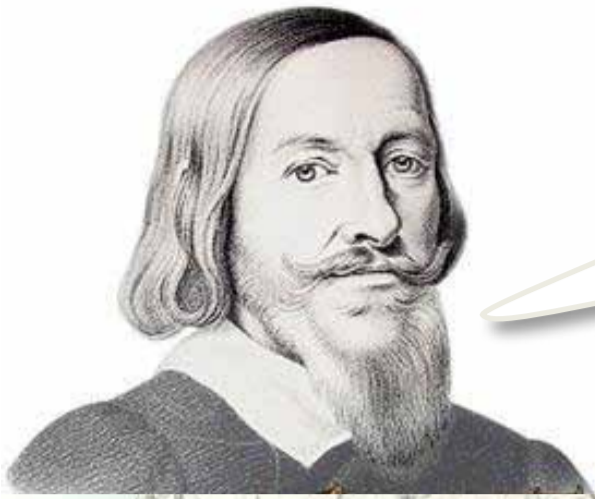


The floor of the naturum visitor centre is 4 metres above sea level – high enough to make sure your feet stay dry at all river levels. That's the way we need to build in the wetlands.

Photo: Sven-Erik Magnusson

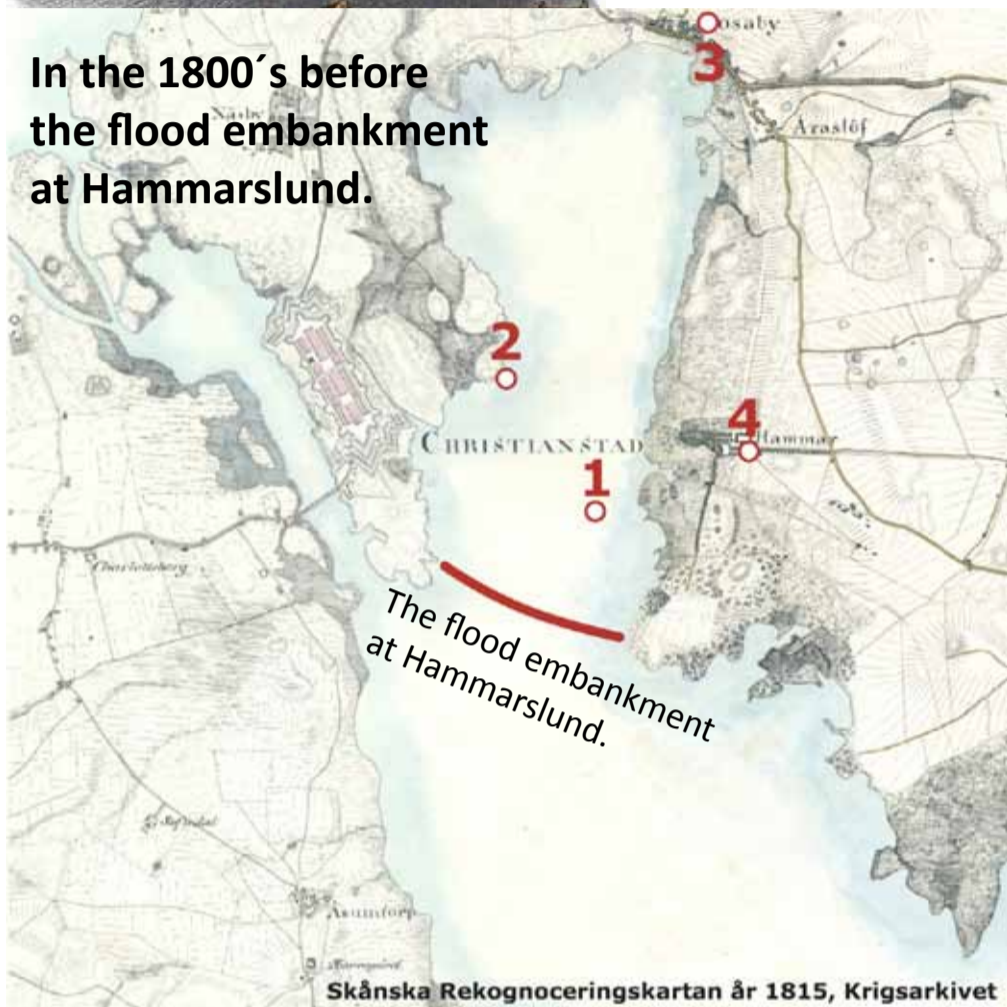
In the heart of the wetlands

Water provides plenty of opportunities for wonderful experiences in rich natural settings. But at the same time it presents us with a challenge: how to protect against flooding. A bringer of benefits and a poser of challenges. That's what water means to those of us who live in the wetlands.



