of resources for everyone living in the basin.

Its aim is to ultimately introduce balance to the Tisza River Basin, balance between the needs of the river, ecosystems and the needs of the people living in the region.

The visions and management objectives of the Integrated Tisza River Basin Management Plan reflect the enormous joint approach among all Tisza River Basin countries. At the same time, they support the achievement of the EU Water Framework Directive objectives in this very large, unique and heterogeneous European river basin.



The Tisza River Basin

The Tisza River is the longest tributary of the Danube. Its basin is the largest sub-basin of the Danube Basin and home to 14 million people throughout five countries: Ukraine, Romania, Slovakia, Hungary and Serbia.

The Tisza River Basin is an area rich in biodiversity, providing habitats for many species no longer found in other parts of Europe. Many areas of the region, including nature reserves and national parks, are important ecological assets.

Unfortunately, the region faces threats from pollution and river engineering as well as from floods and droughts.

The five Tisza countries successfully worked together on the Tisza River Basin Analysis 2007, and now the same countries have come together to create the **Integrated Tisza River Basin Management Plan** – a plan that considers both water quality and water quantity issues and provides a detailed account of the threats. It also identifies vision and management objectives and sets out a Programme of Measures to achieve future goals. The approach of the Management Plan is shared for all countries.

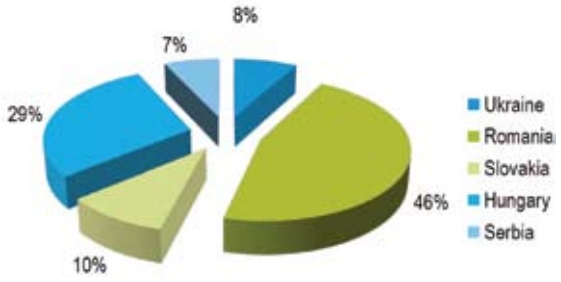
The Tisza River Basin Management Plan is a major milestone on the journey to a balanced Tisza River Basin. Not only does the work done by the participating countries serve as a model for similar projects, the Management Plan also maps out how to protect the future of the Tisza River Basin.

The Tisza River Basin at a glance

Size of the Tisza River Basin:	157,186 km^2
Length of the Tisza River:	966 km
Percentage of the Tisza River Basin in the Tisza countries:	Ukraine 8.1%, Romania 46.2%, Slovakia 9.7%, Hungary 29.4% and Serbia 6.6%
Percentage of the Tisza Basin in the Danube River Basin:	19.5%
Annual mean discharge:	830 m^3/s – contributing 5.6% to the total runoff of the Danube Basin

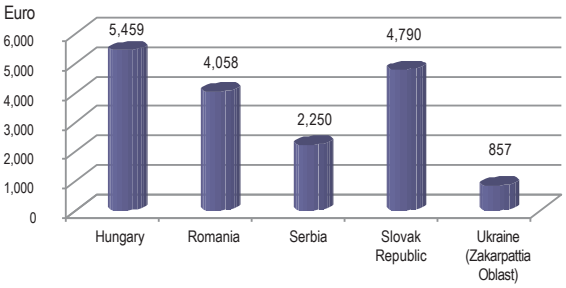
Tisza River Basin - Distribution of the area between the Tisza Countries

% of TRB in each country

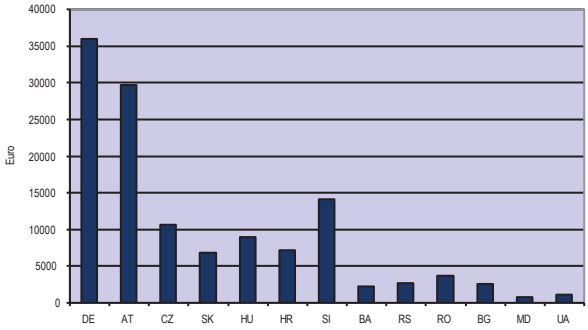


Distribution of the area between the Tisza countries

GDP per capita in Tisza River Basin



GDP per capita in Danube River Basin

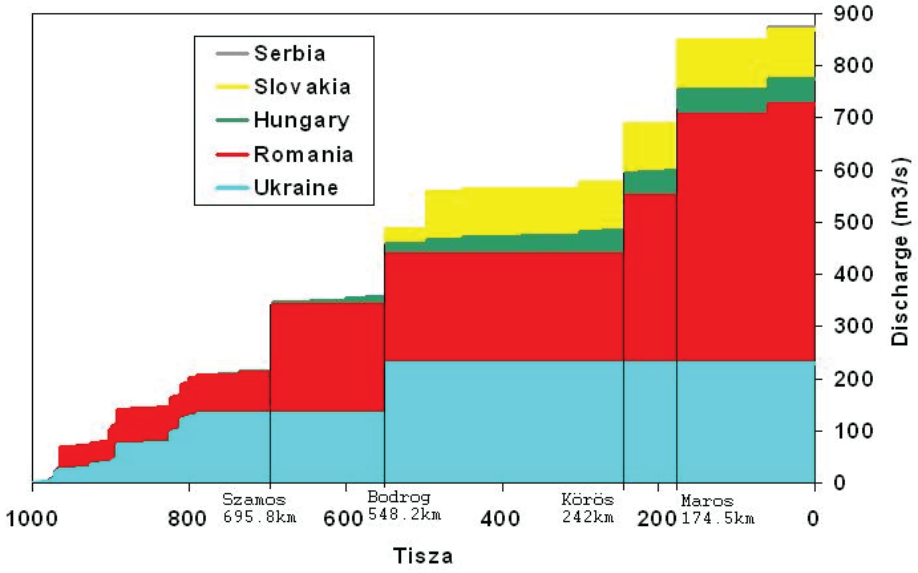


The above figures illustrate the differences in GDP per capita between the countries of the Danube River Basin and Tisza River basin.

Basic information about the Danube River Basin District and largest sub-basins of the Danube, Tisza and Sava River Basins

River basin	Length (km)	Size of catchment (km^2)	Inhabitants (million)	Average discharge at the mouth (m^3/s)	Time series for discharge values
Danube River Basin	2,857	807,827	80.5	6,500	(1914-2003)
Tisza River Basin	966	157,186	14	825	(1946-2006)
Sava River Basin	945	97,713	8.5[1]	1,559	(1946-2006)

Longitudinal profile of the Tisza River and contribution of water from each country (in %) to the mean discharge of the Tisza (in m^3/s)[2]



1. Approximate data
2. Data based on data of Szabó, J. A. (2007): Decision Supporting Hydrological Model for River Basin Flood Control. In R. J. Peckham and G. Jordan (eds) "Digital Terrain Modelling: Development and Applications in a Policy Support Environment", Springer-Verlag, Berlin (In Press). ISBN: 978-3-540-36730-7 (1991-2002) and runs of theVITUKI NFHS flood routing module and runs of the VITUKI NFHS flood routing module

Rivers know no boundaries

The waters of the Tisza River Basin flow from the Chornohora and Gorgany Mountains of Ukraine to the Danube in Serbia, without notice of the political borders of the region. To respond to the needs of the rivers and the people living with them, the Tisza countries have put aside notions of separate activities and instead have worked together across the entire basin.

Building a partnership

All five Tisza countries are contracting parties to the Danube River Protection Convention, signed in 1994. In 2004, the countries established the Tisza Group within the framework of the **International Commission for the Protection of the Danube River** (ICPDR), a platform committed to implementing the Danube River Protection Convention and to strengthening coordination and information exchange related to international, national and regional activities.

