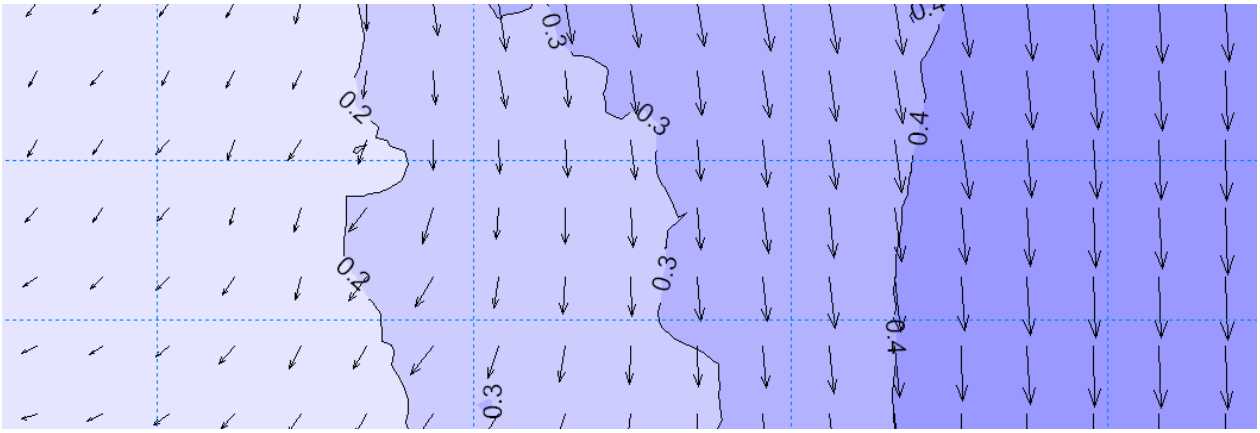


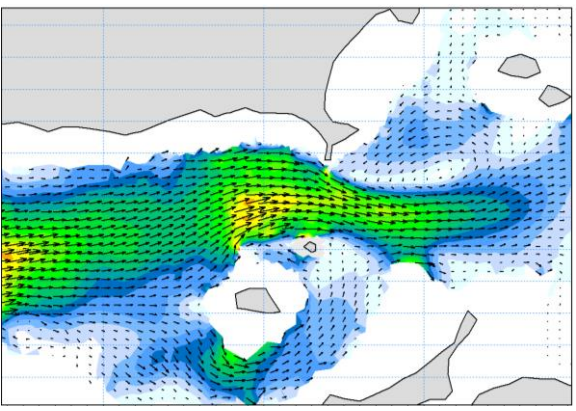
Consultants Ltd.

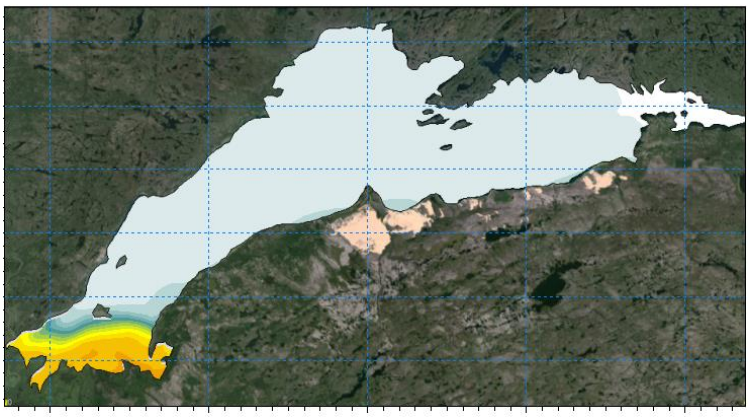
Coastal . Marine .Offshore Engineering and Modelling Specialist

We have over 20 years of experience in applying multidimensional numerical models for engineering and environmental projects. CMO has extensively used wave, hydrodynamic and sediment transport models to test different design options and scenarios in accurate and efficient manner. CMO provides modelling support in the following areas:

- Hindcasting and prediction of offshore and nearshore waves;
- Harbour resonance and tranquility assessment;
- Currents and flow analysis for oceans, coastal waters, rivers and lakes;
- Assessment of sediment transport and morphological evolution;
- Cooling water/thermal dispersion analysis; and
- Water quality modelling.

