



*Paper for the INBO 7th WORLD GENERAL ASSEMBLY*

## Flood Awareness and Prevention Policy in border areas:

### Joint approach to cross-border flood management

Practical solutions to improve cooperation in border regions

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# 1. Introduction to 'FLAPP'

Water managers and researchers from 35 organisations in 12 countries are exchanging knowledge and experience on how to apply sustainable flood management solutions in practice, in a project running from January 2005 to August 2007. This is being done within an EU-funded network on 'Flood Awareness and Prevention Policy in border areas' (FLAPP). More information can be found at [www.flapp.org](http://www.flapp.org)

The focus of the FLAPP network is on integrated river basin management in border areas. A range of flood management aspects are discussed:

- a) Flood prevention by structural and spatial measures
- b) Sustainable flood management, especially related to ecologically valuable areas
- c) Disaster management
- d) Cross-border cooperation to stimulate a river basin approach to flood management
- e) Communication with and involvement of the public to increase flood awareness

Using practical examples provided by partners from all over Europe, members of the FLAPP network have analysed what obstacles and challenges have to be faced in practice in developing and applying sustainable flood management policies and measures on a regional and local scale, across national and regional borders. Based on this analysis, a joint approach to cross-border flood management has been formulated, leading to recommendations to improve flood management in Europe's (border) regions. This paper contains the joint approach to cross/border flood management.

## **2. Context of cross-border flood management**

### **2.1. Cross-border cooperation in river basins**

Most European rivers are shared by two or more countries. Management of water resources is therefore an important issue in border regions. Since floods are basin-wide phenomena, they do not respect borders, whether national, regional, local or institutional.

In many cases, good cross-border cooperation between local and regional flood management authorities can improve the effectiveness of flood management services in these regions. This will ultimately result in better protection of citizens and the environment and reduction of damage. This document stresses the relevance of cross-border cooperation to improve flood management services within the context of integrated river basin management. It also provides practical tips and solutions to improve cooperation in border regions, based on lessons learned by practitioners in flood management.

### **2.2. Urgency of sustainable flood management in Europe**

In the past decade, Europe has suffered a number of major floods, causing fatalities, displacement of people, high economic losses and a large impact on nature. Since floods are natural, climate-driven processes, they can never be completely prevented. Apart from their possible negative impact, the beneficial effects of floods for society should also be remembered. They are part of the hydrological cycle of rainfall, surface and ground water flow and storage. Floods supply the flood plain with sediment and nutrients, which was the reason for early settlement and agricultural development in flood plains. Wetlands provide important services to people, for example as sources of food (fish, meat), as agricultural land and for harvest of semi-aquatic products (reeds, fibres, wood). In addition, intact wetlands provide an environment for highly valued social services (aesthetic value, recreation, education, ceremonies).

It is important to realise that the amplitude, frequency, duration and impact of floods depend on natural characteristics and man-induced changes within the entire river basin area. Climate change appears to increase the chances of flooding, while human intervention and activities appear to reduce the resilience of water systems and their environment. The ongoing occupation of flood plains has not only increased the risk of potential damage, but has also resulted in a loss of ecological, economic and social benefits of wetlands. Simultaneously, the increasing investments in safety have reduced the public awareness of flood risks.

### **2.3. Integrated river basin management with a holistic approach**

The need to develop appropriate strategies, policies and programmes to adapt to the changing circumstances, to reduce the negative impact of flooding and to protect the dynamic function of ecosystems is widely recognised. This offers the opportunity for new, integrated policies and implementation strategies aimed at sustainable and cost-effective investments. Current policy, in contrast, has been to react by means of technical solutions such as raising dykes. European water policies and legislation (Water Framework Directive, EU Flood Directive) embrace an approach to integrated river basin management. This not only deals with issues like waste water treatment, water

quality and flood management. It also combines many other functions, including the dynamics of ecosystems, spatial management and land use, drought management, food production, disaster management, management of economic opportunities, institutional arrangements and public involvement.

Sustainable flood management therefore takes into account the water system in the river basin as a whole. It also aims at achieving a balance, both now and in the future, between ecological, social and economic functions, and between various uses of the water system. Strategy, policy and measures on the prevention, mitigation and protection of floods should therefore be based on a holistic approach. Achieving this requires cooperation between authorities on a river basin scale, as well as integration of spatial planning and water management, integration of the various functions and uses of water, joint disaster management and increased cross-border public awareness.