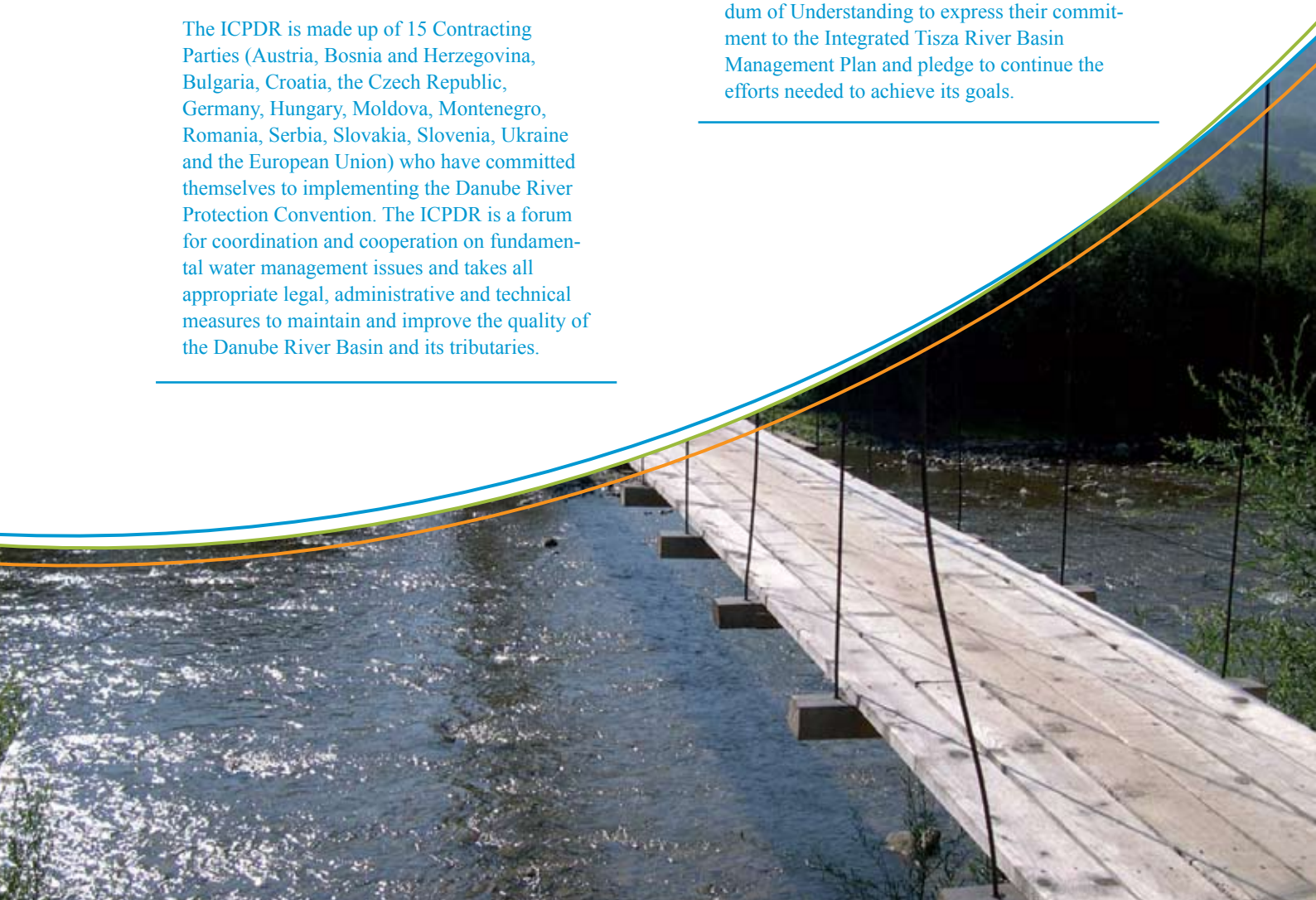
The ICPDR

The ICPDR is made up of 15 Contracting Parties (Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, Ukraine and the European Union) who have committed themselves to implementing the Danube River Protection Convention. The ICPDR is a forum for coordination and cooperation on fundamental water management issues and takes all appropriate legal, administrative and technical measures to maintain and improve the quality of the Danube River Basin and its tributaries.

The Tisza Group

At the first Ministerial Meeting of the ICPDR in 2004, representatives of the five Tisza countries signed a Memorandum of Understanding, agreeing to prepare a River Basin Management Plan for the Tisza River Basin. The 'Tisza Group' was created to prepare and coordinate all activities for the preparation of the Tisza River Basin Management Plan. The Tisza Group also serves as a platform for strengthening coordination and information exchange among relevant international, regional and national bodies and projects in the Tisza River Basin.

In 2011, the countries updated the Memorandum of Understanding to express their commitment to the Integrated Tisza River Basin Management Plan and pledge to continue the efforts needed to achieve its goals.



A management plan for the Tisza

The **Integrated Tisza River Basin Management Plan (ITRBMP)** includes an updated analysis detailing the pressures from pollution, river engineering works, floods and droughts. Furthermore it gives an overview of the status of the Tisza River Basin's waters and identifies the measures needed to be implemented to reach good status of waters by 2015 as set out in the objectives of the EU Water Framework Directive.

The principles of Integrated Water Resources Management promote the coordinated development and management of water, land and related resources, to maximise the economic and social welfare without compromising the sustainability of vital ecosystems.

Water quantity management, like flood and drought protection or climate change adaptation strategies, and development processes like land use management, have a crucial role in reaching good water quality.

The EU Water Framework Directive

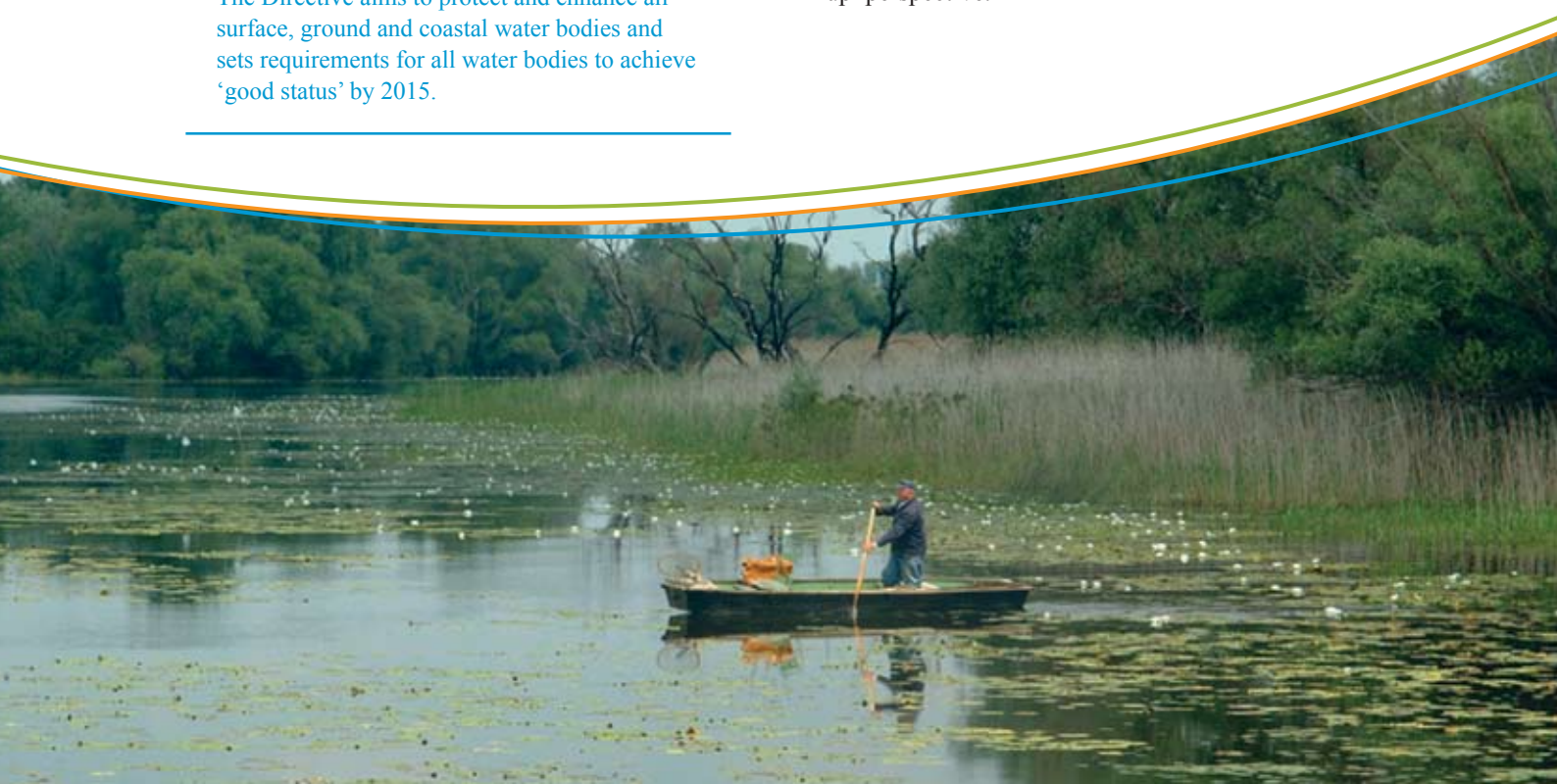
In response to the increasing threat of pollution and the need for cleaner rivers and lakes, the European Union introduced the EU Water Framework Directive in 2000. This important piece of EU legislation establishes, for the first time, a framework for the protection of all waters and the wildlife that depend on them. The Directive aims to protect and enhance all surface, ground and coastal water bodies and sets requirements for all water bodies to achieve 'good status' by 2015.

