

CASE STUDY - RHINE, GERMANY

WATER SAFETY

A TOP PRIORITY ALONG THE UPPER RHINE

*With reference to the Room for the River conference with the keynote speech given by:
Stefan Hill**

■ An approach to countering pollution of the Rhine has resulted in the well-oiled international river management of the entire Rhine River. Following the extremely high waters of 1995, this international approach was applied to water safety as well. Rhine states have already invested 12.5 billion Euros in dike reinforcement, the construction of retention areas, warning systems and the composition of risk charts. The German state Rheinland-Pfalz, responsible for the left bank of the Upper Rhine, has provided an important contribution to water safety by constructing ten large retention areas along the old river meanders. The International Rhine Commission expects far greater retention capacity to be required by 2020 in order to continue to guarantee water safety along the Rhine.

Geographical Context

■ At 1233 km, the Rhine is the longest river of Europe. The river flows from its source in the Swiss Alps to the Bodensee as the Alp Rhine, continues to Basel as the High Rhine, and to Bingen/Mainz as the Upper Rhine. After passing through the Eifel Mountains as the Middle Rhine, the river continues past Cologne as the Lower Rhine. At Lobith, the Rhine crosses the border into the Netherlands with an average discharge rate of 2000 m³/s, and ultimately finds its way to the North Sea via the Waal, Lek and IJssel rivers.

The Rhine is a centuries old trade route for Switzerland, France, Germany and the Netherlands. Many trading posts along the river grew into big cities. As a result, the Rhine has become constricted, and any sustained period of rain quickly results in elevated water levels and flooding. Tall dikes have been built along the Upper and Lower Rhine in order to prevent such flooding.

Many German cities along the Rhine, such as Mainz and Cologne, use Rhine water as a source of drinking water. In the Netherlands, potable water for almost the entire Randstad urban area comes from Rhine water. The dumping of huge amounts of waste water by households and industries in the 1960s and '70s resulted in massive fish kills. The Rhine was soon

dubbed “the sewer of Europe”. Even though the Rhine states had been in close contact since 1950 to decide on strategies to counter pollution, it took dozens of years for water quality to improve significantly. In November 1986, a great deal of toxic fire extinguishing water flowed into the Rhine following a fire at Swiss chemical concern Sandoz. In the span of ten days, a toxic cloud traveled from Switzerland to the North Sea and left a completely dead river in its wake. The Ministers of the river states convened immediately, and decided on a Rhine Action Plan with the goal of cleaning up river water by 2000 to the extent that the river salmon could be reintroduced. In several places, this goal has already been achieved.

International consultation about pollution also resulted in international decisions about flood protection.

Flood History and Risk Perception

Many cities along the Rhine are extremely aware of the flood risks posed by the Rhine. In Cologne and Koblenz, water routinely reaches the doorstep of homes, and mobile flood walls are required to hold back high waters. In 1995, the situation became extremely critical, and downtown Cologne was submerged under two meters of water. In the Netherlands, 250,000 people were evacuated as a precautionary measure.

* Dr. ing. **Stefan Hill**, President of the Environmental Agency of the state of Rheinland-Pfalz.

In response to extremely high waters, the Ministers of all the Rhine states gathered in 1998, and reached an agreement called the Action Plan on Floods, with the goal of reducing water levels by 30 cm. This would result in a reduction of flood risk by 25%.

In the Netherlands and Germany, the realization began to take hold that there was a downside to building ever taller dikes. If a very high dike were ever to fail, the height of the river would result in the release of a powerful mass of water, which would result in considerable damage as well as potential casualties near the dikes. For this reason, the preferred choice in recent years has been for river expansion measures, such as the construction of secondary channels and retention areas.

Jurisdictional Responsibility

Ten states are situated along the banks of the Rhine, each with its own sovereign responsibilities regarding river management. The protection of national interests had stood in the way of free shipping routes, and in 1815 this resulted in the establishment of the Central Commission for the Navigation of the Rhine. This commission is considered the oldest international governmental organization in the world. During the 50s, the quality of Rhine water deteriorated to such an extent, that the Rhine states decided to establish the International Rhine Commission. Unique to Germany, individual regional governments along the trajectory of the Rhine are also represented, in addition to the national Ministry for the Environment. The International Rhine Commission has grown into the universally acknowledged representative of the entire trajectory of the Rhine. Initially, the primary goal was to improve water quality, but since 1995, protection against elevated water levels has also become a priority. All Rhine states coordinate their national flood plans through the Rhine Commission.

