TEMS

TRIDEL ENVIRONMENTAL MONITORING SYSTEM

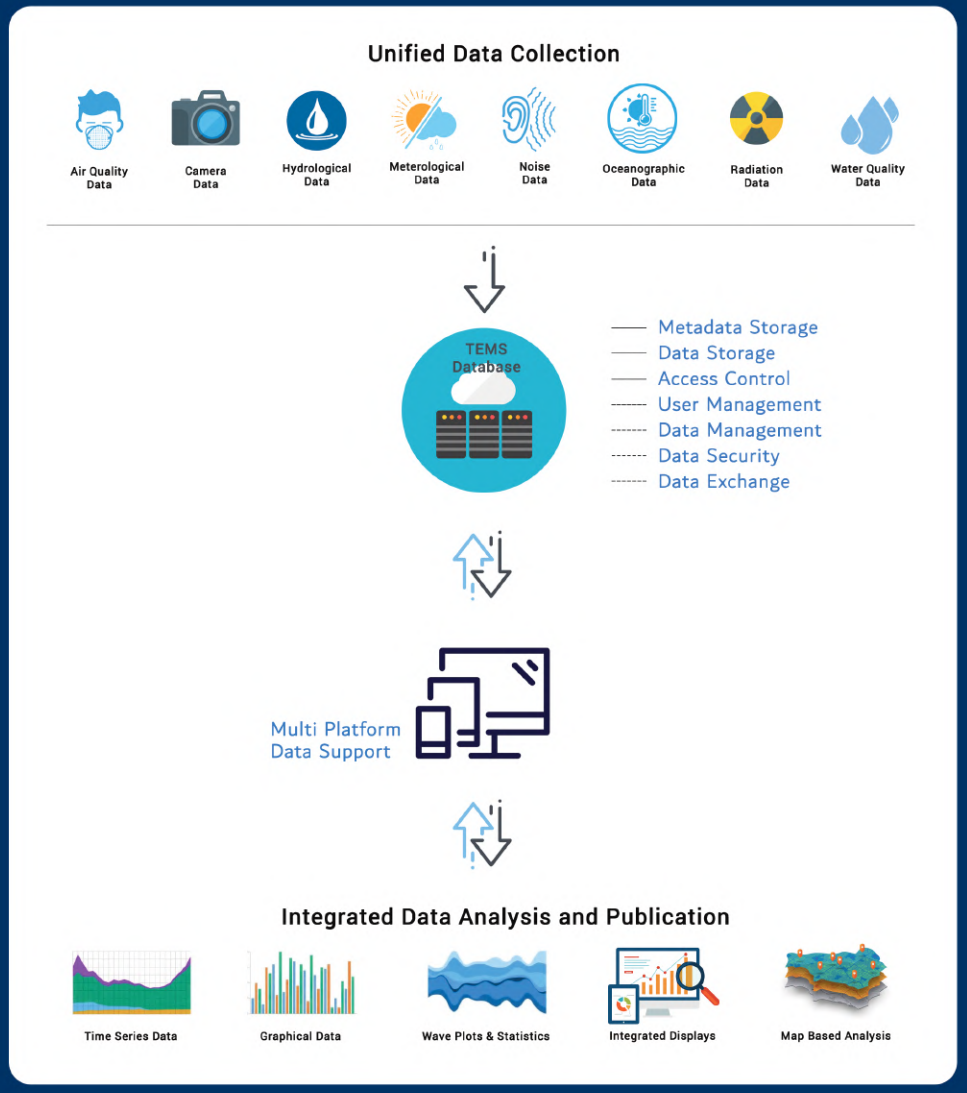


TRIDEL ENVIRONMENTAL MONITORING SYSTEM

One of the major challenges in running and monitoring environmental monitoring programs is to obtain integrated real-time data from the field stations as well as have the capability to simultaneously monitor the health of the various sensors that make the solution network. The problem gets compounded when the sensors are remotely located as well as spatially distanced through a region covering land and water areas, having different types of sensors for various parameters and are difficult to be monitored physically.

TEMS is an outcome of the challenges faced by field teams and the frustrations faced by clients in various environmental monitoring programs. TEMS software is totally instrument and transmission independent and hence can be used flexibly and comprehensively within most applicable environments. TEMS allows real-time visualization of data from various Oceanographic / Meteorological / Air quality / Water quality / Water level / Discharge sensors.

TEMS follows WMO standards and best practices for climate observations, which is critically important for achieving universally common, coherent, traceable and verifiable observations and measurements, and allowing correct operational procedures and management for the technical components including instruments, equipment, stations and networks.