The Directive requires basins to be managed using River Basin Management Plans with a Programme of Measures, consisting of policies and strategies to reduce the risk to water bodies and allow them to achieve 'good status'. While each country remains responsible for its national part of the international area, the International River Basin Management Plans are the sum of all plans related to basin-wide issues, and provide a coordinated and formal strategy for the basin as a whole.

The Tisza River Basin is located on the territories of three EU Member State; two other Tisza countries which are not Member States of the EU are not obligated to fulfil the Directive's requirements. However, in 2000, all the Tisza countries agreed to work together as a whole river basin and implement the Directive under the framework of the ICPDR.

Focusing on the local level

The initial step in developing the Management Plan for the Tisza River Basin, was to scale down the results of the recent UNDP/GEF **Danube Regional Project** to the Tisza Sub-basin, in order to assure that the ITRBM Plan will be developed from both a 'top-down' and a 'bottom-up' perspective. This 'scaling down' of a Danube Basin programme to its sub-basin, the Tisza River Basin, was an important step in bringing the results of the Danube Regional Project to the community level and assuring that the management plan for the Tisza River Basin will be developed from both a 'top-down' and a 'bottom-up' perspective.



UNDP/GEF support in the basin

The Danube Regional Project was one of the three components of the $100 million GEF Strategic Partnership for Nutrient Reduction in the Danube / Black Sea Basin – GEF's largest and perhaps most ambitious water-related project in the world. It supported the intermediate goal of the Commissions for the Danube and Black Sea to reduce nutrient and toxic loads to the Black Sea to mid-1990s levels, and their long-term goal to reduce nutrients and toxic substances to the levels necessary to allow Black Sea ecosystems to recover to conditions in the 1960s.

A follow-on project supported by the UNDP/GEF focused on developing the environmental benefits of wetlands to mitigate impacts of floods/droughts and help to reduce nutrient pollution in the Tisza River Basin. The objectives of this project, called 'Integrating Multiple Benefits of Wetlands and Floodplains into Improved Transboundary Management for the Tisza River Basin' or **Tisza Project** for short, were to **integrate water quality, water quantity, land use and biodiversity objectives under the legal umbrella of the EU and ICPDR** and to **test new approaches on wetland and floodplain management** through community-based demonstration.

Demonstrating new strategies

In order to achieve a bottom-up perspective, pilot floodplain restoration demonstration projects were initiated. These demonstration projects focused on the development of strategies to test the environmental benefits of wetlands to mitigate impacts of floods/droughts and to help reduce nutrient pollution.

The demonstration projects provided specific results of environmentally beneficial actions such as enhancing wetlands by nutrient reduction, biodiversity improvements, flood mitigation and drought impact reduction.

Support from a wider community

The work of the Tisza Group has had significant support via grants and projects from the EU and the participating countries` governments, as well as from UNDP/GEF and the United Nations Environment Programme - Vienna Interim Secretariat of the Carpathian Convention. Additionally, the European Commission/DG Environment provided both technical and directional support as well as co-financing of project related activities.

Various initiatives have been taken by the Tisza Group to promote public participation as one of the core principles in sustainable water management. **This active cooperation has proven to be successful in ensuring that different aspects and approaches help influence and shape the current water management.**

Shared treasures

The Tisza River Basin is blessed with a rich biodiversity, including many species no longer found in Western Europe.

Large carnivores live in the mountains of the Tisza River Basin, including brown bear, lynx, wolf and otter. The variety of habitats in the region supports many vulnerable, threatened and critically endangered species such as the Corn Crake, Geoffroy's Bat, the European Ground Squirrel and the Russian Sturgeon.

The Upper Tisza Basin is an important migration route for fish, notably nase, barbel and sterlet. The area supports a rich wetland fauna of dragonflies and nesting water birds, including all eight European Heron species. The basin is also home to rare plants such as Galium Bailloni, Fumaria Jankae and Thero-Salicornietea.

When the Tisza is in bloom …

Every year between late spring and early summer the Tisza blooms with millions of long-tailed mayflies (Palingenia Longicauda), the largest mayfly species in Europe. The larvae live for three years at the bottom of the river until they break the surface where males moult and females hatch. Just before sunset the beautiful bridal-dance called 'blooming' begins and the river's surface explodes to life. Shortly after the mating, females lay eggs which slowly drift to the bottom. The spectacle is soon over and as darkness falls the river's surface is covered with the dead bodies of the mayflies.

Protecting biodiversity

The region has outstanding ecological values such as unique freshwater ecosystems of 167 larger lakes and more than 300 wetlands. Furthermore, countries in the Tisza River Basin have set aside a significant amount of protected areas and national parks.

Out of 346 protected areas, 276 have been designated following the **EU Habitats Directive** and 60 are protected areas under the **EU Birds Directive**.

Another two areas are protected under both Directives. Some eight are protected area types of non EU Member States. The total surface of protected areas in the Tisza River Basin amounts to 38,223 km^2 and corresponds to about a quarter of the surface for the protected areas in the Danube River Basin District.

The Tisza River Basin is among the most picturesque regions in Europe. Mountain streams and meandering rivers run unhindered in many areas. The Tisza River itself, in the upper section of the basin, runs free of dams and other significant human impacts, contributing to the values of these natural assets which are considered unique in Europe.

An important resource

The Tisza River is also an important European resource, and provides livelihoods for many people through agriculture, forestry, pastures, mining, navigation, tourism and energy production.

However, the last 150 years of human influence have caused a number of serious problems for the Tisza River Basin's waters.

The basin at risk

A healthy river system requires balancing the needs of the region's people and economy with the needs of the river for clean waters and ample habitats for wildlife. The impacts of pollution are significant in the Tisza River Basin and affect human health, the access to healthy fisheries, the safety of settlements and the development of a successful tourism industry. According to the 2007 Tisza Analysis, the basin is threatened by several significant water management issues.

The major cause of **organic pollution** in the Tisza River Basin is insufficient treatment of wastewaters discharged by municipalities, urban settlements, industry and agriculture.

Hazardous substances from industry and mining operations pose a risk to the Tisza River Basin. Whilst there has been much improvement to mining operations after accidental spills over a decade ago that resulted in significant pollution, problems can still occur as was seen in the recent spill in Hungary to the Danube River Basin. This emphasises the need for countries to work together to prevent such accidents and to put strategies in place to ensure quick and efficient management to minimise further risks.

Furthermore, wastewater is not collected at all in more than half of the urban areas in the basin and intensive agriculture has led to an increase in soil pollution and erosion contributing to **nutrient pollution**.

And finally, changes in land-use and **river engineering** resulted in the loss of natural floodplains and wetlands, causing habitat loss for many species. As of 2009, 178 continuity interruptions like dams or locks remain a hindrance for fish migration in the Tisza River Basin.

While these four problems were also identified as significant water management issues for the entire Danube River Basin, the Tisza River Basin Analysis in 2007 showed that water quantity issues can also play an important role in reaching good water status. The **integration of both water quality and water quantity aspects** is crucial for the Tisza River Basin.

In 2008 the Tisza Group and UNDP/GEF Tisza project experts identified an additional six issues, related to the integration of water quantity and water quality, specific to the Tisza River Basin. The six issues include problems from **floods and droughts**, the impacts of **climate change, demands on groundwater and surface water, solid waste** in the river, **accidental pollution** due to flooding and **loss of wetlands.**

Coping with floods and droughts

Recent years have seen an increase in floods in the Tisza River Basin with devastating results in areas naturally prone to flooding, areas where rivers are confined to man-made channels and where houses and industrial sites have been constructed in floodplain areas.

