



## DHI SOLUTION

# MONITORING WATER QUALITY & QUANTITY IN MINING

## Environmental monitoring - tailor-made!

### ENVIRONMENTAL MONITORING - THE KEY TO KNOWLEDGE

Regardless of the project, monitoring is a crucial element of gaining knowledge about environmental conditions. When it comes to monitoring water, it is essential to do this in an optimal way so as to provide only the necessary information, which can be used for specific actions. Too many monitoring programmes have been established with the aim to know everything, which eventually leads to enormous amount of data but not knowledge.

Water is linked to nearly every type of mining industry, whether as groundwater, surface water coastal water, or process/wastewater and accordingly there is a substantial need to assess water quality and quantity conditions in all phases of mining: exploration, operation/production and decommissioning.

We at DHI work with tailor-made monitoring, which enables the client to get all the relevant data - and only those.

Changes in water quality can lead to many types of impacts and the mining industry unfortunately creates various such problems. One of the standard impacts comes from acid drainage of the mines or the mine-tailing and has multiple impacts on not just the biology but also on water which is taken downstream for domestic or industrial use. The acidity can by itself change the pH conditions in the water, but it is



usually also connected to substantial changes in the concentration of various metals, which are mobilised by the changes in pH. Besides acidity the water quality can also be changed due to application of different types of chemicals to the mining and process water. Finally, also ordinary wastewater from domestic household can severely change the water quality.

### WATER QUANTITY DATA

Traditionally, data on water quantity in rivers had been collected using water level stations and occasional measurements using flow meters. Today, DHI works with ADCP systems, providing instant information about the flow, depth and velocity and

### SUMMARY

#### CLIENT

The mining industry and associated companies

#### CHALLENGE

- Assessment of water quality and quantity
- Collect the right variables
- Fulfill the regulations
- Ensure scientifically sound judgement of impacts

#### SOLUTION

- To provide tailor-made monitoring based on the relevant data
- Applying state-of-the-art technologies as part of the monitoring

#### VALUE

- Optimisation of monitoring costs
- Fast delivery of data
- Easier compliance with permits

a range of sensors for turbidity, temperature, oxygen and other variables. Such systems are of course online systems, allowing the client to access the results 24/7.

### WATER QUALITY DATA

change like annual/seasonal or random. Eliminating variables, which do not provide information, is part of the DHI approach. We design and assess the programme and ensure that the client only gets what is necessary and accordingly to a price balancing the needs. As for water quantity, we build stations with online sensors and provide access to raw and processed data through our Global Data Handling Centre .



### BIOLOGICAL MONITORING

There is a rising trend to use biological monitoring as well as water quality monitoring—the main reason being that biological monitoring is capable of providing much better information about the actual state of the aquatic environment. The focus is mainly on benthic invertebrates and fish.

The key principle is that if the water quality conditions are fine, then we will find a healthy invertebrate and fish community. If there are contaminants, the communities will be impacted and there will only be tolerant species or, in severe cases, no animals at all. The fish and invertebrates live all their life in the aquatic system and are thus continuously exposed to the water quality conditions. Therefore, biological monitoring provides information about the long-term conditions in the water, as opposed to water quality monitoring, which provides information in snap-shot-mode.

### DHI OFFERS

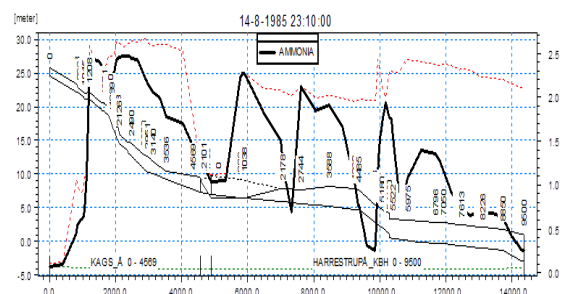
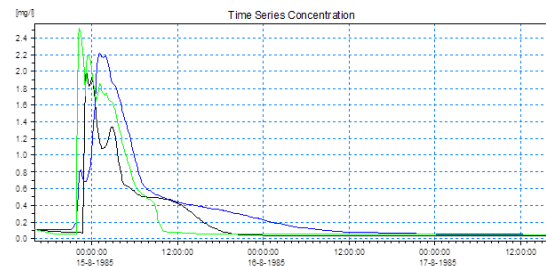
#### TAILOR-MADE MONITORING

Being a water and environment consultant for more than 40 years has taught us at DHI, how to optimise monitoring programmes on all levels. programmes at all levels. We are running national and international monitoring stations for rivers and oceans and are providing water forecasts for ports, terminals, oil and construction operations, globally.

Our experience benefits your operation and optimise your monitoring network to ensure a smooth operation. The data gathered through various channels will be analysed and

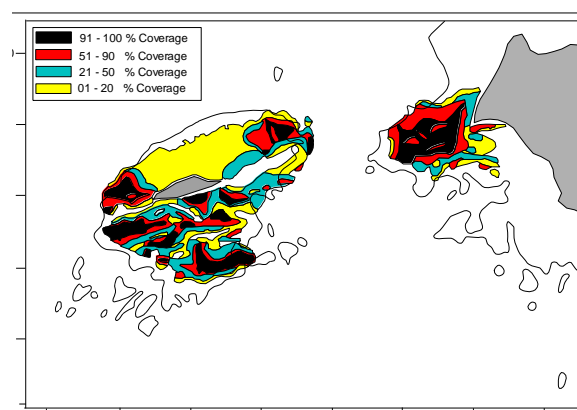
prepared to match the demands of the authorities.

We can engage with the authorities and ensure that the information delivered from our monitoring systems will fit with the demands of the public.



Longitudinal concentration plot for Ammonia along a river.

From our experience, we know that many industrial operations are not judged correctly in terms of their impact from discharge, mainly due to the fact that upstream operations and discharges, often from public sources, are not taken into account and hence the industrial operation is blamed for the whole load to the river, despite it being from upstream sources. We carry out, up-and downstream assessments before we design a proper monitoring network. We also, to our possible extent establish reference stations to provide data for comparison.



Assessment, based on biological monitoring of Common Mussel, done in association with building bridge facilities in Denmark.

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