'The wetlands are the moat that protects my town!'
*King Christian IV of Denmark,
who founded Kristianstad
in 1614*

In the 1800's before the flood embankment at Hammarslund.



1. Lowest point in Sweden, 2. Hospital, 3. Church in Nosaby, 4. House of Hammar

How come it's like this?

Denmark's King Christian IV (1577–1648) founded the town that bears his name in the middle of marshlands.

The boggy ground provided protection against attacks from the Swedish army.

In the 1860s Kristianstad needed more arable land. The Englishman, John Milner, was called in to drain parts of Lake Hammarsjön.

Today the hospital, the water treatment works and the lowest point in Sweden are all on what once was the lake bed, almost 2.5 metres below sea level.

Ice-skaters on Åsums ängar.



Photo: Karin Magntorn

Water – a source of diversity

Variations in water level in the River Helge å are reflected in the changing appearance of the surrounding countryside. In winter the ice on the seasonally flooded grasslands is ideal for skaters. Later in the year, as the water subsides, the same grasslands offer good summer pasture and provide a home for countless plants and animals. You can follow the changes in water level on the posts outside the naturum visitor centre, on the Kristianstad Vattenrike Biosphere Reserve homepage and on <http://floodwatch.kristianstad.se/>.

The floodbank by Finlandshusen
south of Tivoli Park.



Photo: Michael Dahlman, C4-teknik

Embankments and pumps

A ring of floodbanks and pumping stations is being built around Kristianstad to protect the city from flooding.

We are building to withstand the combined effect of:

- a water level in the River Helge å that is approximately 3.7 metres above sea level
- a flow of 527 m³/s in the river at Torsebro
- a sea level 2 metres above mean sea level.

An extreme event such as this

is expected to occur only once every 10,000 years.

The Allöverket CHP plant supplies district-heating to municipal buildings and residential properties.