A drought is an extended period of time when a region experiences a shortage of water. Although droughts can persist for years, even a short intense drought can cause significant damage to the ecosystem and agriculture and harm the local economy.

Solid waste in the rivers

Solid waste-related problems like plastic bottles and plastic bags tying up the rivers are a specific issue in the Tisza River Basin. The accumulation of plastic is a growing threat throughout the region, choking floodplains and spoiling valuable grazing areas and recreation zones. River banks act as a filter and whole river cross-sections have been blocked by such floating waste.

Loss of wetlands

Wetlands and floodplains provide habitats for wildlife and reduce nutrients, trap sediments, aid flood protection and recharge groundwater. Many of these habitats in the Tisza Basin have been lost due to land changes and the canalisation of former natural rivers has caused floods in downstream communities.

Demands on water resources

The increasing demands on water resources in the region for drinking water, as well as for agriculture and industry, result in significant depletion of groundwater. While current reserves are still sufficient, efforts are required to manage resources fairly.

Accidental pollution due to flooding

The problem of the flooding of landfills, dump sites and storage facilities – where harmful substances are deposited and toxic substances can be transferred into the water – is still a big problem in the Tisza River Basin.

Impacts of climate change

Climate fluctuations will likely have an impact on the water quality and ecology of the river basin. Learning to adapt to extreme events from further changes will be an important challenge for people living in the Tisza River Basin.

The status of the basin

Approximately 40% of the river water bodies reached good or better ecological status/potential, and around 43% have moderate or worse ecological status/potential. Out of 223 river water bodies, 107 reached good chemical status and 43 fail to reach good chemical status. The chemical status is unknown for 73 river water bodies.

The results of **chemical status** assessment show that out of 85 groundwater bodies of basin-wide importance, good chemical status was observed in 72 water bodies. Out of this number, there are 47 cross-border and 25 national groundwater bodies. Ten groundwater bodies have poor chemical status and there is no data about chemical status for three groundwater bodies from Ukraine.

The results of **quantitative status** assessment show that out of 85 groundwater bodies of basin-wide importance, good quantitative status was observed in 54 water bodies, out of which 42 are cross-border and 12 national groundwater bodies. Poor quantitative status was observed in 28 groundwater bodies (16 national and 12 cross-border). There is no data on quantitative status for three groundwater bodies from Ukraine.

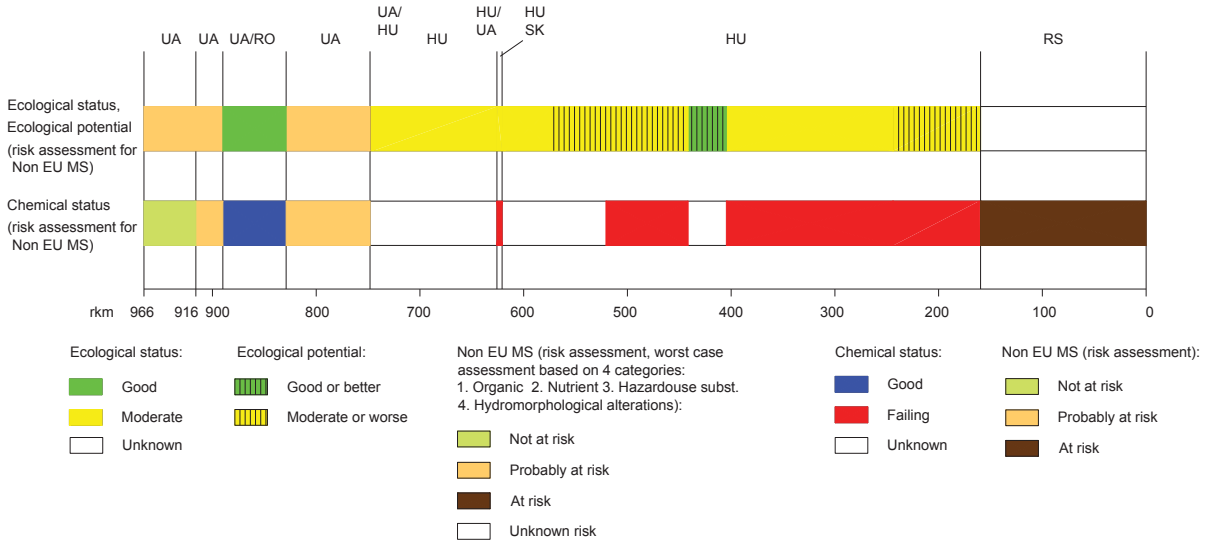
The percentage of surface water bodies designated a **heavily modified water body** (HMWB) in the Tisza River Basin is 34%. This is less in comparison with the entire Danube River Basin, where it is 40%, but still significant. Approximately 38% of the Tisza River water bodies are designated as HMWB or provisional HMWB (for the Danube River, approximately 57% of the water bodies are designated HMWB or provisional HMWB).

The assessment of the ecological status/potential according to the EU Water Framework Directive was a challenge for all EU Tisza Countries, and there are still several gaps and uncertainties to be dealt with in the future. There are also significant data gaps for chemical status.

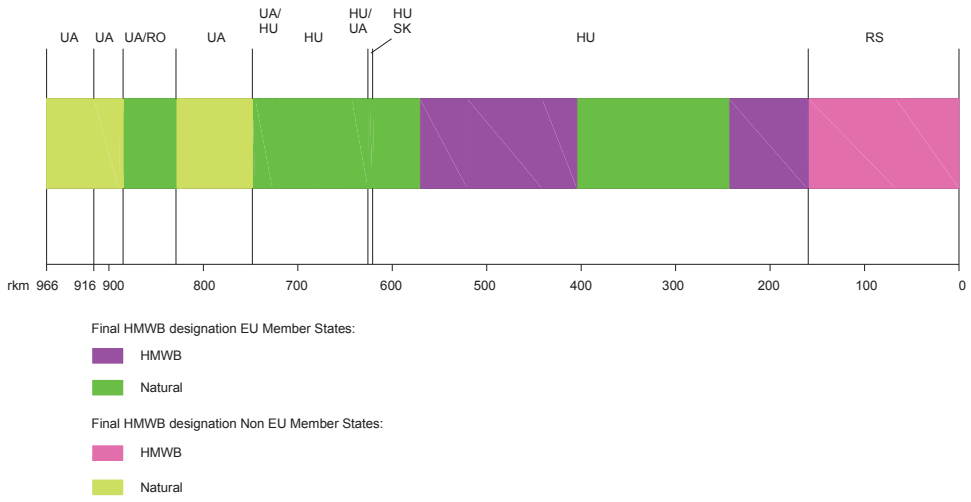
The results of the status assessment show that there are still a number of actions to be taken by the Tisza country governments in order to protect this important region.

Status classification for the Tisza River represented as a continuous band

The total length of the Tisza River is 966 km. Of this, approximately 410km were identified as HMWB or provisionally HMWB (pHMWB) representing 42.4% of the Tisza River.



Heavily modified water bodies of the Tisza River



Visions and management objectives for the Tisza

The Tisza River Basin countries have prepared the Integrated River Basin Management Plan, which includes the next steps and long-term actions required to fulfil the EU Water Framework Directive and all other relevant legislation.

The plan helps countries to design and implement measures to reduce pressures resulting from organic, nutrient, hazardous substances pollution and river engineering changes, as well as strategies to address measures which might have positive impacts in relation to both water quality and quantity by mitigating floods and droughts, improving land management and reconnecting floodplains and wetlands.

Reducing organic, nutrient and hazardous substances **pollution, and pressures from river engineering.**

Organic pollution

The Tisza basin-wide vision for organic pollution is zero emission of untreated wastewaters into the basin's rivers and tributaries.

The technical implementation of the EU Urban Waste Water Treatment Directive and the Integrated Pollution Prevention and Control Directive, and an equal level of measures in non EU countries will significantly address the problem of organic pollution, as on the Danube Basin-wide scale. Implementing the EU Sewage Sludge Directive will ensure that contaminated sewage sludge does not contribute to organic pollution through agriculture.