TEMS supports data protocols as per WMO No. 386 Manual on the GTS as well the data interfaces are customisable to support proprietary formats meeting national or regional data exchange codes. The data exchange module within TEMS could be configured to support proprietary formats for communication with wide variety of field stations as well as for data distribution with third party environmental systems and data centres.

TEMS FEATURES



Open architecture



Scalable Platform



Real-time Field Data Collection

Developed as an open architecture and scalable platform, TEMS software package enables real-time field data collection from environmental monitoring stations. TEMS is developed as a transmission independent software and supports various communication protocols for data collection as well supports full-duplex mode of operation for seamless experience of real time data monitoring and remote diagnostics.



Statistical Data Analysis



Integrated Data Visualisation



GIS Publication + Map Analysis

TEMS provides various dashboards to view and analyse environmental data. It includes facility to view and analyse the individual sensor data with user selectable visualisation tools like graphical, tabular with time series and rose plot & frequency distribution chart for wave and wind. TEMS allows integration of data to GIS applications for spatial data analysis as well export data in different standard formats including text, excel, pdf



Centralised Data Management



Integrated Data QA / QC



Data Security + User Management

TEMS provides integrated data collection with centralised database management. All data is saved in a secured database system. In addition to current data, TEMS as well provides links to an archival database to permit analysis and output results in desired formats. It allows input from diverse data sources and integration with integrated QA /QC module to ensure that the data collected are accurate, complete, authentic and reliable.



Deployment on Cloud/ Server at Client Site



Customised Displays & Reports



Research & Development

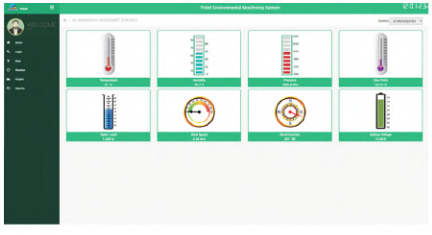
TEMS supports multiple platforms and could be deployed on cloud as well as on client site server. User Interfaces are customisable and supports creation environmental reports. TEMS includes notification module that could generate event based alarms through SMS, emails and mobile application alerts. TEMS has evolved through collaborative development with inputs from clients and with strong impetus on environmental research & development.

TEMS

CAMERA DATA

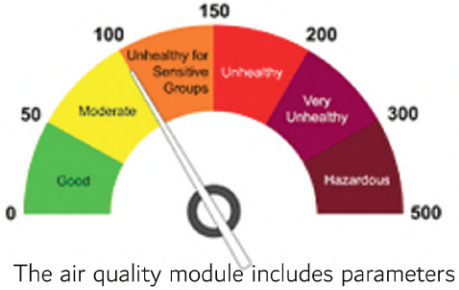


TEMS supports convergence of IP camera systems with databases thereby providing effective usage of optical systems as effective tools for monitoring of various environmental parameters, even in adverse weather and critical conditions like storm surges in coastal areas and flood situations in dams and rivers. TEMS provides seamless interfacing of camera systems to provide continuous, contactless measurement of environmental parameters. It supports coastal zone monitoring for analysis of shoreline changes, inter-tidal beach profile, occurrence of rip currents and sandbar formation, wave run-up and rip current forecasting.



HYDROLOGICAL DATA

TEMS supports data collection and processing of hydrological data from rivers, inland waterways, groundwater monitoring stations and provide interface to modelling platform for the needs of agriculture, flood and drought management. TEMS provides an integrated platform for hydrological data collection, database management, quality control and statistical analysis for generating outputs like water level, water quality, flow rate, discharge and pollutant levels. TEMS provides interfacing with 1D / 2D hydraulic models for provision of hydrological forecast information, inundation and flood maps.

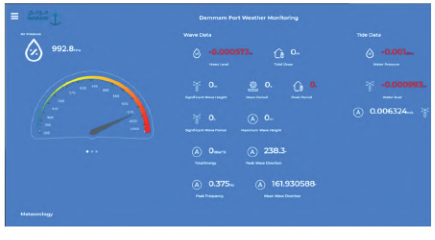


AIR QUALITY DATA

TEMS supports short-term as well as long-term assessment of ambient air quality by systematic measurement and analysis of quantity and types of pollutants in the atmosphere.