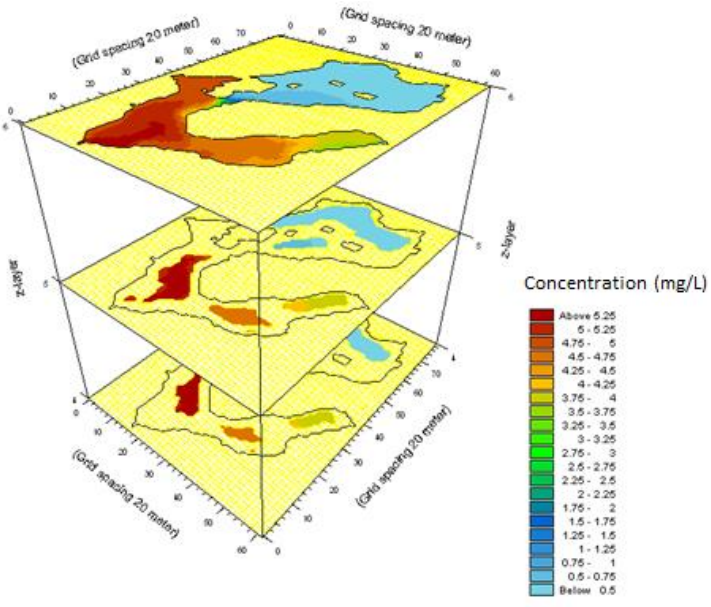
We have used a range of numerical modelling suites for simulating tsunami, storm surge and coastal flooding for comprehensive assessments of coastal hazards. We have also provided modelling support for developing LNG facilities, dredging operations, EIA and permitting processes. We are experienced in outfall modelling for mining industries and municipalities. Our effluent dispersion modelling experience includes simulation of water quality parameters and chemical fate transport.



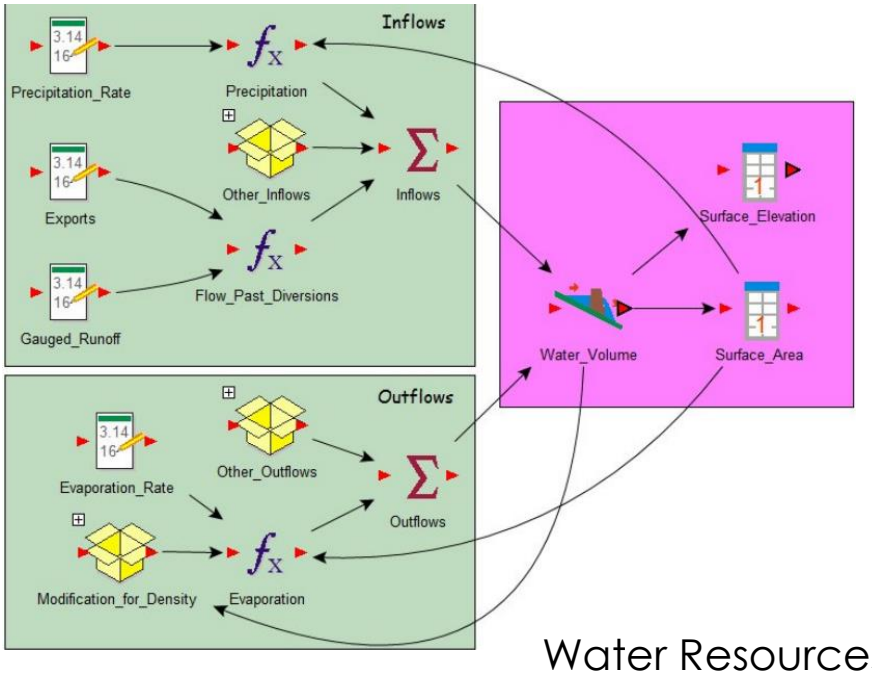


Water Quality Modelling for Mining Industries

Water released from mine sites to rivers, lakes and coastal water raise concern over their environmental impact on the ecosystem. The assimilative capacity of receiving waters, which depends on the circulation and mixing characteristics of the system, and environmental guidelines dictate the effluent discharge limits and design of discharging outfalls. Initial dilution calculations are performed using near-field mixing models (such as CORMIX and PLUME) to evaluate plume characteristics. Three-dimensional hydrodynamic and water quality models (such as MIKE3 and DELFT3D) are then used to evaluate plume characteristics governed by the ambient far-field hydrodynamics.

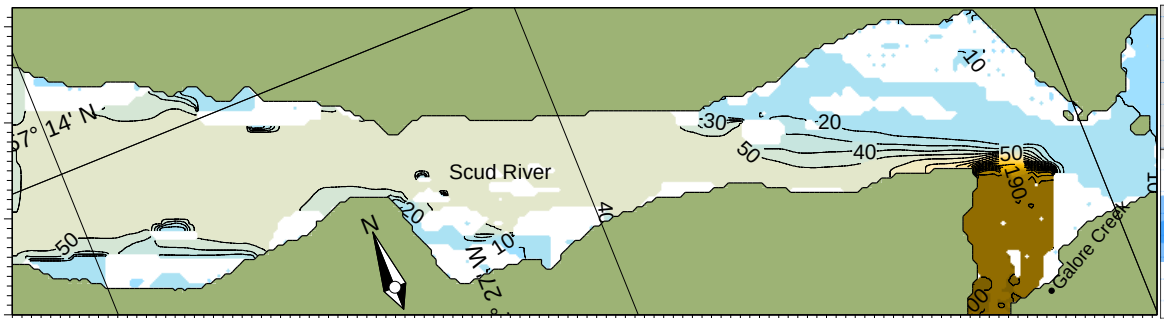


Engineers in CMO have extensive experience in surface water quality modelling for mine development and operations in North America and the Asia-Pacific region. We have used combinations of numerical models to characterize baseline conditions and predict impact of mine water discharges by utilizing hydro-meteorological and water quality data. Such modelling was often performed with coupled hydrological and hydrodynamic modelling schemes. Model results were statistically analyzed, explained and presented within the framework of regulatory guidelines.