The reduction of organic pollution from wastewater is expected to be significantly higher in the Tisza River Basin than in the Danube River Basin, since many Tisza communities will have constructed secondary treatment facilities for wastewater. In addition, the effect of the urban wastewater treatment measures will be more visible for the smaller scale of the Tisza River Basin than for the Danube River Basin.

Nutrient pollution

The Tisza basin-wide vision for nutrient pollution is the balanced management of nutrient emissions so that neither the waters of the Tisza River Basin, the Danube River Basin or the Black Sea – via the Tisza River Basin – are threatened or impacted by eutrophication.

To achieve the basin-wide vision, a number of management objectives must be met to reduce the total amount of nutrients entering the Tisza and its tributaries to the Danube and to bring the nutrient loads of the Black Sea back to levels observed in the 1960s.

EU Member States will have to implement the Urban Wastewater Treatment Directive and the Nitrates Directive. The EU Nitrates Directive aims to limit the amount of nitrates permitted and applied and the resulting concentrations in surface and ground water bodies. The overall application of nutrient removal technologies is expanding, but new investments in wastewater collection and treatment in non-EU Member States must also consider nutrient removal technologies during upgrades or new construction. In addition, a greater use of Best Environmental Practices will further reduce pollutants from agricultural emissions.

Reducing nutrient pollution by introducing wastewater treatment plants depends on the specific situation in the countries. Connecting remote villages to wastewater treatment plants is cost intensive and may require a long time before households can be connected to a central system.

The reduction goals will probably not be met in time for the Tisza River Basin, as agricultural practices are expected to intensify for some countries, which could even lead to an overall increase in pollution to the Tisza River Basin. However, some reduction goals could be reached by implementing a ban on phosphates in laundry detergents alone. This relatively cost effective and easily implemented measure will be one of the first solutions to be realised.

Ban on phosphates in laundry detergents

Phosphates are used to improve the cleaning effect of detergents, especially when used with hard water. However, phosphates can contribute to an excess of nutrients, which causes eutrophication - an accelerated growth of algae and plants leading to a disturbance to the balance of organisms. A new amendment to the EU Detergent Regulation uniformly limits phosphorous-containing compounds in laundry detergents to 0.5 percent of weight as of January 2013.

Hazardous Substances

The Tisza basin-wide vision for hazardous substances pollution is no risk or threat to human health and the aquatic ecosystem of the waters in the Tisza River Basin as well in the Danube River Basin District and that Black Sea waters are not impacted by the Tisza River discharge.

Considering the high environmental damage of pollution due to accidents, especially in the mining areas, the relevance of preventive measures is much higher in the Tisza Basin than in the Danube Basin. Special attention is needed to update facilities with a high accidental risk, including industrial sites, on-going mining activities, solid waste disposal and abandoned tailing deposits. Emergency management procedures related to cross-border accidental pollution, such as mutual assistance and contingency planning, have to be developed.

Measures to reduce or eliminate hazardous substances need to be based on a variety of approaches addressed to individual pressures and sectors. Best Available Techniques for industrial sources – including technological changes in the production process and substitution of specific substances – have been proven to bring significant reduction in a short time period. For agriculture, implementing Best Environmental Practices and an immediate pesticide ban for the most hazardous priority pesticides would also reduce input of hazardous substances in the Tisza River Basin.

For EU Member States, it will also be necessary to implement the Integrated Pollution Prevention Control Directive and the Dangerous Substances Directive. These measures, along with the Urban Wastewater Treatment Directive needed for organic and nutrient pollution, will serve as comprehensive instruments to integrate and address different aspects of pollution control to further contribute to achieving environmental objectives.

River engineering impacts

The Tisza basin-wide vision for river engineering impacts is the balanced management of past, ongoing and future structural changes of the river's environment, so that the aquatic ecosystem in the entire Tisza River Basin functions in a holistic way and is represented with all native species.

Barriers make it difficult for fish to move between spawning grounds and other habitats, and have resulted in the sharp decline of many migratory species. The management objectives to achieve this vision include constructing fish migration aids to ensure reproducing and self-sustaining populations of sturgeon and other migratory species. In addition efforts to restore, conserve and improve habitats and their continuity will need to be undertaken for migratory species in the Tisza River and its tributaries.

As of 2009, 240 interruptions of river and habitat continuity are located in the Tisza River Basin. Fortunately, the Tisza countries have reported that measures like the construction of fish migration aids will be undertaken by 2015. However, for some 137 interruptions, river continuity will remain impassable for fish migration by 2015. Good ecological status and good ecological potential may not be ensured then, but it is likely that these objectives can be achieved after 2015.

GROUNDWATER

The basin-wide vision is that the emissions of polluting substances do not cause any deterioration of groundwater quality in the Tisza River Basin. Where groundwater is already polluted, the ambition is to restore it to good quality. In addition, the vision calls for the appropriately balanced use of water that does not exceed the available groundwater resources in the Tisza River Basin, considering future impacts of climate change.

Status assessments showed that 85% of the Tisza River Basin groundwater bodies have good chemical status, but good quantitative status was not as high with only 64% of groundwater bodies achieving good status.

To address groundwater quantity in the Tisza River Basin, it is necessary to implement appropriate controls of the abstraction of fresh water and to create a register of water abstractions. Additionally, other measures such as changing drainage systems, stopping illegal abstractions, introducing crops with low water demand and applying water-saving irrigation technology, should also be applied to improve the water balance.

Slow and insufficiently recharging deep aquifers in some parts of Tisza River Basin, followed by several decades of intensive demands on public water supplies have resulted in over-abstraction. Sustainable solutions for future water supply in such cases include investigations for alternative water sources.

Integration of water quality and quantity issues

Floods and droughts

The Tisza basin-wide vision for floods and droughts is that the negative effects of natural phenomena (such as floods, flash floods, droughts and soil erosion) on life, property and human activities as well as on water quality are reduced or mitigated. In addition, the vision calls for flood management that follows the entire cycle of risk assessment (prevention, protection, mitigation and restoration) and is integrated to ensure both flood protection and the good status of water bodies.

Harmonising the implementation of the EU Water Framework Directive and the Floods Directive is an important step for the Tisza River Basin. The EU Floods Directive will provide better insight to the threats and pressures, particularly through the preparation of flood-risk maps for the Tisza River Basin in 2013.

While it is clear that in some cases, structural solutions like dyke and bank reinforcements are needed to protect urban settlements, space for rivers should be the overarching strategy for sustainable flood protection measures within the Tisza Basin. Identifying measures that have benefits for both flood protection and nature protection (win-win measures) are part of such 'space for the river' strategies.

Demonstration projects of non-structural measures, such as the concept of 'making space for rivers' (e.g. UNDP/GEF Tisza Project in the Bodrog basin and Integrated Land Development project), will help to illustrate both the environmental and economic benefits of such approaches while still achieving the overall objectives of reducing the harmful impacts of floods.

