

CASE STUDY - MISSISSIPPI, USA

CHANGING FROM FEDERAL GOVERNMENT TO PUBLIC-PRIVATE RIVER MANAGEMENT

*With reference to the Room for the River conference with the keynote speech given by: Steve Mathies, Ph.D.**

■ The Mississippi river has broken two records over the last two years. In 2011, the highest water level ever recorded was measured. In 2012, the rainfall in the drainage basin was the lowest recorded over the previous 50 years. Flood protection and the navigability of the river have always been the responsibility of the U.S. Army Corps of Engineers. The extreme drought in 2012, however, made it clear that management of the Mississippi River does not stop at flood protection and navigation, but also includes the supply of fresh water to half of America and the many resources that depend upon it. A recently started citizen's initiative is aiming for a public-private partnership involving many interest groups.

Geographical context

■ The drainage basin of the Mississippi River is the third largest in the world and takes in 32 states in the U.S. and two Canadian provinces. The Mississippi River system has over 19,000 kilometres of navigable stream with a depth of at least 2.7 meters. The Mississippi starts in the north near Minneapolis, Minnesota, to the west of the Great Lakes. Another great river, the Missouri, joins at St Louis, Missouri. The Ohio River joins a little further downstream at Cairo, Illinois. The Ohio River provides a link with the heavily industrialised north-eastern part of the United States and the upper Mississippi and Missouri Rivers connect with the vast grain producing area of the central U.S. From Cairo south to New Orleans and the Gulf of Mexico, the Mississippi River serves as America's most important marine transportation corridor. The average river discharge rate is 16800 m³/s, sometimes rising as high as 86800 m³/s or falling as low as 4500 m³/s.

The characteristics of the upstream and downstream parts of the Mississippi differ greatly. The Upper Mississippi is dominated by 43 dams and 196 navigation locks that strongly influence the flow of the river. Despite this, the river remains natural to a great extent and flows through three national parks. Runoff

from agricultural growing areas accounts for elevated nutrient levels in the river and in turn adversely impacts water quality.

The Middle Mississippi is a relatively short section of 310 kilometres flowing between St Louis and Cairo. The drop is limited and the river flows freely. The Lower Mississippi, so-called 'mighty' Mississippi, is actually the downstream section below Cairo that flows for nearly 2000 kilometres. This is the domain of the enormous barges, pushing their cargos of coal and grain down the river to New Orleans, barge tows sometimes numbering up to 40 barges. Every year virtually the entire grain harvest from mid-America is transported on the river to New Orleans for shipment to the rest of the world. Nearly 600 million tons of cargo utilize the river on an annual basis. In addition, according to the U.S. Environmental Protection Agency, more than 50 cities rely on the river for their drinking water needs.

Flood history & risk perception

The dangers of flooding are well understood along the Mississippi River. In 1993, the Upper Mississippi flooded 72,000 homes. There were 50 casualties and the damage amounted to \$15 billion. In 2011, it happened again with the Lower Mississippi reaching

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Flood marks on the floodwall along the Mississippi in Vicksburg (source: Wilfried ten Brinke)

record heights. By executing their flood protection system, the river flooded 2.6 million hectares of land, but the U.S. Army Corps of Engineers (USACE) managed to control dangerous high water levels and avoid flood damage to major cities including Memphis, Baton Rouge and New Orleans. Execution of the flood control plan required removal of certain lower level dikes and operation of several floodways. Operation of the system as designed resulted in repair needs once the flood threat passed. These repairs are estimated to cost between \$2 and \$4 billion. There were no casualties as a direct result of the record flood of 2011.

The Lower Mississippi has many dikes along it and at various locations 'bypasses' and 'spillways' have been constructed which can be opened to lower the water levels. The USACE has been using the "Room for the River" principle for many years and has utilized overflow areas at various locations. The discharge capacity over the entire length of the river is properly coordinated and the general protection level is based on an event once in every 100 years. This does not apply to the Upper Mississippi. There has never been a clear plan for this section of the river and the level of protection differs from city to city.

Jurisdictional responsibility

Flood protection, more accurately referred to as flood risk reduction, along the Mississippi River is controlled,

funded, and administered at a national level and is the responsibility of the USACE. In addition to flood protection, the USACE is also responsible for ensuring adequate water depths for navigation. This dual responsibility was specifically granted to the Mississippi River Commission by the U.S. government in 1879. In the initial years, the emphasis was on increasing the navigability of the river. Only after the catastrophic flood of 1927, when the existing levees were breached at 147 places, 6.8 million hectares flooded and 246 people lost their lives, more robust structural measures were authorized to provide flood protection. On the basis of the 1928 Flood Control Act, \$325 million was made available for an extensive dike rebuilding plan at that time.