## **2.4. Benefits and challenges of cross-border cooperation**

Floods are basin-wide phenomena. They do not respect borders, whether national, regional, local or institutional. Floods often create common problems for citizens and authorities, with locally varying intensities in the river basin. Management should therefore be based on the boundaries of the river basin, not on administrative or country borders. These borders are however present, they cannot be ignored and are therefore a reality that has to be dealt with. Cross-border cooperation will contribute to reaching a truly integrated river basin approach. It will provide the opportunity to broaden the solution space and knowledge base to find better and more cost-effective solutions. It is widely recognised that increased knowledge of the flood formation processes from the source to the mouth of the river will lead to better solutions. At the same time, enlarging the planning horizon will enable measures to be placed at those locations in the river basin where they have optimum effect. And finally, disaster management depends greatly on early information and needs forecasts, and on data from the river basin as a whole.

Border regions, however, have specific characteristics and present specific challenges to be met when addressing natural, climate-driven phenomena like floods. The border areas are the direct problem owners of floods, while their mandates and responsibilities to deal with these problems are often limited since they are mostly located at considerable distances from the political and administrative centres of the countries concerned. In some cases they have a weaker economic development and less access to information, and the available infrastructure and services are often insufficient. In addition, the border itself is often an impediment to effective and efficient development of the border regions. Economic activities may be cut off from part of their natural hinterland across the border, which is especially true for regions on the outer EU borders. Furthermore, the border forms a barrier to the exchange of information, to effective area-oriented management and planning, and to effective cooperation between counterparts on both sides of the border. The lack of mechanisms for cross-border cooperation in many cases leads to less efficient solutions and negative trade-offs.

Despite the clear benefits, cross-border cooperation in flood management is therefore not always a natural option in Europe. It requires specific efforts from authorities on both sides of the border, whether these are national, regional, local or institutional. Successful cross-border cooperation depends on a common understanding of the problem, the needs and interests of regions on both sides of the border and the causes of the problem with respect to natural and social processes. Essential requirements for progress in the cooperation process are common goals, agreed strategies to achieve these goals and compensation mechanisms such as cross-border financing or other trade-offs to

balance the costs and benefits. These requirements can only be met if the partners know each other by frequently working together and by providing each other with access to all relevant information, thereby creating the necessary level of confidence and trust for successful cross-border cooperation.

## **2.5. Practical solutions prepared by the FLAPP network**

Based on practical examples provided by partners all over Europe, members of the FLAPP network have analysed the obstacles and challenges to be faced in practice in developing and applying sustainable cross-border flood management policies and measures on a regional and local scale.

This document is structured according to the following questions:

- What are the possible benefits of a cross-border river basin approach?
- What are the obstacles to cooperation between authorities in flood management?
- Which solutions are applied in practice to improve cross-border flood management?

### 3. Benefits of a cross-border river basin approach

Floods are basin-wide phenomena. They do not respect borders, whether national, regional or institutional. Floods therefore often create common problems with locally varying intensities. The great advantage of cross-border cooperation is to broaden the solution space and knowledge base to find better and more cost-effective solutions for floods, because:

- Better knowledge of the flood formation processes will lead to optimised projects
- Enlarging the planning horizon enables measures to be placed at the locations where they will create the optimum effect
- Disaster management depends greatly on early information and needs forecasts, and on data from the river basin as a whole

As well as direct benefits for flood management, cross-border cooperation within river basins may lead to more general benefits in strengthening regional development. This section summarises the possible benefits of regional cross-border cooperation in flood management, and illustrates them with practical examples from all over Europe.

#### *Sharing information and knowledge transfer*

Cross-border cooperation can be a vehicle for sharing information and knowledge transfer.

Cross-border counterparts can learn from each other, train each other and even exchange expert personnel.

#### **Lower Nemunas: flood risk management and cross-border cooperation**

In the Nemunas delta (border Lithuania/Russia), flood and water management problems on both sides of the delta are comparable. Yet there is only very limited exchange of experience between Russian and Lithuanian emergency management professionals.

#### *Sharing of management strategies for river catchments*

Cross-border cooperation provides the opportunity to share visions and strategies on the management of a whole river catchment. This can support sustainable, effective and efficient intervention in the river basin, from which all riparian regions can benefit.

#### *Positive cross-border effects*

The solidarity principle in European legislation already requires that measures on one side will not lead to negative effects on the other. In addition, cooperation on flood management creates the opportunity to promote measures with positive cross-border effects.

#### *More efficient investments*

Cross-border investments in service systems (downstream – upstream) may allow greater safety benefits to be achieved at the same cost. Solutions may even be possible only when they are implemented in the neighbouring country.