The air quality module includes parameters for gases such as CO, O3, H2S, NH3, SOx, NOx, VOCs, BTEX and PM. TEMS provides computation of Air Quality Index (AQI) according to the US EPA AQI formula and a widely accepted international guideline for reporting air quality. AQI provides valuable information on air quality by considering concentration of various pollutants and relating them to a single scale value.

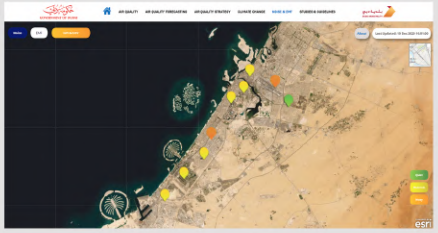
METEOROLOGICAL DATA



TEMS is a complete data management software for managing meteorological data from weather stations and other field environmental monitoring unit. it provides comprehensive web based tools for managing a small network to large regional scale weather platform.

TEMS provides a wide selection of dashboards for visualization of meteorological data in text, time series, graphical, rose plots and capability for generating customised reports. It provides tools for validation of the data, generating alarms and notifications as well data exchange modules for import and export of data with external / 3rd party systems and applications.

NOISE DATA



TEMS supports monitoring of noise levels from noise monitoring stations with computation and web based publication of harmonized noise indicator levels such as Laeq as well as specialized indicators such as Lden (day-evening-night equivalent level) and Lnight (night equivalent level).

TEMS provides tools for mapping of noise data for preparation of colour coded noise maps, noise contour maps and development of Noise Perception Index (NPI). TEMS also supports integration of data from hydrophones for provide detailed assessment of underwater noise during marine construction and offshore survey activities as well as for study of marine mammals.



OCEANOGRAPHIC DATA

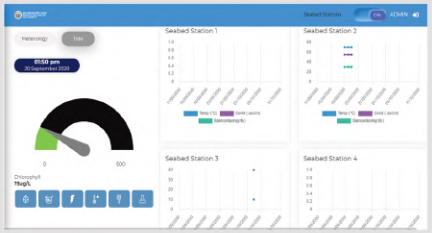
TEMS is a comprehensive platform managing oceanographic data including tides, current profiles and waves. It supports interfacing of data from various oceanographic sensor packages from coastal / jetty based stations as well as from data buoys & offshore platforms.

TEMS includes tools for analysis of oceanographic data from sensors such as tide gauges (acoustic / pressure / Radar), Acoustic Doppler Current Profilers (upward looking / downward looking / horizontal / vessel mounted) as well wave sensor (accelerometer / acoustic / GPS based) and presentation of data in customizable user interface.

RADIATION DATA



TEMS supports monitoring of variation types of radiations in ambient conditions for applications such as measurement of EMF levels in urban areas as well as gamma and solar radiation monitoring. TEMS supports integration of various types of solar radiation sensors like pyranometers for global solar radiation, albedometers for measurement of solar radiation + reflection, pyrgeometers for infra red radiation and Net radiometer for measurement of radiation balance. It also supports integration of sensors for measurement of gamma radiation dose rate.



WATER QUALITY DATA

TEMS is an integrated platform for managing water quality data from inland, coastal and offshore water quality monitoring stations for parameters like Conductivity / Salinity, Temperature, Dissolved Oxygen, pH, Turbidity, Chlorophyll, Blue-Green Algae, Nitrates....