The EU Floods Directive

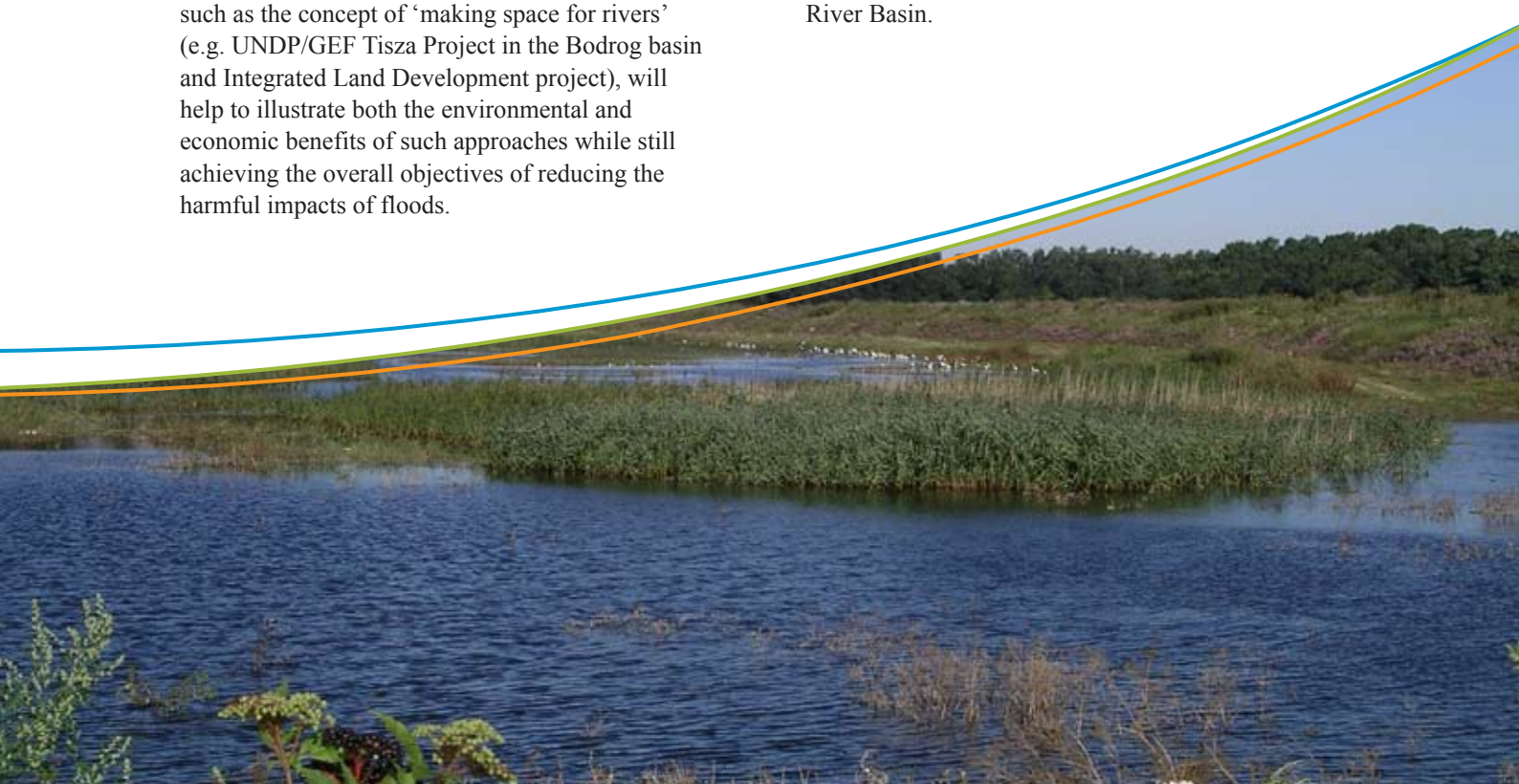
The aim of the EU Floods Directive is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. Affected areas would need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

Addressing problems of solid waste

The Tisza River basin-wide goal for solid waste is that solid waste obstructions are removed from the Tisza River and its tributaries.

Despite national regulations, solid waste remains a problem, mainly due to illegal waste disposal in the mountainous area of the Upper Tisza Basin.

A range of measures to address the sources of the solid waste problems, such as plastic bottles, is being tested under the UNDP/GEF Tisza Project and the ICPDR/Coca Cola support in Ukraine with the active support of local authorities and WWF-Germany. These measures range from education and awareness-raising on the appropriate disposal of plastic bottles to collection and recycling activities that will potentially lead to an income stream to assist with sustainability. The lessons learned will be applicable throughout the Tisza River Basin.



Disconnection of wetlands

The Tisza basin-wide vision is that wetlands be reconnected and restored so that their integrated function ensures the development of self-sustaining aquatic populations, flood protection and pollution reduction in the Tisza River Basin.

Wetlands reconnection has a positive impact on limiting the damages of floods, land use management and on other water quantity aspects of the basin. Compared to the Danube River Basin, the Tisza countries have more potential to 'give space to the rivers', thus restoring unique environments. In the Tisza River Basin, 17,306 ha of wetland areas with the potential for reconnection were identified in 2009. By 2015, some 2,651 ha are expected to be reconnected to the Tisza Rivers and 1,662 ha will be reconnected in Slovakia after 2015. An additional 12,993 ha are expected to be reconnected to the Tisza Rivers in Ukraine by 2021. The measures in Ukraine are mainly for flood protection in the Upper Tisza.

Improving the linkages and integration with planned flood protection measures is needed to ensure that regional and local measures can be implemented with minimal competition between the needs to protect property and lives from flood events with alternative approaches to mitigating peak floods whilst ensuring maximum benefit to the riverine ecosystems.

Demands on water sources

The Tisza basin-wide vision for water scarcity is that water resources are used efficiently so that resource availability, demand and supply is balanced and that water-related ecosystems are not influenced in their natural development and distribution.

Water demand is expected to increase in the near future. The Tisza River Basin Analysis 2007 estimated that water consumption will nearly double by 2015, mainly due to the significant increase of irrigation.

Although appropriate measures such as using crops with low water demand, applying water-saving irrigation technology, registering water abstractions, changing drainage systems and stopping illegal abstractions, are effective, it is not known to what extent these will be applied throughout the Tisza River Basin. These measures need to be targeted towards specific local situations within the basin.

Better knowledge is needed of the spatial distribution of use and future demands of limited water resources. This knowledge, supported by maps defining droughts and water scarcity, will enable better planning and management. Special attention should also be given to the allocation of cross-border water resources.

Accidental pollution

The Tisza basin-wide vision for accidental pollution is that land is managed in such a way that the negative impacts of floods and droughts (such as pollution from contaminated sites or agricultural impacts) are minimised.

It is very important to prevent accidents and ensure effective contingency planning in the case of an incident. The Danube as well as Tisza countries, in the framework of the ICPDR, have taken important steps to ensure such mechanisms are in place. An **Accident Emergency Warning System** has been developed and is being used and continually improved.

The Accident Emergency Warning System
The Accident Emergency Warning System is activated whenever a risk of transboundary water pollution exists, or dangerous levels of hazardous substances are released. The system sends out international warning messages to countries downstream. This helps national authorities put environmental protection and public safety measures into action. Principal International Alert Centres in each country form the central points of basin-wide cooperation in early warning.

The Accident Emergency Warning System has recently been strengthened in Ukraine; however there is a need for continual review of both the operation of the system at the Tisza Basin scale, as well as of the risks in the basin.

The existing inventories should be updated to reflect both the clean up that has taken place and to ensure that all significant sites (both within and outside flood-risk regions) are documented. Initial steps to update the inventories of accident risk spots include a common approach to establishing threshold values, and agreeing on priorities for measures and concrete targets.

Climate change impacts

The Tisza basin-wide vision for climate change are that impacts such as droughts, floods and flash floods are fully addressed in decision-making to ensure sustainability of the ecosystems.

It is important to follow-up on the ongoing results of scientific projects related to possible climate changes in the Tisza River Basin and to identify adaptive measures considering specific phenomena of the area (such as flood and drought and their impacts on climate change). The creation of a sustainable Danube Basin Development Strategy could outline climate-resilient economic development options.

Finally, a healthy aquatic ecosystem is naturally more resilient to climate change impacts, and implementing other measures of the Integrated Tisza River Basin Management Plan, such as floodplain restoration, can help protect the basin against further impacts.

Leading by example

The following three demonstration projects were developed under the UNDP/GEF Tisza Project. These projects proved very successful by promoting cross-border collaboration between the Tisza countries and by actively involving stakeholders and local citizens in the solution of environmental problems.

Finding balance through floods

In earlier centuries, land use in the Tisza lowland was adapted to the natural dynamics of the river system, allowing locals to take advantage of the seasonally recurring floods. However, much had changed since the old times and so a project, called 'Integrated land development (ILD) programme to improve land use and water management efficiency in the Tisza Basin' attempted **a complete reversal of land use practices.**

The ILD project, which ran from March 2009 to January 2011, set out to reintroduce this ancient, tried and tested approach of land use and flood management on a demonstration site in Nagykörű, Hungary to prove that a balance of the connection between land and water with alternative means was possible.