#### **From Border Meuse to Common Meuse: consultation and cost-sharing**

The Common Meuse or Border Meuse forms the border between Flanders (Belgium) and the Netherlands. In the 19th century the two countries split up and a river stretch of 42 km became part of the border. Under the Border Treaty of 1843, both countries have to inform and consult each other if they want to make changes in the river course. But more important, the changes can only be carried out if the other country agrees. At the end of the 20th century, these principles were used as a basis for finding synergies between Flemish and Dutch plan development in relation to the Common Meuse. For flood

management and nature protection and development it was agreed to 1) prevent or mitigate negative cross-border impact; and 2) explore possibilities for mutual positive effects and strengthen them. One of the principles of cooperation in flood management agreed by the two countries is that if only one country benefits from flood management measures, then that country will bear the cost of those measures, regardless of the side of the border on which the measures are realised.

#### *Reduced flood risk in border areas*

Flood events do not respect administrative borders. The implementation of the various steps in the flood management cycle will therefore be more effective and efficient if physical and administrative borders are ignored.

#### **Cross-border flood map: coordinated information exchange and crisis management**

In a pilot project for the German-Polish cross-border cities of Görlitz (Germany) and Zgorzelec (Poland), a joint flood map has been created. The map improves information exchange and cross-border coordination of crisis management in case of flood.

#### **Cross-border observation and information network**

The Hungarian-Ukrainian observation network in the Upper-Tisza basin is an automated data collection and transmission system. The network makes it possible to create accurate forecasts giving as much advance warning as possible. These can be used for disaster prevention in both countries.

#### *Promoting integrated solutions in water resources management*

Water is used for a wide range of purposes such as hydro-electric power generation, irrigation, nature, communal water supply, fishing and navigation. The associated uses, interests and problems may differ on both sides of the border. Regional cross-border cooperation in flood management can be a trigger for developments in integrated water resources management, which is internationally recognised as the most sustainable model for water management.

#### **Mesta/Nestos river basin: dealing with water level fears**

The Mesta/Nestos River (Greece/Bulgaria) has a number of hydroelectric power plants on the Greek side which need an adequate river flow to operate properly. At present the inflow into Greece is satisfactory. However the hydroelectric and irrigation complex in the Greek part is very vulnerable to interventions in the equipment in the Bulgarian part of the river basin. It is feared that future interventions in Bulgaria may cause shortfalls in the required water levels in Greece.

#### **Ebro river basin: effects of dams on ecosystems**

In the past many dams have been built in Spain for both flood prevention and water storage for the summer. While these two objectives have in most cases been met, the effects of these dams on the fluvial ecosystems are only now becoming clear. Due to the lack of floods in the Ebro river basin, river forests are drying and the surviving trees have grown old. Since no new seeds are arriving, no renewal of the riparian vegetation is possible. Sediment retention in the big dams is accelerating the erosion of the delta by the sea. The eel, which used to be common all over the Ebro basin, has disappeared from the reaches upstream of the dams. Instead, the new flow regimes in the Ebro river are favouring the spread of invasive exotic species.

#### *Synergies with other sectors and development*

Integrated cross-border solutions can promote spatial development and related policy areas such as nature, regional economy, tourism, recreation etc.

#### **Cross-border development of the Niers river valley: ecological solutions and nature reserve development**

In the river Niers (Germany/Netherlands), ecological and hydrological goals have been combined with recreation and tourism. This has resulted in solutions to the loss of ecological function of the river, flooding and drought problems, as well as the development of a (cross-border) nature reserve with a recreational function.

#### *Preservation of valuable ecosystems in border areas*

Rivers which cross borders act as vital corridors, both between ecosystems and for the rivers themselves. They connect natural and semi-natural ecosystems in a river basin on which nature and people depend. Cross-border cooperation will contribute to balanced management on both sides, as well as the preservation of valuable ecosystems.

#### **Cross-border development of the Niers river valley: from farmland to nature reserve**

The river Niers has a cross-border catchment area (Germany/Netherlands). The Niers valley forms an ecological connection between German and Dutch nature reserves (Natura 2000 sites) and the river Meuse. Historical operations in the Niers river valley have included intensive drainage of the former wetlands, normalisation and intensive maintenance and canalisation of the river bed. The original meandering river has now partly been restored by reconnection and reactivation of former river channels. The flood plain was transformed from farmland into nature reserve. As a result, the river has more room for the retention of natural floods, and flood peaks have been topped off since the length of the river and its hydraulic roughness have increased. Moreover wetland habitats have been reactivated resulting in the return of typical river species such as the beaver, which has been extinct in the area for many years.

#### **Nature restoration in the Schoorbroekbeek valley**

The Schoorbroekbeek is situated at the border of the Flemish and Walloon parts of Brabant (Belgium). This small stream runs through a mainly agricultural landscape, where nature values are concentrated in the natural valley. Flood risks in the nearby commune of Hoegaarden have been reduced by reinforcing the natural qualities and restoring habitats in the natural valley.

#### *Improved relationships*

Successful cross-border flood management can benefit from, but also may trigger and promote, overall cooperation at local, regional or national levels.