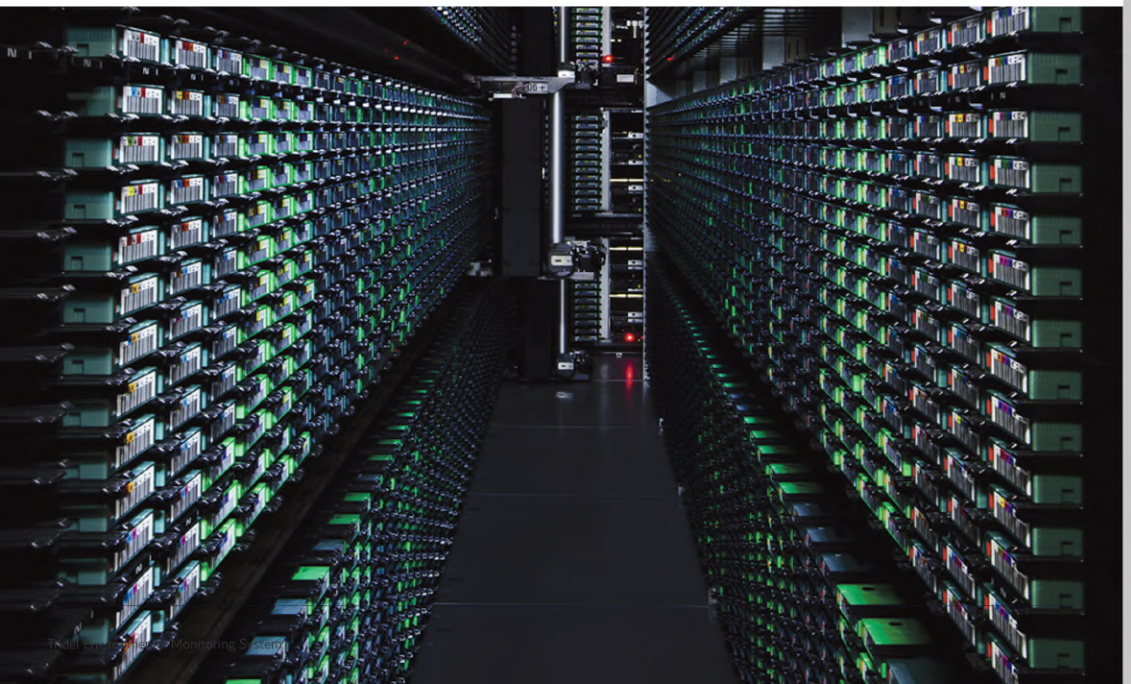
TEMS supports integration of water quality data with ecological data like for benthic ecology like coral reef, seagrass beds, mangrove communities, macroalgal beds as well as plankton characterization like phyto and zooplanktons. This combined data management of real-time water quality with ecology data and its ability to integrate to a spatial GIS platform for developing thematic maps is an Unique feature of TEMS.....



Tridel Environmental Monitoring System

TEMS : Salient Features

Instrument and transmission independent software architecture specially designed for supporting applications for environmental data acquisition and management.
Integrated software for field data collection, QA/QC, statistical analysis, processing, mapping and publication on multiple platforms.
Fully customisable software and can be suited to the individual customer needs.
Customisable modules includes data collection types & protocols, visualization, measurement database, reporting, maintenance modules, data download / exchange functions..
Support end users to create time series plots, rose plots, frequency distribution chart as well export data in different formats, including text, excel or pdf.
Reports function brings an easy to use interface for generating the standard tabular and graphical reports (daily, weekly. monthly and annual).
Secure platform with User Authentication with User Group Management Module for accessing the software and the database.
Interface with GIS applications





TEMS : Maintenance Module

TEMS includes a dedicated Maintenance Module that supports preventive, predictive and on-call maintenance of field stations. It provides full-duplex integration with remote diagnostics and maintenance with details of each station & sensor information. The module generates alerts whenever maintenance or sensor calibration is due. TEMS enables real time update of service tasks conducted at the field stations to the central server providing transparent maintenance operations and management of the remotely located field assets. The maintenance module features includes ;