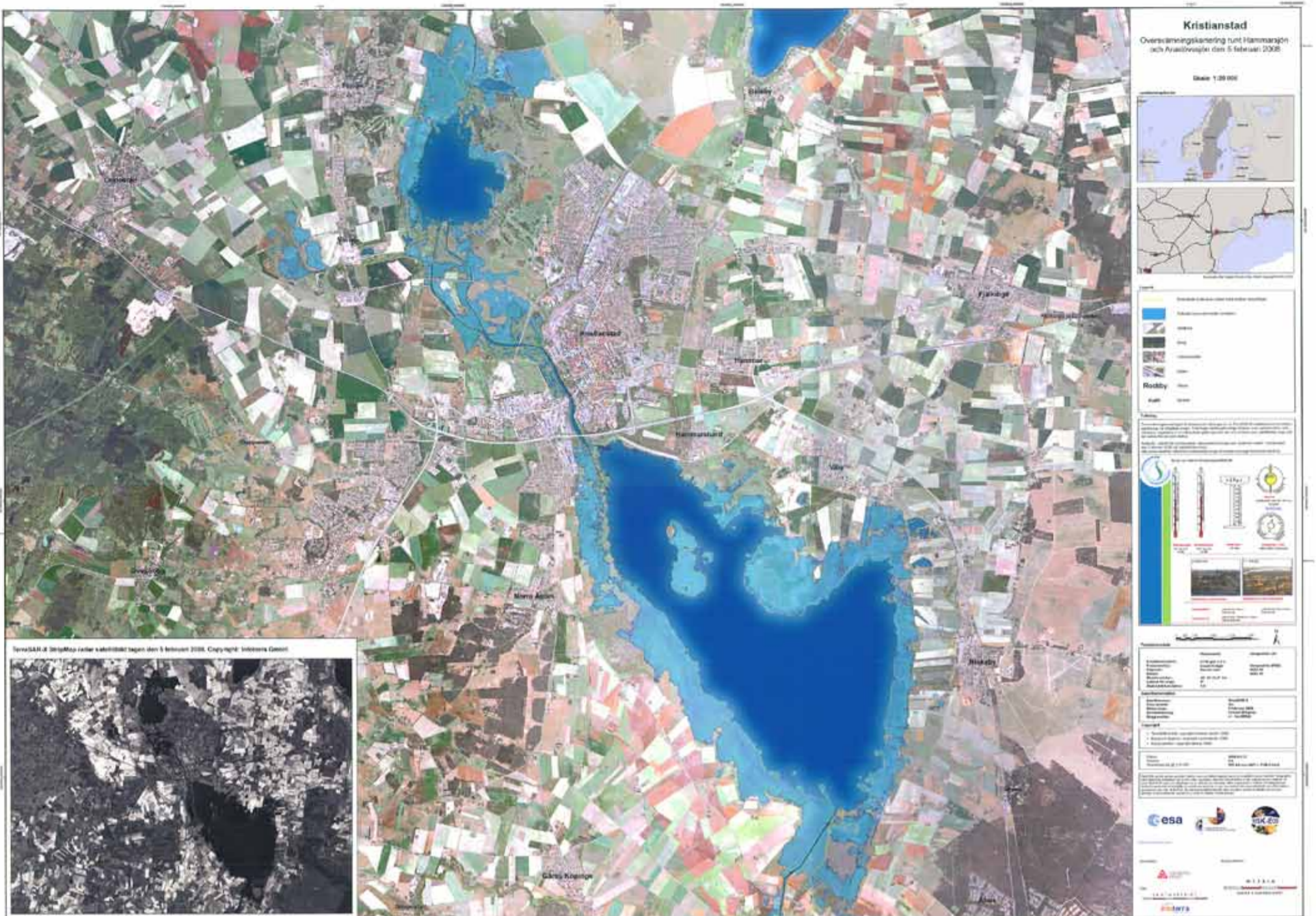
Photo: Lars Carlsson

Reducing climate impact

Higher temperatures are expected to lead to rising sea levels and increased precipitation. This means that high water flows are likely to be more common in the river.

Reducing climate impact is part of the long-term strategy that has been adopted to protect Kristianstad against flooding.

Climate-friendly initiatives include the use of biogas, district-heating, wind power and climate-smart transport solutions.



Just an ordinary day

The light-blue marking on the map shows how things can look when the water level is 1.21 metres above sea level on a winter's day in February.

In the winter months the water level in Kristianstad is frequently around 1 metre above sea level.

In summer the water level is often just above sea level.

Björkhäll, Hovby



Photo: Sven-Erik Magnusson

Water level in the River Helge å 1,92 meters above sea level.



Photo: Sven-Erik Magnusson

Water level in the River Helge å 0,2 meters above sea level.

Håslövs ängar, Brudasten



Photo: Sven-Erik Magnusson

Water level in the River Helge å 1,09meters above sea level.



Photo: Sven-Erik Magnusson

Water level in the River Helge å 0,15 meters above sea level.

Kristianstad – A role model city for Disaster Risk Reduction



The United Nations has accepted Kristianstad as a role model in the campaign Making Cities Resilient. This means that the municipality is a model for prevention and management of natural disasters. The city's combined work to prevent flooding will inspire cities across the world.

The Chairman of the City Council in Kristianstad, Sten Hermansson received a certificate from Margareta Wahlstrom, the Special Representative of the United Nations Secretary-General for Disaster Risk Reduction in November 2011.

It's an honor to be recognized for our success in the DRR work we have done. However it is also a commitment, he says. The Municipality of Kristianstad

was early to invest in environmental sustainability, in our case biogas. After the flooding in 2002 the work that had already begun was intensified. This included building dikes, pump stations, early warning systems and ecosystem protection.

-Now we have to continue to work and be prepared to show others how it can be done, says Sten Hermansson.

The distinction of Biosphere Reserve in 2005 was a positive step in the municipalities work to plan and develop the city in harmony with nature.

-We have to adapt to the conditions that exist due to increased water. Everything is connected, says Sten Hermansson.

How does Kristianstad Municipality become a resilient city?



If we do not undertake mitigating actions, we will not be able to protect the town should the water in the Helge River rise too high. Kristianstad's Emergency Services Department wrote about this in their risk analysis in 1999. Extensive work started. You have to prepare for a disaster, act in a crisis and recover afterwards.

-We need to be better prepared than most, because of the city is located in a vulnerable position, said fire engineer Anders Pålsson. In 1999, flood risk was included in the city's risk analysis. The municipality's city council realized the seriousness of the risk, decided about the mitigation actions and in 2001, began construction planning.

During the 2002 floods, large parts of Tivoli Park were under water. This intensified the need for protection. A construction company started building dikes and pumping stations. The municipality identified the need for 10 km ramparts and six pumping stations to stop the water. The work was estimated to cost at least 300 million Swedish kronor.