## 4. Obstacles to cooperation between authorities in flood management

As the previous section shows, there are numerous potential benefits of cooperation in cross-border flood management. But even so, regional cross-border cooperation is not yet everyday practice. The achievement of mutual cross-border benefits appears to be hindered by a number of obstacles. These vary by region, for example depending on the cultural and historical context or institutional and legal differences. However, practices of water managers in the FLAPP network show that these obstacles can be overcome. Part 4 shows some of the possible solutions as good practice examples. This section summarises themes that may appear to be obstacles to regional cross-border cooperation in flood management. The themes are illustrated with abstracts of the good practice examples from all over Europe, of which fuller descriptions can be found in Part 4.

### *Knowledge differences*

Different levels of experience and knowledge on both sides of the border may be an obstacle to successful cooperation. Different levels of data availability between counterparts will also result in a lack of meteorological and hydrological data for the whole river system. Another possible obstacle is the use of different, non-compatible models, monitoring techniques etc.

#### **Evros river: need for aligned meteorological and hydrological data**

The Greek – Bulgarian – Turkish cooperation in the Evros–Maritsa– Meriç basin is hampered by the knowledge gap between the partners. The availability, quality and compatibility of meteorological and hydrological data, hydraulic computations and emergency plans in the three countries are not yet aligned.

#### **Lower Nemunas: flood risk management and cross-border cooperation**

In the Lower Nemunas delta (Lithuania/Russia), specialists on the Lithuanian side are unaware of who is responsible for the various stages of the flood management cycle on the Russian side (Kaliningrad). One of the reasons for this is that the Russian safety plan is a secret document.

### *Low accessibility of knowledge and information*

In many cases it is not clear for water managers where to get specific knowledge and information. Valuable knowledge at private institutes may be (too) expensive for public water managers. Together, these problems can lead to the use of data of different quality on both sides of the border.

### *Little scientific cooperation in border regions*

Scientific institutes can contribute to generating objective data, modelling systems for river basins etc. However in many cases there is no cross-border scientific cooperation.

### *Lack of insight into mutual benefits, common goals and shared interests*

In border regions the goals and interests may be different on both sides of the border. Lack of insight into each other's interests and the apparent absence of mutual benefits can be an obstacle to cooperation.

#### **From Border Meuse to Common Meuse: working on differences**

Originally Flanders (Belgium) and the Netherlands had different interests and visions on the management of the Common Meuse. Flanders took a number of structural flood prevention measures (Dyke decree, 1996). Flanders also intended to phase out gravel extraction and started to shift its focus towards nature conservation. In the Netherlands the focus was

originally on a combination of gravel extraction and nature development ('green for gravel'). These differences in visions and interests made effective cooperation difficult when flood management issues appeared to become much more urgent in the mid-1990s.

#### *Pressing time factor*

Establishing cross-border cooperation takes time. At the start of the cooperation process, the results will first be unclear. This may be an obstacle for politicians who want rapid results.

#### *Low involvement of regional and local interests*

In many countries the responsibilities and mandates on water resources management are centralised at national level. This may lead to specific local and regional issues and interests being neglected.

#### **Evros river: low priority for flood management**

The Evros River is shared by Turkey, Greece and Bulgaria. In Greece the national government is responsible for management issues concerning the river and surrounding land use. However regional flood management has a low priority since the impact of the floods which occur almost every year is of minor importance for central government (only limited agricultural areas are affected). In Turkey the impact of floods is also mainly limited to agricultural land, with more interest for other rivers that are connected to the flood-prone areas on the Turkish side.

Parts of the Evros/Meriç river bed serve as state border between Greece and Turkey. Cross-border cooperation has in the past been difficult because of the lack of trust in the political relationships between these countries. For example the river is located in a military controlled area, and a special permit from the military authorities is needed for all scientific, infrastructural or other activities near the rivers.

#### *Under-representation of regional or local authorities in International River Basin Committees*

The focus of international river basin committees often lies on national issues in an international context. National interests play a major role. The representation and voice of local and regional water managers is in many cases poorly developed.

#### *Non-harmonised legal basis*

Neighbouring countries often lack harmonised legislation, regulation and policies on water resources management. In addition, a lack of formal agreements may lead to a lack of coordinated action.

#### **Evros river and Mesta-Nestos river basin: common legislation and conventions not applicable**

Common legislation or conventions do not apply to the management of cross-border rivers in Greece like the Evros and Nestos. Greece and Bulgaria are EU members (obliged to comply with the WFD), whereas Turkey is a non-member, although accession negotiations are currently in progress with the EU.

#### *Lack of cost recovery of flood management*

Cost recovery of flood management services by local or regional service providers leads to empowerment of local or regional decision-making for efficient investments. This can facilitate a broader view on cost/benefit analyses, and as a result on cross-border investment and cooperation. In practice, there is no (partial) cost recovery in many cases.

