

Acid sulfate soils – assessing the threat to the wetlands of the Murray-Darling Basin

Acid sulfate soils explained

Acid sulfate soils are those soils and sediments that contain sulfuric acid, or have the potential to form sulfuric acid.

Acid sulfate soils form naturally when sulfate-rich water (eg. saline groundwater, sea water) mixes with sediments containing iron oxides and organic matter. Under waterlogged, anaerobic (oxygen-free) conditions, bacteria act to convert sulfates to sulfides. These sulfides react with iron and other metal compounds to form sulfidic sediments which have the potential to form sulfuric acid if exposed to oxygen in the air.

Why action is required

Changes to the hydrology of inland rivers and wetlands have led to the accumulation of sulfidic sediments. If left undisturbed and covered with water, sulfidic sediments pose little threat. However, because of the sustained drought in the Murray-Darling Basin, river levels have dropped significantly and many wetlands have dried out. Long-submerged soils and sediments are being exposed to the air creating the potential for sulfuric acid production. Following reflooding, or significant rains, this acid can be released into surrounding waters with potentially disastrous consequences.

When this sulfuric acid is released into the water, it can cause other problems. The increased acidity degrades nutrients important to plant life. It can damage the health of fish and other organisms.

If acidification occurs, metals like iron and aluminium can be released. Beyond certain levels, these can be toxic to plants, animals and humans. The acidic water can also be very corrosive of pipes, concrete structures, bridge supports and fence posts.

Given the potential for irreversible damage to the environment and serious impacts on water supplies and human health, the extent of the threat posed by acid sulfate soils requires assessment.

How the problem is being addressed

In March 2008, the Murray-Darling Basin Ministerial Council agreed to an assessment of acid sulfate soils in key wetlands in the Basin. The project is called the Murray-Darling Basin Acid Sulfate Soils Risk Assessment Project.

The objective of the Murray-Darling Basin Acid Sulfate Soils Risk Assessment Project is to assess the spatial extent of, and risk posed by, acid sulfate soils at priority wetlands in the Murray River system, Ramsar wetlands and other key environmental sites. It will also identify and assess management and mitigation options.

An expert group has identified the wetlands in the Basin for inclusion in the project. The selection of sites was based on the ecological importance of the wetland, and

also the magnitude of the risk posed by the presence of acid sulfate soils to the environment, water supplies and human health. The group prioritised the wetlands to determine the level of assessment required at each site.

An initial desktop assessment of each wetland has determined the degree to which acid sulfate soils are likely to occur. Wetlands which had a low probability of acid sulfate soils did not warrant closer examination.

Nearly 1500 wetlands throughout the Murray-Darling Basin were considered to possess the typical precursors for the development of acid sulfate soils. As such, these wetlands received a rapid on-ground assessment. These rapid assessments involved measurement of soil and water pH and salinity, as well as basic soil description. Samples of water and sediments were also collected and sent to a laboratory for assessment of sulfate concentration.

Based on the results of the rapid assessment wetlands were selected for further detailed assessments. Detailed assessment is the final stage in the assessment process and involves comprehensive sampling and analysis to assess the extent of acid sulfate soils and any associated risks, including the potential for acidification, deoxygenation, production of gases and metal mobilisation. Management options will be identified for wetlands at high risk.

The current field program involves sampling wetlands to determine if acid sulfate soil materials are present and to provide characterisation of the properties and types of acid sulfate soils materials that are found. If the acid sulfate soils materials identified during the sampling and analysis are

determined to be a concern at a wetland scale, further analysis will be conducted to determine the specific risks associated with the acid sulfate soils materials. These results will help to understand the impacts of acid sulfate soils materials at a wetland, and help to inform future management of the wetland.

Further information on acid sulfate soils:

An introduction to sulfidic sediments in the waterways of inland Australia – Murray-Darling Freshwater Research Centre, available at:
<http://www.mdfrc.org.au/sulfidic>

Atlas of Australian Acid Sulfate Soils, CSIRO Land and Water, available at:
<http://www.clw.csiro.au/acidsulfatesoils/atlas.html>

Fact sheet: Assessing the risks of acid sulfate soils in Murray-Darling Basin Wetlands
<http://www.mdbc.gov.au/acidsulfatesoils>

Contact details:

Relevant contact:



MDBA contact:

Rob Kingham
Assistant Director, Wetlands Unit
Murray-Darling Basin Authority
GPO Box 1801 Canberra ACT 2601
Phone: (02) 6279 0533
Fax: (02) 6248 0558
Email: rob.kingham@mdba.gov.au