Going against man-made systems

The pilot site at Nagykörű in Hungary still had the features of a river bed where man made draining canal systems got rid of the surplus water. Here, the ILD project aimed to **proactively flood deeper lying land** where nature has already designed appropriate reservoirs, in a controlled manner, so that man and nature could co-exist without too much confrontation.

The ILD project aimed to develop a toolkit for integrated land and water management practices which could replace current sector-based approaches. A document was prepared to identify the current situation, so that ways towards an alternative land use practice could be found. Then the necessary changes regarding land consolidation, land use and water management as well as designing and building structures were decided on. Finally, the land owners were approached, with the **proposal to change some of the land from tillage to wetland.**

Overcoming reluctance to change

However, **the land owners were not interested** in these changes. Agricultural subsidies, disaster cover payments and ownership rights kept them from embracing the idea of seeing their land go under water. Surveying and engineering design also raised some problems, but these were dwarfed by the administrative and social barriers.

However, the project accumulated a lot of information on the regulatory environment, local land owner approach and practical opportunities of ILD, which was shared with the countries of the Tisza River Basin. In conclusion it can be said, that to achieve changes in land use, **administrative steps like changing the cultivation type and setting up new sub parcels would be needed.**

Solving environmental problems at the local level

Two villages, though separated by national borders, share the same livelihood and the same challenges. Velyky Bychkiv in Ukraine and Bocicoiu Mare in Romania live on timber processing and suffer from severe floods and environmental stresses like **toxic wood residues, destroyed riverbeds, poor infrastructure, solid and organic waste and high flood risk.** The joint Ukrainian-Romanian demonstration project involving the two mountainous communities was realised in 2009-2010.

Simple solutions to help man and fish

The goal of this project was to tackle these problems with **cost effective and easy to implement solutions**, like raising awareness of the need of **proper maintenance of the local streams** among the villagers. The project created deepened places in the riverbed for garbage to be trapped in order to clean the streams easily and inexpensively. In addition, a **biological wastewater treatment facility** was installed for a local boarding school, decreasing untreated waters entering the Tisza.

Fish could not survive in the increasingly acidic water caused by the decay of wooden residues from unsustainable forest management. Streams were restored to their natural condition, decaying wood was removed and typical fish fauna, including **river trout returned to the mountainous creeks.**

Additionally, the project **collected new data for flood preparedness.** A water gauging station was reopened for flood forecast and management, with the data available on-line and which led to the creation of a flood hazard and flood risk map, as required under the EU Floods Directive.

Providing information to make the right decisions

The project showed that **involving local citizens in the solution of environmental problems** can have very successful outcomes. The project provided practical support for Ukrainian-Romanian relations at a local level. In addition, the project highlighted how to establish a sustainable local waste management system and introduce low-cost methods to mitigate the consequences of local floods.

Making space for cooperation

The Bodrog River Basin is shared by Ukraine, Slovakia and Hungary and covers a total area of 11,522 km². The territory is frequently affected **by major floods due to the destruction of the original floodplain areas by human actions** such as: clearing of forests, straightening of rivers and suppression of natural flood plains, inadequate drainage and most importantly, extensive building in high risk, flood areas. All of this has resulted in the degradation of agricultural areas, deterioration of soil quality and forest management problems.

A series of severe floods in 1998-2001 prompted a reconsideration of the traditional system of flood prevention based on dikes. Although the three countries had developed their own national flood mitigation plans, cross-border strategies had not been developed within the Bodrog River Basin.

Giving space back to the river

The flood prevention strategy applied by the project, 'Making space for water in the Bodrog River Basin', is based on the capacity of restored and reconnected wetlands to offer t**emporary space for water during flood events.**

The bed of the Tova River, in Ukraine, had been overgrown with plants and trees and polluted by garbage. Over three kilometres of the riverbed was cleaned up to improve the water flow capacity for flood protection purposes. In Slovakia, the original floodplains affected by intensive drainage systems were restored by reconstructing the existing floodgate as well as by drying a bypass channel.

The water supply to the Tokaj-Bodrog corner Landscape-protection District in Hungary had suffered from an increased water stream velocity due to technical flood protection measures. This was improved by bringing water during the floods into an oxbow and retaining the water there afterwards

Taking responsibility for the river

The Bodrog Demonstration Project showed the significance of helping people to feel responsible for their land. Local communities were motivated to plan additional projects to increase the attractiveness of the area for environmentally-focused visitors. On the other hand, experiences from Slovakia showed that the reluctance of farmers to cooperate due to unclear ownership situation and current agro-environment subsidies is a basin-wide issue. However, the project has introduced approaches from the whole Tisza River Basin into the Bodrog Sub-river Basin and established a close cooperation among the three countries.

Sharing results for wider success

The results of all the demonstration projects are an important step towards changes to current policies and towards the balanced approach of the Integrated Tisza River Basin Management Plan. The feedback these projects generated can be applied as a guidance document in other countries for similar attempts. Such a document could act as background material for decision and policy makers supporting the necessary legislative changes. In fact, many of the problems tackled by the demonstration projects are at present being further solved with involvement of the EU Commission.

The future of the Tisza River Basin

The Integrated Tisza River Basin Management Plan is more than just a document; it represents a commitment by all Tisza countries to implement the measures needed to achieve real integration and coordinated sustainable development in the basin. The continued involvement by the ICPDR and the Tisza Group will serve to monitor the progress of implementation and provide necessary support for the international efforts.

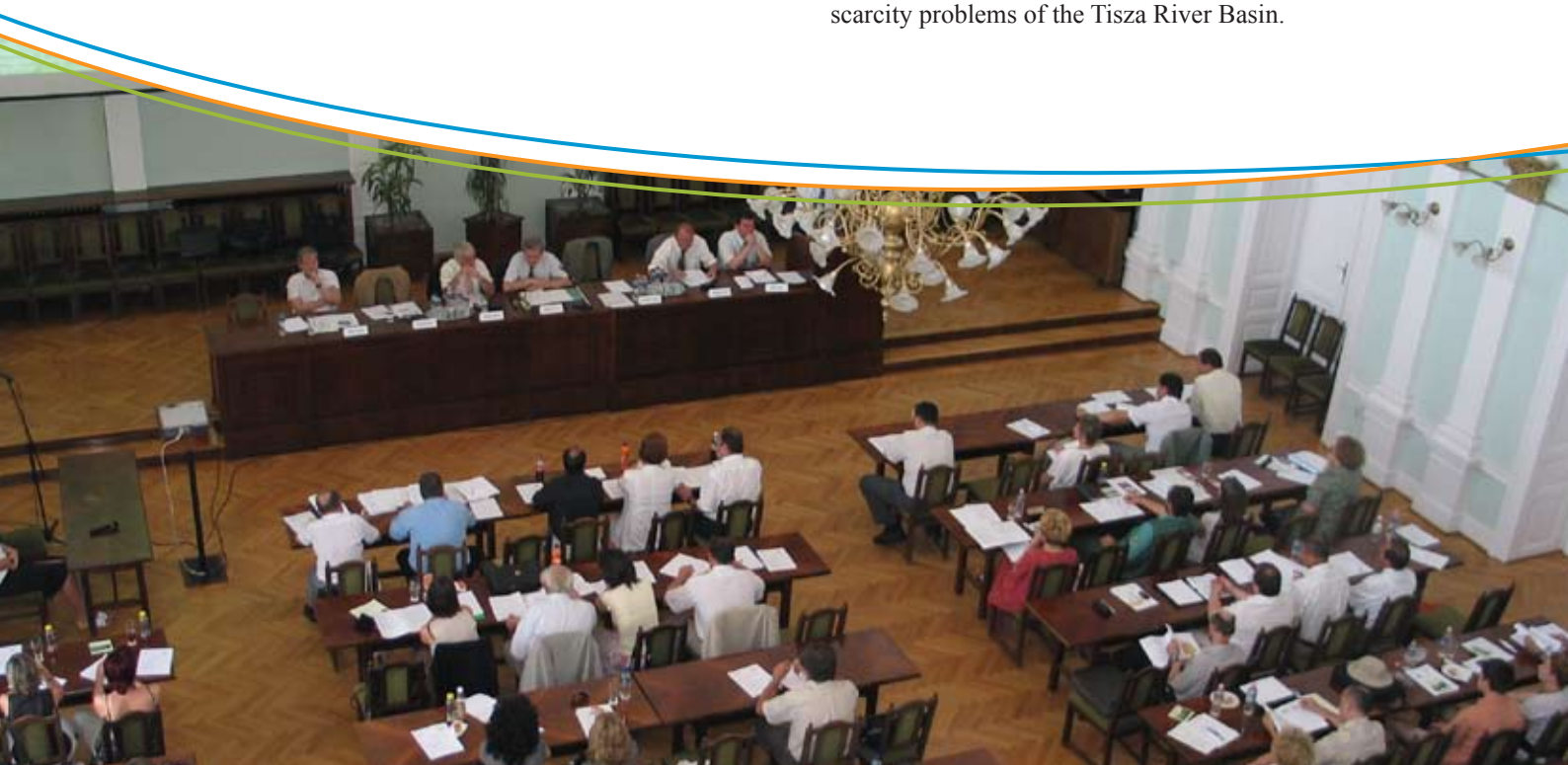
The Carpathian Convention's Article 6 "Sustainable and integrated water/river basin management" is strongly linked to the activities of the Tisza Group and the two organisations have established mutual observer status. They have pledged to develop and implement joint, coordinated and complementary activities and projects in fields of common interest, such as spatial development, renewable energy and education. In particular, the two organisations will work to raise awareness of the cultural heritage and traditional knowledge of land use management in the Carpathians and the Tisza River Basin.