#### **Cross-border sewage treatment and cost recovery**

The sewage produced by the Selfkant border area in North Rhine-Westphalia (Germany) has since 1997 been treated in the Sewage Treatment Plant in Susteren in the Netherlands. German municipalities collect pollution tax from the German citizens, using their own revenue-collection structures and methods. These municipalities are then billed by the Dutch Roer

and Overmaas regional water authority. The pollution tax is calculated according to the Dutch criteria. The German municipalities use their own methods to collect the tax from their citizens.

#### *Differences in cultural background*

Differences in interpersonal behaviour and cultural backgrounds may create obstacles to cross-border cooperation.

#### **From Border Meuse to Common Meuse: 'green for gravel'**

The Common Meuse project (Netherlands/Belgium) combines a number of goals: flood protection, ecology and nature development and the use of natural resources (gravel). The latter goal is to a certain extent supported by the Dutch public. The motto of the project is 'green for gravel', which refers to the fact that nature developments are financed by benefits from gravel extraction. However on the Belgian side of the river the public discussion has led to a moratorium on gravel mining. In the coming years this activity therefore only takes place on the Dutch side of the river.

#### **Cross-border development of the Niers river valley (Germany/Netherlands)**

A study of regional cross-border water management addresses differences in professional culture. For example scientific research plays a very important role in German policy-making, while in the Netherlands modelling and estimating prevail in policy-making and planning. In Germany this approach is at times regarded as inaccurate, while the Dutch may experience the German approach as time-consuming. The same study observes differences between the Netherlands and Flanders and between the Netherlands and Germany in dealing with hierarchy. The latter difference was experienced in practice in the cross-border project concerning the River Niers: "In Germany a lot of governmental and non-governmental organisations had to be involved in the planning process, while in the Dutch situation one person covered several departments. As a result, there were sometimes meetings in which about 40 persons took part."

#### *Wrong or not enough partners involved*

Different stakeholders and users have to be involved in flood management cooperation processes. But for various reasons, not all authorities or stakeholders on each side of the border, or not the right ones, may be reached.

#### **Evros river: allocation of responsibilities**

In Greece, responsibilities for the different water issues (irrigation, emergency planning, water distribution etc.) are shared between the local, regional and national levels. However the decision-making process is not effectively coordinated between these levels, and the allocation of responsibilities is unclear for the different authorities.

#### **River Meuse: various government levels involved**

In the Netherlands the province of Limburg (regional level) has a lot of responsibilities relating to the management of the Meuse basin. However in Wallonia (Belgium), it is the Walloon Region (national level) that is responsible. The formal counterpart of the Walloon Region is the Netherlands national government, as the province of Limburg is used to communicating at local/regional level. This mismatch between government levels leads to difficulties in (formal) communication, resulting in an obstacle to coordinated river basin management.

#### *Language differences*

Different languages are sometimes regarded as an obstacle to successful cross-border cooperation, especially in relation to technical terminology, definitions and specific concepts.

#### **Three Countries Park: delays due to cultural differences**

The Drielandenpark/Parc des trois pays/Dreiländerpark is a strategic initiative for the development of a cross-border region shared by Germany, Belgium and the Netherlands. The common definition of starting points and design of future perspectives was reached very quickly. However when it came to formulating policy recommendations, it appeared that the

direct style of the Dutch written language did not match with the French and German styles. As a result the formulation of policy recommendations proved to be relatively time-consuming.

*Lack of vision on the development potential of cross-border regions*

Regional and local decision-makers are used to looking within their own territories for development opportunities. However, the potential for development and common benefits in border regions often lies in cross-border cooperation.

## 5. Solutions for improved cross-border flood management

The challenges of sustainable regional cross-border flood management have been formulated in the previous paragraphs, either as possible benefits or obstacles. The practical experiences gained in the FLAPP network show a number of basic elements that can contribute to meeting the challenges and creating solutions. Successful cross-border cooperation appears to depend on a number of factors, including:

- Understanding the problems and needs of the cross-border partners
- Understanding each other's distinctive social, cultural and economic characteristics.
- Understanding the causes of the problem in respect to natural but also social processes
- Identifying common goals and agreeing on the strategies to achieve them
- Defining compensation mechanisms such as cross-border financing or other trade-offs to balance the costs and benefits

These factors can be only reached if the partners know each other by working frequently together and have mutual access to all the relevant information, thereby creating the necessary level of confidence and trust.

This section gives an overview of possible solutions that can contribute to improved cross-border cooperation in flood management. It is based on practical experience gained by partners in the FLAPP network. This section provides practical guidance for regional and local water managers on how to generate benefits and elements that could be promoted in regional and local policy.