Additional Safety

The German state Rheinland-Pfalz is currently undertaking dike reinforcements along the Rhine that are not a direct consequence of the extremely high water levels of 1993 and 1995. Rheinland-Pfalz is

responsible for river dikes on the left bank of the Upper Rhine, from the border with France to Bingen/Mainz. Those two high water situations occurred within such a short time span that, as in the Netherlands, German water managers became aware of the necessity of more stringent water management strategies. For the government of Rheinland-Pfalz, this resulted in the decision to increase water safety along the Rhine to an estimated flood risk of once every 200 years. With this, the state decided on water safety measures far more stringent than required by German law, which prescribes a flood risk of only once every 100 years.

Three Types of Measures

The Ministry for the Environment of Rheinland-Pfalz is responsible for the implementation of measures to increase water safety for the Upper Rhine area. This concerns three types of measures. The most conspicuous concerns substantial widening and heightening of all dike surfaces along the Rhine. The second measure is the creation of additional space for the river by moving dikes back from the banks. This will take place in four areas. Finally, the state will create 10 water retention areas with a total storage capacity of 62 million cubic meters.

Treaty with France

By 2013, all planned water retention areas in Rheinland-Pfalz must be operational. Several areas are already in use, and this means the state has the greatest water retention capacity of all the German Rhine states at its disposal. This is a consequence of the fact that the Upper Rhine is exceptionally well suited for large-scale retention, due to its many unused meanders. The old meanders are lightly populated, and therefore especially qualified for retention areas.

The construction of retention areas is also part of a treaty with France and the neighboring provinces of Hessen and Baden-Württemberg for the implementation of 288 million cubic meters of retention capacity. The construction of dams with hydroelectric power plants along the French-German Upper Rhine in 1977 resulted in a diminished water safety situation. The treaty was signed in order to compensate for that effect through additional water retention capacity.

Aktion Blau

In addition to construction work along the Rhine and its tributaries, Rheinland-Pfalz started the program Aktion Blau in 1995. The program is ongoing, and is focused on including the improvement of ecology and safety of all surface and ground water in every administrative decision made. These guidelines are applicable to ministries, district governments, municipalities, and residents, and manifest in four main activities:

COMPARING WATER GOVERNANCE: GERMANY VERSUS THE NETHERLANDS

The approach by the International Rhine Commission regarding water quality in the 1960s and '70s has resulted in collaboration between the Netherlands and Germany, and excellent coordination of river management plans. In Germany, individual provinces are responsible for flood risks along the Rhine, which sometimes results in tensions between them.



The Rhine River between Mainz and Bingen (source: Archangeli, www.flickr.com)

- Development of user manuals and methods for the creation of maps, eco-morphological evaluations, etc.
- Communication, such as the publication of water atlases and newsletters.
- Development of concepts for such undertakings as restructuring.
- Supervision of actual implementation.

Altering Discharge Regime

According to the International Rhine Commission, the Netherlands, Germany and France have spent nearly 12.5 billion Euros on water safety along the Rhine since 1995. The Rhine Commission concluded that climate change is already having measurable impact on the discharge regime of the Rhine, and expects up to 20% greater discharge in winter and 10% lower discharge in summer months by mid-century. According to the commission, the projected water retention capacity of 362 million m³ by 2020 will be insufficient. As a result, additional water retention areas will be required after 2020. The commission has estimated that required capacity will eventually reach 535 million m³. The International Rhine Commission is currently setting up a flood risk management plan that – in

agreement with the EU Flood Directive – must be ready as a draft in 2014, with a final version in 2015. The current Action Plan on Floods will then become obsolete. ■

SOURCES LISTED BY GUEST SPEAKER AND REVIEWER:

- 1] <http://en.wikipedia.org/wiki/Rhine>
- 2] http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/rhine2.pdf
- 3] <http://geographyfieldwork.com/RhineEffects1.htm>
- 4] ICPR (2001), Rhine 2020, Program on the sustainable development of the Rhine. Last visited on 7 October 2012. http://www.iksr.org/fileadmin/user_upload/Dokumente_en/rhein2020_e.pdf
- 5] Jones-Bos, R., D. Morris (2011), Room for the River, From Flood Resistance to Flood Accommodation. Presentation. Last visited on 7 October 2012. <http://www.slideshare.net/DutchEmbassyDC/room-for-the-river-presentation-2011>
- 6] <http://www.iksr.org/index.php?id=309&L=3>
- 7] http://www.iksr.org/index.php?id=191&L=3&tx_ttnews%5Btt_news%5D=775

Additional internet sources used for this article:

Aktion Blau: <http://213.139.159.67/servlet/is/8380/>