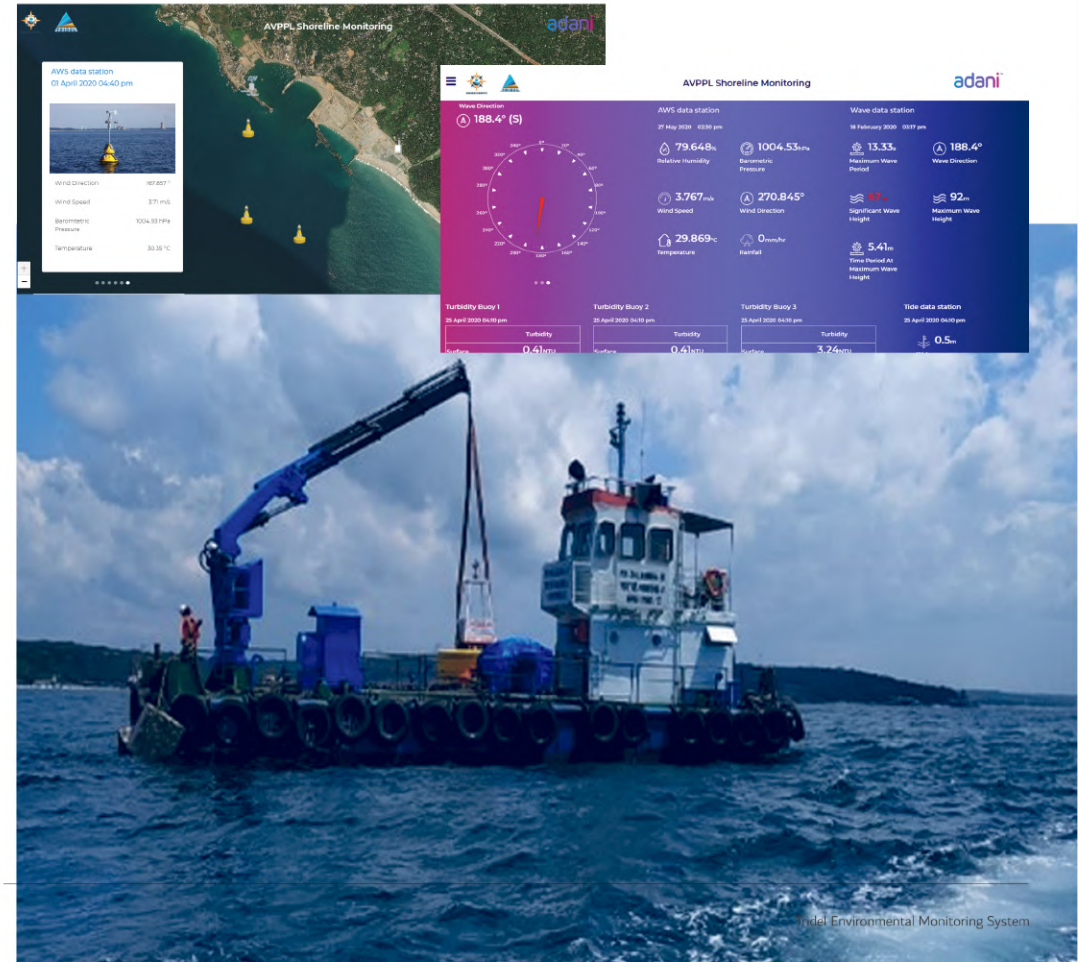
- ☆ Scheduling maintenance tasks.
- ☆ Managing maintenance logs.
- ☆ Generating alerts for maintenance and calibrations.
- ☆ Buoy watch circle & drift warning alerts through email & SMS.
- ☆ System audits and certifications.
- ☆ Managing maintenance consumables & spares.
- ☆ Documentation system for recording asset history.



Case Study

Adani Vizhinjam Port – Metocean & Water Quality Monitoring System

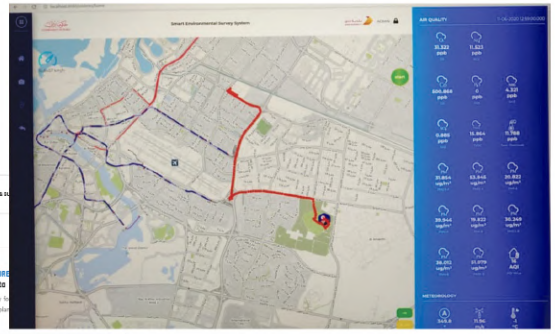
Adani Vizhinjam Port is a deep draft, all-weather port development project that is being build to be the largest commercial port of India. Proposed to be the only port in India with handling and storage facilities for crude oil, containers, dry bulk, break bulk, automobiles and liquid cargo. TEMS platform for environmental data collection during the port construction with web based data publication. Data collection from network of monitoring stations for various parameters such meteorological, tide, data buoys with multi-level sensor package for turbidity profiling along with integration of existing wave rider buoy system.

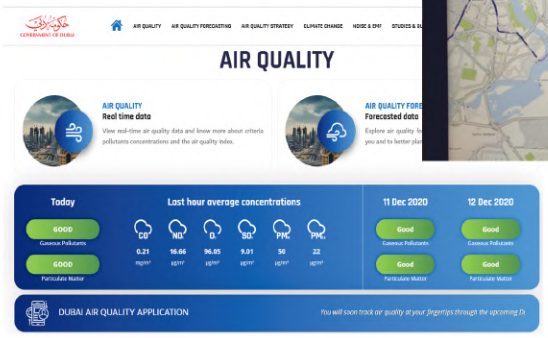


Dubai Municipality – Air Quality, EMF & Noise Monitoring System

First of its kind solution in the region for compact vehicle mounted system for monitoring of gaseous pollutants-NO_2, SO_2, CO, O_3, PM_{10}, $PM_{2.5}$, odorous gases- H_2S, NH_3, TVOCs, BTEX, Odor Intensity, Noise, EMF, Meteorological parameters with real time alarm and tracking system with camera integration. Data from all the sensors transmitted to DM central server for real time displays and analysis. Customised web platform for integrated acquisition and publication of data from air quality, noise & EMF monitoring stations with interface to forecasting model.

