GTC | Geo-intelligence, Building Multi-dimensional Foundation

Water Resource Management using GIS

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TODAY'S DISCUSSION

- Distribution of water surfaces on Earth
- Water Resources
- Water Resource Management
- Challenges in WRM
- GIS in WRM

TOPICS TO COVER

HYDROSPHERE: EARTH'S WATER SPHERE



<u>Average salinity of Earth's oceans</u>: 35 gm/kg of sea water (3.5%)
Contains approximately 1.4 billion km³ water

Over 97% water is in the oceans

EARTH'S WATER RESOURCE

- \approx Ocean water: 97.2 %
- \approx Glaciers & other ice: 2.15 %
- \approx Groundwater: 0.61 %
- \approx Fresh water lakes: 0.009 %

- \approx Inland seas: 0.008 %
- \approx Soil Moisture: 0.005 %
- \approx Atmosphere: 0.001 %
- \approx Rivers: 0.0001 %

EARTH'S WATER RESOURCE



0.023%

Water accounts for a mere 0.023% of the earth's total mass.

Of that, only a small percentage (about 0.3 %), is even usable by humans. The other 99.7 percent is in the oceans, soils, icecaps, and floating in the atmosphere. Still, much of the 0.3 percent that is useable is unattainable.

FRESHWATER DISTRIBUTION



Source: USGS

WATER RESOURCE MANAGEMENT

Water Resources Management (WRM) is the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. It includes the institutions, infrastructure, incentives, and information systems that support and guide water management.

Source: WORLDBANK, 2017

CHALLENGES IN WRM

According to World Bank estimates.

This is where, Data and Information systems are needed for an Integrated Water Resource Management Scheme, in sectors of -

- ✓ Water Resource Monitoring,
- ✓ Decision Making Under Uncertainty,
- ✓ Systems Analyses,
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✓ Hydro-meteorological Forecast And Warning

WATER QUALITY ANALYSIS

- \rightarrow Water quality modeling
- \rightarrow Use of GPS / photographic tie-points
- → Use of passive and active water quality monitoring systems

WATERSHED MANAGEMENT

- \rightarrow Terrain modeling
- \rightarrow Flow modeling
- \rightarrow Debris flow probability
- \rightarrow Stream Order Analysis

FLOOD MANAGEM

HYDRO GEODATABASE

- \rightarrow Flood plain delineation
- \rightarrow Channel characteristics
- \rightarrow Inundation modeling
- \rightarrow Infrastructure analysis
- \rightarrow Risk modeling and mitigation

GROUNDWATER MODELING

- → Modeling subsurface, flow rate, advection, concentration
- \rightarrow Well and spring models.

R





Burst Simulation

G I S

IN

<image>





W R M APPLICATION MECHANISM OF GIS IN WRM





GIS Hydro Modeling



It efficiently parameterizes input data of various hydrologic and water quality models to represent spatial and temporal characteristic of factors affecting hydrologic components (surface, subsurface, groundwater, etc.) and pollutant generation (nonpoint pollution) and transport with water via surface or infiltration, thus flowing into streams. GTC | Geo-intelligence, Building Multi-dimensional Foundation

Thank You!

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