### *Empower regional/local water managers*

Regional and local water managers and flood risk service providers generally aim at delivering services in a way that is as economically efficient as possible. To achieve this they are willing to cooperate at a regional level. To use their mandates and (financial) resources across borders, a national framework for cross-border cooperation may be necessary. National governments and the international river basin committees can provide such a framework. The barrier effect of country borders will be reduced when regional and local water managers focus on regional and local (flood management) issues in combination with the ability to take the initiative at a regional level. This will also require regional and local funding of cross-border initiatives. A clear mandate and independence from national funding can help to promote adequate action at the regional and local levels.

### *Involve local and regional stakeholders*

Participation by direct problem owners (or potential benefit sharers) and knowledge of their interests and needs will facilitate cross-border cooperation. Consultation with local and regional stakeholders, and thorough identification of their needs, problems and priorities, is therefore needed. If solutions are to be sustainable, this process should include a wide range of different beneficiaries from different sectors.

#### **Cross-border development of the Niers river valley: selecting interested stakeholders**

Stakeholders were invited to participate in the Niers river valley project (Germany/Netherlands) before it was officially started. They received a personal letter explaining the aims and process of the project and the possible role they could play in it. The invited stakeholders all had an interest in the project because of their role in policy-making or in the execution of plans. The selection of stakeholders was based on the networks of both the German and Dutch project partners.

### *Increase public participation and awareness*

Programmes to increase cross-border awareness and education can be a starting point for cross-border action against flooding. People have to be aware that they share the same resource. Starting awareness building in schools will lead to long-term benefits. A valuable tool to increase awareness can be the mapping of flood risks in cross-border regions, and publishing the results on the internet. In addition, publicity campaigns like the introduction of a 'Day of Flood' will contribute to public awareness. To achieve sustained and successful cross-border cooperation, confidence and trust both in each other and from the public are necessary. The parties involved should therefore communicate their successes to the public.

#### **Vital Signs Ireland: educational and professional benefits**

The Vital Signs Ireland programme was developed to record information on various aspects of a river. It is used educationally by schoolchildren, while fisheries organisations use it to monitor water and fish quality in the various river catchments that straddle the Northern Ireland/Republic of Ireland border. As well as being an important science learning tool in schools, Vital Signs is also used by professionals responsible for water management, including fisheries, local authorities and industries such as farming, to measure the impact that their activities may have on local river systems. It also promotes the ethos of 'cross-border catchment care', and aims to nurture a sense of ownership and responsibility for the shared aquatic resource, thereby minimising the effects of the political border.

### *Create adequate legal arrangements*

Existing formal treaties can in some cases prove to be a sound basis for cross-border cooperation. However, reaching agreement by formulating (new) formal treaties will in general be very complicated and time consuming, and will require the involvement of many (national) institutions. Regional and local administrations can therefore use civil agreements or contracts to support political agreement on joint action.

#### **Cross-border service agreement in the Meuse**

The Flemish Region and the Netherlands have signed a 'Flow Treaty' for the river Meuse which agrees the minimum flow for the Border Meuse. In addition it has been agreed that during droughts, 'return drainage' will take place in the Meuse canals, the Julianakanaal (the Netherlands) and the Albertkanaal (Flanders) to ensure an adequate water level for navigation. However, return pumps are not available in the Albertkanaal. The return pumps of the Julianakanaal are therefore being used for both the canals. The Flemish Region pays the Dutch government if this service is needed.

### *Include the insurance industry in flood management*

Including the insurance industry in flood management is important for two reasons. First of all it will provide the necessary funding for the recovery phase of the risk management cycle. And secondly, insurance companies have more direct access to home owners and can demand prevention measures when setting the level of insurance premiums. If flood damages are covered by state funds, there are no incentives for those in the private sector to minimise their own risks. All natural hazards should be incorporated in a single contract, since most hazards like flood, storm, earth slides, hail and heavy rainfall generally occur in the same event, which makes it difficult to separate out the damage that corresponds directly to the insured hazard. Since every place is exposed to some natural hazard, the creation of a larger (cross-border) insured community leads to lower premiums.

#### **Flood insurance in the UK: cooperation between government and insurance industry**

In the UK, insurance companies and governmental agencies cooperate, each with its own specific role. The government is primarily responsible for taking preventive measures (e.g. spatial planning, planning of residential areas) and protective measures (e.g. dykes, retention areas) in flood-prone areas. The insurance industry advises and supports the government on the nature of these measures. Communication about measures and their effects on flood risks, for example using risk maps,

is a joint responsibility of the government and the insurance industry. The main task of the latter is insuring flood risk, with premiums and coverage based on the government's actions and flood risk information. In addition, insurance companies can of course use other variables to define insurance premiums, for example demands in relation to the design of houses.

