Smart water management:

Data Ingestion: Set up a system to receive water consumption data. This can be done via IoT devices, manual data entry, or integration with water meters. Ensure data security and encryption during transmission.

Data Storage:

Store the received data in a secure and scalable database, such as SQL or NoSQL, with redundancy for data protection.

Data Processing:

Implement data preprocessing to clean, validate, and structure the data. This may involve removing outliers and handling missing values.

User Authentication:

Develop a user authentication system to ensure that only authorized individuals can access the data.

User Interface:

Create a web or mobile application for users to interact with the data. The interface should be intuitive, visually appealing, and responsive. Users should be able to view historical and real-time consumption data.

Data Visualization:

Utilize charts, graphs, and maps to display water consumption trends and patterns. Include options for filtering and customizing the view.

Alerts and Notifications:

Implement a notification system to alert users about unusual consumption spikes or leaks. Users should be able to set custom thresholds.

User Management:

Admins should be able to manage user accounts and permissions.

Security:

Implement robust security measures to protect the data, including encryption, access control, and regular security audits.

Program:

```
<!DOCTYPE html>
<html>
<head>
  <title>Water Consumption Dashboard</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      margin: 0;
      padding: 0;
      background-color: #f2f2f2;
    }

    h1 {
      background-color: #0074D9;
      color: #fff;
      padding: 20px;
      margin: 0;
    }

    #data-table {
      margin: 20px;
    }

    table {
```

```
      width: 100%;
      border-collapse: collapse;
      background-color: #fff;
    }

    table, th, td {
      border: 1px solid #ddd;
    }

    th, td {
      padding: 10px;
      text-align: left;
    }

    th {
      background-color: #0074D9;
      color: #fff;
    }
  </style>
</head>
<body>
  <h1>Water Consumption Data</h1>
  <div id="data-table">
    <table>
      <thead>
```

```
        <tr>
          <th>Device ID</th>
          <th>Timestamp</th>
          <th>Consumption (Liters)</th>
        </tr>
      </thead>
      <tbody id="data-body">
        <!-- Data will be inserted here dynamically using JavaScript -->
      </tbody>
    </table>
  </div>
  <script>
    // Simulated IoT data (replace with actual data retrieval code)
    const IoTData = [
      { deviceID: 'Device001', timestamp: '2023-10-25 08:00:00', consumption: 100 },
      { deviceID: 'Device002', timestamp: '2023-10-25 08:15:00', consumption: 80 },
      // Add more data entries
    ];

    // Function to populate the table with IoT data
    function populateDataTable() {
      const tableBody = document.getElementById('data-body');
      IoTData.forEach((data) => {
        const row = tableBody.insertRow();
        row.innerHTML =
`<td>${data.deviceID}</td><td>${data.timestamp}</td><td>${data.consumption}</td>`;
```

```
    });
  }

  // Call the function to populate the table
  populateDataTable();
</script>
</body>
</html>
```

Conclusion:

smart water management is a crucial approach to addressing the growing challenges of water scarcity and environmental sustainability. By leveraging technology and data-driven solutions, it offers the potential to optimize water usage, reduce waste, improve water quality, and enhance overall water resource management. Embracing smart water management practices can lead to a more efficient, resilient, and sustainable water infrastructure, benefiting both the environment and society in the long run.