ENVIROMENTAL MONITORING IN PARKS

- *Environmental monitoring products and environmental monitoring software, such as Environmental Data Management Systems (EDMS), facilitate the implementation and monitoring of environmental monitoring and assessment programs, which includes*
  - *central data management hub,*
  - *automated environmental monitoring alerts,*
  - *compliance checking,*

  - *validation,*
  - *quality control,*
  - *generation of reports on dataset comparisons.*

Monitoring Types

The three main types of environmental monitoring are soil, atmosphere, and water. Some techniques of environmental scanning and monitoring include filtration, sedimentation, electrostatic samples, impingers, absorption, condensation, grab sampling, and composite sampling

- Air Monitoring: Environmental data gathered using specialized observation tools, such as sensor networks and Geographic Information System (GIS) models, from multiple different environmental networks and institutes is integrated into air dispersion models, which combine emissions, meteorological, and topographic data to detect and predict concentration of air pollutants.

- Soil Monitoring: Grab sampling (individual samples) and composite sampling (multiple samples) are used to monitor soil, set baselines, and detect threats such as acidification, biodiversity loss, compaction, contamination, erosion, organic material loss, salinization, and slope instability.

  - Salinity Monitoring*: Remote sensing, GIS, and electromagnetic induction are used to monitor soil salinity, which, if imbalanced, can cause detrimental effects on water quality, infrastructure, and plant yield.*

  - Contamination Monitoring*: Chemical techniques such as chromatography and spectrometry are used to measure toxic elements, such as nuclear waste, coal ash, microplastics, petrochemicals, and acid rain, which can lead to the development of pollution-related diseases if consumed by humans or animals.*

  - Erosion Monitoring*: Monitoring and modeling soil erosion is a complex process in which accurate predictions are nearly impossible for large areas. The Universal Soil Loss Equation (USLE) is most commonly used to try to predict soil loss due to water erosion. Erosion may be due to factors such as rainfall, surface runoff, rivers, streams, floods, wind, mass movement, climate, soil composition and structure, topography, and lack of vegetation management.*

- Water Monitoring: Environmental sampling techniques include judgmental, simple random, stratified, systematic and grid, adaptive cluster, grab, and passive; semi-continuous and

continuous environmental monitoring; remote sensing and environmental monitoring; and bio-monitoring are used to measure and monitor ranges for biological, chemical, radiological, microbiological, and population parameters.

- These are the factors which influence the management of the environment

IOT Based Environmental Monitoring

- *Environmental monitoring solutions have evolved over the years into Smart Environmental Monitoring (SEM) systems that now incorporate modern sensors, Machine Learning (ML) techniques, and the Internet of Things (IoT). Technologies such as IoT devices and wireless sensor networks have made advanced environmental monitoring using IoT a more streamlined and Artificial Intelligence-controlled process.*

- *Data captured by IoT environmental monitoring sensors from a wide variety of environmental conditions can be integrated via the Wireless Sensor Network (WSN) into one, cloud-based environmental system, in which IoT devices embedded with ML can record, characterize, monitor, and analyze elements in a specific environment.*

- *IoT for environmental monitoring facilitates the development of wireless, remote environmental monitoring systems, which enable operations to remove much of the human interaction in system function, which reduces human labor, increases the range and frequency of sampling and monitoring, facilitates sophisticated on-site testing, provides lower latency, and connects detection systems to response teams, ultimately resulting in higher rates of significant disaster and contamination prevention.*