In May 2011 the safety situation was just as critical as in 1927. It emerged in the final report published by the Mississippi River Commission a few months after the extreme high water levels, that the USACE were able to keep everything fully under control. The report shows on a day to day basis precisely what happened and which decisions were taken to keep the river navigable for as long as possible and also to prevent flooding in residential areas.

Incomplete integration

Management of the Mississippi by the USACE is based on the Flood Control Act (1928) and also

the Mississippi River & Tributaries project (1928) emanating from it. Since that time the USACE has, with funding from the federal government, spent \$14 billion on structural levee protection and building facilities for inland shipping. The discharge capacity of the Lower Mississippi has been increased by 11% to 66800 m³ per second. According to the USACE, this has prevented \$430 billion of damage, equalling a return on investment of 30:1.

Despite this, the situation is still not perfect, because the 1928 safety plan is limited to the downstream area of the Mississippi River. Upstream the Mississippi and the great tributaries of the Missouri and the Ohio are the responsibility of other divisions and there is no common systematic harmonisation with respect to safety levels or management of the entire Mississippi River watershed as a system.

The Upper Mississippi River Comprehensive Plan was published in February 2008 and it details a strategic vision for the Upper Mississippi and the Ohio rivers. The most striking part of the plan is the proposal to give the entire upstream area a safety level of once in 500 years for urban areas and once in 200 years for rural areas. The plan has not been officially accepted by USACE and the senate has called the plan prohibitively expensive.

Drought record

Following the record high flood of 2011, a record drought and resulting low water was recorded in 2012. By some accounts, there has never been so little rainfall in mid-America over the last 50 years. Again the USACE took action and worked tirelessly to maintain navigation despite the low water levels.

The drought resulted in renewed interest in the Mississippi River and its tributaries as a source of freshwater. Many towns and farming communities, as well as coastal restoration interest in areas adjacent to New Orleans and across southern Louisiana, have voiced the need for future river management from a broader more integrated approach to ensure that the many services provided by the river are continued to be met in years to come. To that end, in September 2012, twenty mayors met in St Louis and called on the U.S. government to provide funds for flood protection,

sustainable development, and the ecological restoration of the river and coastal Louisiana.

Public initiative

The USACE is facing a number of high costs for the renovation of some outdated shipping locks. Furthermore, maintaining flood protection levels, management of the larger freshwater reserves, and the ecological restoration of the river and coastal Louisiana are all going to cost a lot of money. A group of citizens from the business world, civil engineers, science and nature groups have come together to set up America's Great Watershed Initiative (AGWI). According to the initiators, virtually all interest groups are already convinced of the importance of the river for citizens, the economy and the natural environment. According to them the only thing still missing is a shared vision and authority and funding for its implementation. The AGWI steering committee, with support from Nature Conservancy and USACE, are now working on a 100 year vision in which local, regional and federal interests are aligned in the areas of industry, agriculture, fishing, energy supplies, ecosystem restoration and nature conservancy. One of the aims of the initiative is to set up a public-private partnership that maintains contact with all the interest groups and ensures wide-ranging, integral river management. ■

SOURCES PROVIDED BY THE GUEST SPEAKER:

- 1] http://en.wikipedia.org/wiki/Mississippi_River.
- 2] http://en.wikipedia.org/wiki/Mississippi_River_floods.
- 3] Mississippi River Commission (2007), The Mississippi River & Tributaries Project. Information Paper 2007. MRC: Vicksburg, http://www.mvd.usace.army.mil/mrc/mrt/docs/Project_Flood_info_paper.pdf.
- 4] USACE (2008), Upper Mississippi River Comprehensive Plan, Main Report, US Army Corps of Engineers: Rock Island, St. Louis and St. Paul.
- 5] UMIMRA (2011), The Upper Mississippi River Comprehensive Plan for Flood Control. <http://www.umimra.org/documents/CPFactSheetFeb2011.doc>.
- 6] http://en.wikipedia.org/wiki/Great_Mississippi_and_Missouri_Rivers_Flood_of_1993.
- 7] http://en.wikipedia.org/wiki/2011_Mississippi_River_floods.
- 8] Black, R., B. McKenney, A. O'Connor, E. Gray and R. Unsworth (1999), Economic Profile of the Upper Mississippi River Region. Industrial Economics: Cambridge, Massachusetts. http://library.fws.gov/Pubs3/economicprofile_miss99.pdf.
- 9] Black, R., S. Hutchison and C. Warshaw (2004), Economic Profile.

Additional sources used in this article:

History of the Mississippi: <http://www.mvn.usace.army.mil/pao/bro/misstrib.htm>

America's Great Watershed Initiative:

<http://www.agwi.org/>

WATER GOVERNANCE COMPARISON: THE US VERSUS THE NETHERLANDS

In the U.S., the management of large rivers is of national importance and is entirely the responsibility of the U.S. Army Corps of Engineers. The river management is typically biased towards civil engineering and is aimed at structures to benefit navigation and provide flood protection. The budget made available on a yearly basis by the national government is based on current political priorities.