Water Resources Modelling

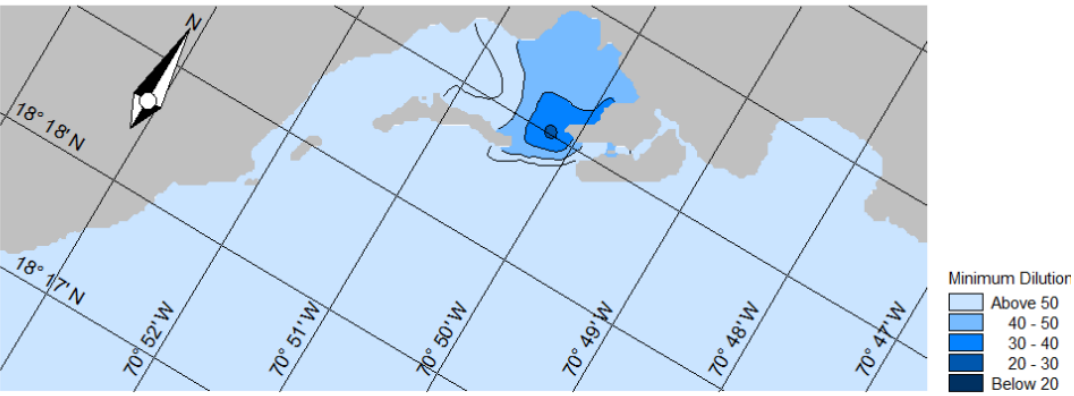
Hydrological and geo-spatial information based water balance and flow modelling results can be very useful for hydro-power and mine site water management. Engineers in CMO have extensively used GOLDSIM, UBCWM, and MIKE11 modelling software for analyzing hydrological and hydraulics properties of local and regional watersheds and provided input for deriving cost effective water management plans within the framework of regulatory guidelines. Specific experiences include water resources modelling for diamond mine water management and hydropower expansion projects in Northern Canada.



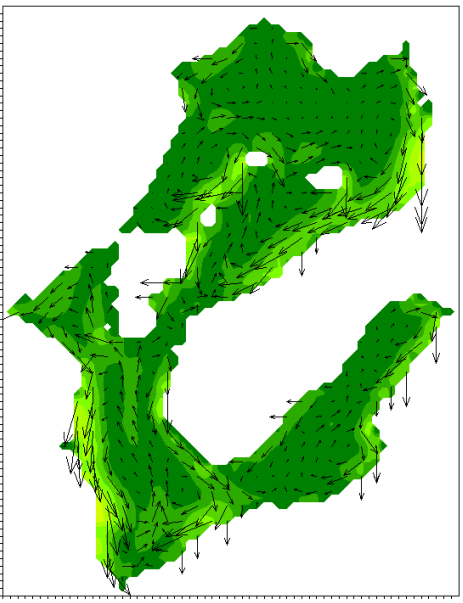
Aquatic Eco-system Modelling for Environmental Impact Assessment

State of the art numerical models are extremely powerful tools for understanding the complicated relationship between the elements of an aquatic ecosystem and their responses to development activities interfering with the system. A coupled eco-system model combining modules for physical, biological and chemical processes can be applied for characterizing the baseline condition and analyzing the impact of project development on an aquatic environment in a very detailed and realistic manner. Such impacts can be evaluated in a local or regional scale and predictions can be extended over the long-term in most scientifically justified manner.

CMO is experienced in complex aquatic eco-system modelling for environmental impact assessment and has used three dimensional modelling tools like Delft3D-WAQ, MIKE3 and EUTROP. Such models were applied to simulate the dynamics of lower trophic system and predict the concentrations of water quality parameters (total and dissolved organic and inorganic matters) for assessing development impacts. For the evaluation of industrial discharge impacts, chemical fate simulations were performed by resolving bio-geochemical processes both in the water column and sediment layers.



Water Modelling for Power Sector



Engineers in CMO have extensively used state-of-the-art near- and far-field hydrodynamic models to determine transport mechanisms (currents and mixing zones) to understand and predict the role of heated discharges and cooling water intakes. Predicting and mitigating the impacts of heated discharges to, and cooling water intakes from lakes, reservoirs, rivers, estuaries and coastal waters are essential for optimal design of power plant and LNG facilities, and for the associated environmental permitting processes. The impact issues stem from two considerations: environmental questions arising from concern for ecological impacts and engineering questions concerning the design aspects of power plants.