#### *Involve the decision-makers from the beginning*

As long as no flood disaster happens, flood management is a relatively abstract issue for decision-makers. Experts therefore need to communicate with regional and local decision-makers about the possible impact of floods, their projects and the benefits of cross-border cooperation in flood management. It is essential that the theme of flood management is explained in language that can be understood by everyone.

#### *Explore mutual benefits and coordinating flood management policy goals*

Flood management issues represent just one field of interest in specific (cross-border) regions. By following a holistic approach in which these issues are integrated or combined with other issues in the region, additional benefits or new opportunities may emerge. This can lead to a better balance between different interests, and to synergies between different disciplines. An open discussion about and respect for each other's policy goals for flood management, and identifying possible mutual benefits, can contribute to a thorough understanding of each other's interests. It provides a basis for coordinating flood management goals. For example it will be important to assess the damage potential in an entire river basin, and to coordinate approaches to upstream and downstream safety levels.

#### **Three Countries Park: projects based on a common vision**

Many cross-border contacts already existed in the countryside area between the cities of Maastricht, Heerlen (Netherlands), Hasselt (Flanders), Liège (Wallonia) and Aachen (Germany). For technical, financial, political and cultural reasons it was decided to develop these contacts within the framework of a single project: the Three Countries Park. Concrete projects were defined on the basis of an integrated common vision (on the economy, cultural heritage, nature and environment, agriculture and water management). Where possible, various disciplines were addressed in these projects. Cross-border cooperation and the multidisciplinary approach made it possible to carry out developments within logical or natural borders instead of administrative borders. Another advantage was that certain initiatives were only possible if the scale of investments was large enough.

#### **From Border Meuse to Common Meuse: mutually beneficial strategies and solutions**

Belgium and the Netherlands acknowledged the need for cooperation for their Common Meuse, which forms the border between the two countries over a length of 42 km. They both stressed the challenge of finding mutually beneficial strategies and solutions. They therefore defined five principles of cooperation, that respect both this challenge and national sovereignty and policies. The principles are:

- *Principle 1.* Definition of common objectives and shared vision on end-results
- *Principle 2.* Definition of a common reference situation
- *Principle 3.* Definition of multiple objectives
- *Principle 4.* Dealing with negative effects
- *Principle 5.* Cross-border optimisation and cost-sharing

#### **Aragon River Management Plan: nature conservation and flood management**

The Aragon River Management Plan (Spain) is an example of flood prevention measures based on a nature conservation initiative. The plan addresses the conservation and restoration of habitats and species in this Natura 2000 site. It is understood that the conservation of the key elements of the site requires a holistic approach to river management. The proposed measures therefore include spatial arrangements for the flood plain – for example the removal of the dykes that constrain natural flood plains to provide space for the river, and the land use changes necessary to restore natural flood plains for nature development and flood prevention.

**ELLA: spatial planning and flood management**

A cross-border flood risk management strategy has been developed in the Elbe river basin (Germany/Czech Republic) with emphasis on spatial planning under the Interreg III B project ELLA. The strategy is based on an analysis of existing concepts, programmes and legal frameworks for flood protection and spatial planning in the respective countries of the Elbe river basin.

*Agree on standards for model and calculation outputs*

In many cases, countries use their own standards for calculation methods and models. However, agreement on data transfer and compatibility of models will form a common basis for assessing the situation in the river basin. Potential measures can be discussed on their merits, without conflicts about the calculation of their expected effects.

**From Border Meuse to Common Meuse: joint assessment of plans and measures**

For managing the Border Meuse, Flanders and the Netherlands developed their own plans. They decided on a joint assessment of these plans by starting a 'cumulative research' programme into the effects and mutual impact. The research started with commonly accepted calculation methods and models. The research and underlying methods and models are still used by both countries to assess their own and each other's measures, to find joint solutions for possible side effects and to look for ways to reinforce each other's measures.

*Promote cross-border exchange and informal communication*

Development of cross-border cooperation networks among all the involved institutions along the border may create insight into each other's organisational structure, and make it clear who is responsible for what. Providing those institutions with political support will strengthen regional cross-border structures and networks. In addition, cross-border networks will facilitate information and knowledge exchange. Such networks can aim at:

- Sharing and cross-referencing of information and knowledge
- Joint research and policy development
- Temporary exchange of personnel between organisations

**East Flanders (B) Provincial Safety Cell involves representative from Zeeland (NL)**

The East Flanders Provincial Safety Cell (the coordination centre of the Governor) in Belgium organises monthly formal meetings to discuss current issues in the field of public safety and contingency planning. As well as the Belgian partners, a representative of the adjoining Dutch province of Zeeland also participates in these meetings. The East Flanders Provincial Safety Cell also operates when there are major incidents and disasters. The Zeeland representative will be alarmed and called to the meeting if cross-border issues arise or cross-border communication is needed. If there are emergency situations in Zeeland with cross-border effects, the representative starts the contacts with East Flanders immediately. As well as the contacts in the Safety Cell, the chairman of the Safety Cell and the Zeeland representative cooperate in a number of cross-border and European projects. They have each other's mobile phone numbers and contact each other weekly. Both East Flanders and Zeeland organise introductory internships for operational officers of the emergency services on both side of the border. This is a good example of how knowing each other in advance is a big advantage for working together in a crisis.