-The flooding of New Orleans in 2005 meant that we became even more convinced of the serious risk that our municipality faced. We also saw the tough process for the municipality to recover after a disaster, says Anders Pålsson. Efforts to create a resilient city include also being prepared to respond to a disaster and recover

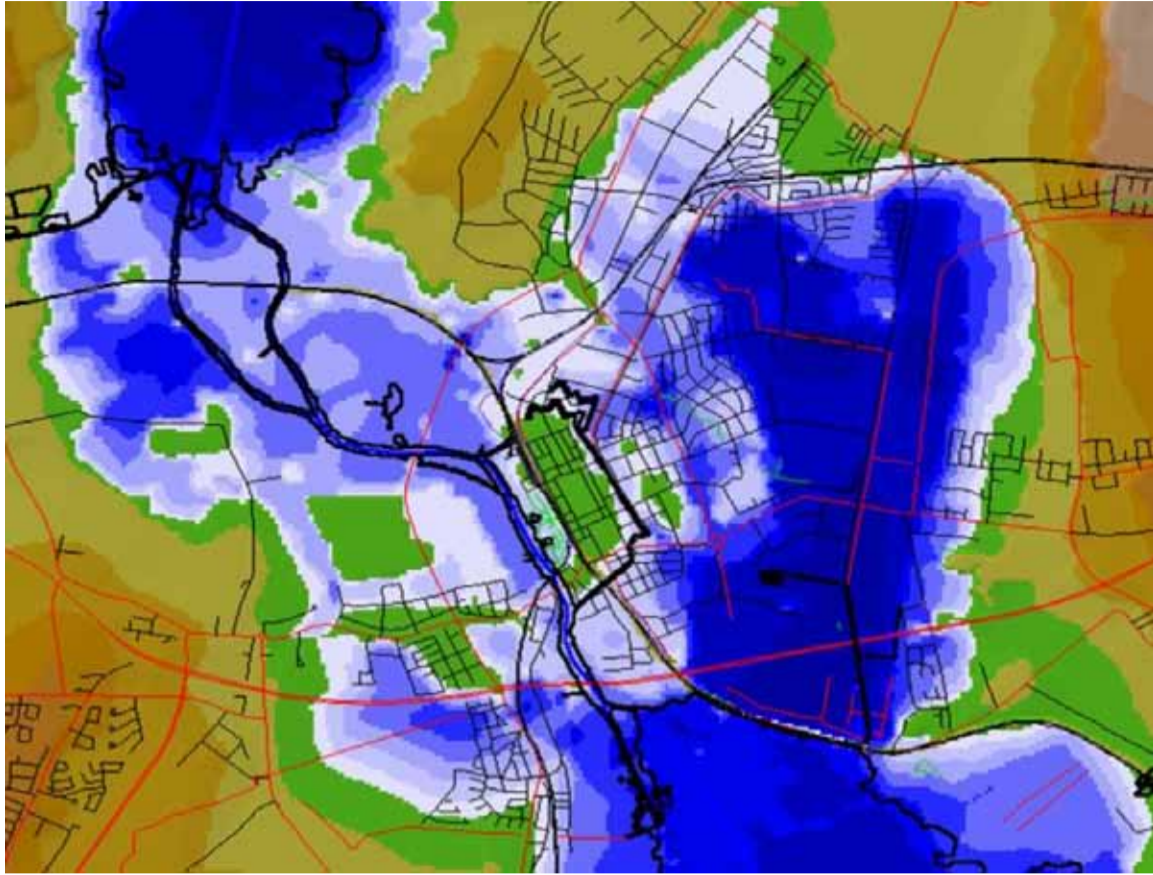
ering well. Strategies and exercises based on realistic scenarios have sharpened our skills. Overall, the work to build resilience to disasters in Kristianstad is critical for maintaining a safe place to live - both today and in the future.

Facts about resilience

Resilience means that an organization builds an adaptive strategy and capacity to deal with unwanted and serious events. Resilient communities are communities that are both robust enough to handle such a threat when it occurs, and that it can recover quickly.

Source: Swedish Civil Contingencies Agency (MSB)

If the worst should happen



What happens if we do not protect the city and its residents?
If for example, the levees would not withstand the force of the flood water.

The worst case scenario could mean that the wastewater treatment for Kristianstad and 18 other cities would not function. The central hospital would be flooded and must be evacuated.

Large areas of housing, day care centers and schools must be evacuated. 16,000 people would be directly affected.

The lack of supplies of electricity, heat and water would cripple central functions as well as individual properties.

The fire station and the central alarm station would be flooded as well as several large companies.
Important communication routes would be blocked.

The city would be abandoned and the recovery time is estimated to last several years.