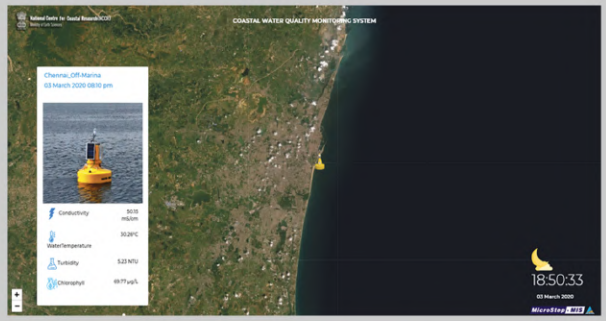






Ministry of Earth Sciences, India – Metocean & Water Quality Monitoring System

TEMS platform for integrated data collection and web based publication for various parameters: Meteorological- Humidity and Temperature Probes, Wind Speed & Direction, Atmospheric Pressure Sensor, Solar Radiation sensor ; Oceanographic & Water Quality- Doppler Current Meter, Directional Wave Sensor, Water Quality Sonde for Conductivity, Temperature & Chlorophyll, pH, DO, BGA and anti-bio fouling modules.

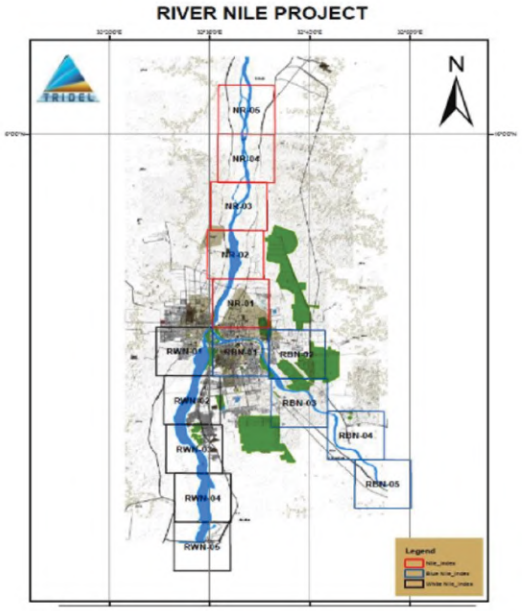






River Nile Inland Waterways Project, Khartoum Region - Integrated River Monitoring & Modelling System

TEMS enables to effectively monitor, visualize and manage quantitative and qualitative data regarding surface water processes in rivers. TEMS application for River Nile Monitoring System included design and development of a customised platform which provides precise weather, river level and discharge monitoring for supporting the transportation and navigational along River Nile. The river monitoring system was interfaced with topographic and bathymetric survey data in Khartoum Region in Sudan where White Nile meets Blue Nile. Central system for hydro-met data collection, database management, statistical analysis and publication. System integrated with geospatial database for storage and management of surveyed data with interface with hydraulic models for river dynamics modelling and forecasting applications.



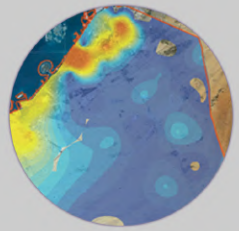




Dubai Municipality – Groundwater Monitoring & Modelling for Emirate of Dubai

TEMS provides an easy-to-use platform delivering centralized and secure management of hydrological data for groundwater monitoring and modeling applications. The web based platform with scalable features developed for Dubai Municipality allows managing water level & water quality data from over 70 nos. of groundwater monitoring stations in real-time from desktops, smart phones or tablets. TEMS analyzes time-series data from the groundwater monitoring stations and supports creation of interactive maps, graphical representation and GIS based products. The system includes powerful graphing and charting modules along with user defined dashboards to support easy integration, analysis and inter-comparison of data from different sources. Geostatistical interpolation based on advanced kriging based tools supports generation of groundwater map surfaces from a scattered set of data points. TEMS supports generation of intuitive maps providing spatial overview with coloured map markers to indicate notification levels for each groundwater monitoring stations, providing a quick overview of health status and data patterns. The system supports seasonal data comparisons and trend analysis along with functions for advanced map publication & printing.





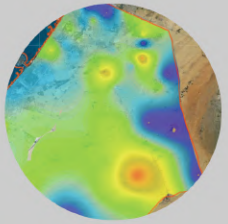
Interactive Dashboard



Statistics



Reports



Interpolation

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