*Build confidence: start cooperation at project level and improve cooperation in step-by-step processes*

Discussing cross-border flood management between experts at an early stage appears to result in fewer obstacles to cooperation than discussions at the policy level. Developing (small) common flood management projects can therefore be a simple first step in successful cross-border cooperation, that will at the same time lead to improved flood management. In addition, cross-border actions (plan development, implementation etc.) must take place in a step-by-step process. The advantage of this

will be that participants in the process are able to familiarise themselves with (possible) differences in procedures, structures and culture. A further benefit of a step-by-step process is that it will allow the pros and cons, success factors and obstacles to be evaluated at each step.

**Evros River: online real-time meteorological and hydrological data**

In the Evros – Maritsa – Meriç basin (Greece/Turkey/Bulgaria), Turkish professionals plan to provide their Greek and Bulgarian counterparts with online real-time meteorological and hydrological data. This will allow them to analyse the data and gain useful results as input for flood mitigation models.

**Upper Tisza monitoring system: advance warning and cross-border cooperation**

The Hungarian-Ukrainian observation network in the Upper Tisza basin creates two main benefits: on the one hand it provides accurate forecasts giving as much advance warning as possible, which can be used for disaster prevention in both countries. And on the other hand it makes it possible for cross-border counterparts to get to know each other, thereby providing a basis for cooperation on further steps to improve flood management.

**Cross-border development of the Niers river valley: step-by-step execution**

Water authorities on the German and Dutch sides of the border had the common objective of ecological and hydrological rehabilitation of the cross-border river the Niers. In achieving these objectives, the following factors were experienced as crucial:

- *Interactive* plan development: creating a joint vision through participation of a variety of stakeholders. Stakeholders were invited personally before the project was officially started.
- Step-by-step plan execution by means of pilot projects. It was not possible to take measures everywhere at the same time in such a large area, because of local resistance, fear of unforeseen effects etc. To promote the execution of the plan, a pilot project was developed: a relatively small area of flood plain in which certain measures could be taken since the land was already acquired during the planning process.

**Elbe Atlas: flood maps support cross-border discussion**

A cross-border flood map atlas for the Elbe river (Germany/Czech Republic) has been produced under the Interreg III B project ELLA. The atlas helps to identify and assess the flooding risk of urban areas along the Elbe river. The flood maps also support cross-border discussion of appropriate flood protection measures.

*Recover costs of flood management services*

The operational and maintenance costs of flood management services need to be recovered from the local or regional beneficiaries. This means that those beneficiaries should also have a say in the flood management service policy. This can strengthen local or regional decision-making for cross-border service delivery. It also means that the beneficiaries should pay either directly or indirectly for services across borders if they benefit from them.

*Explore additional financial resources for regional flood management services*

The benefits of flood management services can lead primarily to regional or local benefits. As stated above, the costs of these services should be recovered (at least for maintenance and services) from the beneficiaries. However, the function and development of border regions is also of national interest, and a basic European principle is solidarity. Regional and local water managers should therefore explore the possibilities for co-financing of the initial investments by national governments or the EU for their cross-border initiatives.

*Introduce regional cross-border finance mechanisms*

Measures on one side of the border (e.g. upstream) can lead to benefits on the other side. Regional and local administrations should look for measures that will have a common effectiveness across their

borders. In some cases it will be more cost-effective for a country to invest in measures on the other side of the border. In those cases regional and local administrations should agree that the beneficiary region will pay for the initial costs of measures, unless the other government should have taken them anyway. This can help in the implementation of measures that may not benefit the one region (upstream) at all, but have large benefits for the other (downstream), or in the implementation of effective interventions that are too expensive for one country to bear alone.

**From Border Meuse to Common Meuse: cross-border cost-sharing**

Cooperation Principle 2 of the Border Meuse agreement between Belgium and the Netherlands ('Definition of a common reference situation') states that any measures taken should not have an adverse effect on the water levels in comparison with the year 1995. In the Border Meuse project, the Netherlands lowered the water levels everywhere, except for two locations where the water levels increased. Because there was no space on their own river bank to mitigate this effect, the Netherlands financed projects on the Belgian river bank.