Giving a voice to all stakeholders

Just as water quality and water quantity management issues must be integrated to reach good water status, so are common solutions needed to reach good water status by facilitating the dialog between different sectors (such as flood management, water resource management/drought management, land use management for agriculture, forestry, mining industries, detergent industries, waste management) and outlining measures having a positive impact on both water quality and water quantity.

As a first step a **communication strategy** will be developed to outline facts, problems and needs in connection to integration of water quality and quantity in the Tisza River Basin issues as well as to introduce relevant stakeholders. Dialogue between land use management as well as water quality and quantity related sectors is vital and has to be further facilitated in the future, also taking into account the need of integrated actions due to anticipated impact from climate change.

Filling data gaps related to the overview on water demands and uses, like low water flow related problems and groundwater depletion due to over abstraction enables a better water resource management. It also gives a clearer view on drought and scarcity problems of the Tisza River Basin.



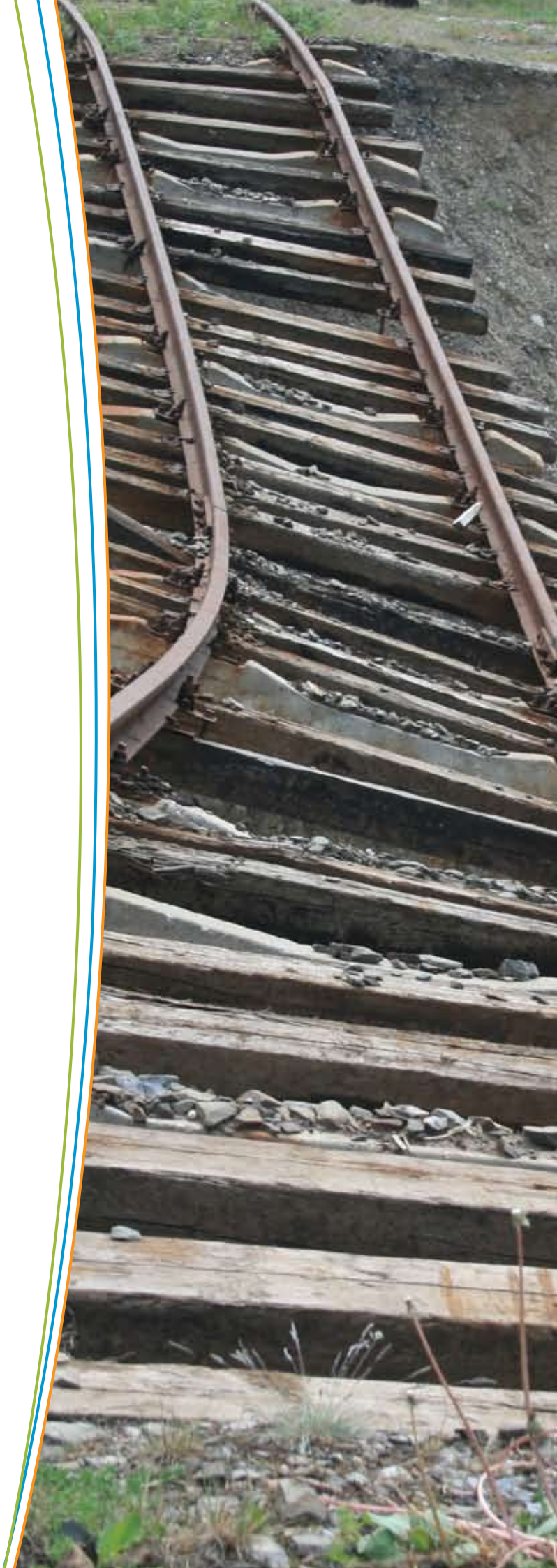
Taking steps to reduce threats

To achieve the goals identified in the Integrated Tisza River Basin Management Plan, specific issues need to be addressed. After an assessment of the positive impacts on water quality due to the increasing level of treatment of urban wastewater in the Tisza River Basin, a phosphate ban will be imposed. Then steps towards the reduction of accidental risks specifically from mining activities will be taken. The dialog between flood management and water quality management sectors by indicating common targets of planned infrastructure projects will make an assessment of the impacts of flood protection measures on the water quality possible.

Looking at the consequences of agriculture developments in the basin in terms of both water demands and the increasing use of pesticides will give a better understanding of the impacts on water quality in the basin. Also, the achievements of waste management activities and its positive impacts on water quality will be widely shared.

Finally, **a case study on climate change adaptation,** based on available projections relevant for the Tisza River Basin, will result in an assessment of possible impacts on flood management and water resource management (including drought/water scarcity) due to climate change. All these measures need to include an assessment of the possible impacts on water quality.

It is critical to follow up on the work begun in the Tisza River Basin in order to protect the Tisza ecosystems from pollution as well as from floods and droughts. Success will depend on the dedicated cooperation from all countries and continuing work on long-term actions.



Relying on the strength of cooperation

For centuries, the people of the Tisza countries have relied upon the resources of the river and its tributaries. Today this dependence is as strong as ever across the entire region, with the basin providing domestic drinking water, industrial and agricultural water supply, hydroelectric power generation, navigation, tourism, recreation and fisheries. The large population living and working in the basin results in great pressure on Tisza resources.

For most measures related to integrated water management, local action alone is not an option. In most cases the impacts will materialise on a larger geographical scale. Therefore, the international dimension of measures related to integrated water management has to be identified and there needs to be action to solve the issue in an internationally coordinated way.

Integration of water quality and quantity in land and water planning will be essential. To achieve this success in the Tisza River Basin, countries must work together and with all other partners.

For the first time, the Tisza countries have created a plan to address those problems for the entire region. A management plan for the Tisza and all of its tributaries demonstrates an innovative approach for basin-wide issues.

The Integrated Tisza River Basin Management Plan is a result of five contracting countries focusing their efforts to achieve shared goals. Only through this shared commitment and a joint effort of the Tisza Basin countries can the environmental problems of the Tisza River Basin be addressed.

The Tisza Group and the countries of the Tisza River Basin have achieved significant progress and serve as an outstanding example of cooperation.

The work done by the ICPDR Tisza Group toward the Plan for the Tisza River Basin serves as a pilot programme for other European sub-basins and beyond. With the Integrated Tisza River Basin Management Plan, the ground has been set for all countries in the basin to work together to manage their land and water operations for the benefit of the environment and the people living in the region.

Many people contributed to the successful preparation of this report, for the development of the Integrated Tisza River Basin management Plan and implementation of the UNDP/GEF Tisza project in particular:

The ICPDR Tisza Group experts, observers and demonstration project leaders from the five Tisza countries contributed comprehensive data and text as well as comments and ideas:

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· Svitlana Rebryk ·
· Graziella Jula · Elisabeta Oprişan ·
· Emilia Kunikova · Boris Minarik ·
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