Monitoring of Water Pollution

Defining Monitoring

- Monitoring is defined by the International Organization for Standardization (ISO) as: “the programmed process of sampling, measurement and subsequent recording or signalling, or both, of various water characteristics, often with the aim of assessing conformity to specified objectives”.

Why Monitor Water Quality?

1. Characterize waters and identify changes or trends in water quality over time
2. Identify specific existing or emerging water quality problems
3. Gather information to design specific pollution prevention or remediation programs
4. Determine whether program goals -- such as compliance with pollution regulations or implementation of effective pollution control actions -- are being met
5. Respond to emergencies, such as spills and floods

Surface Water Quality: Detection of Pollution

Often pollution is first detected from visual observation. Visible signs of pollution include:

- Floating debris
- Occurrence of fish-kill
- Bad taste and odor
- Excessive growth of aquatic plants
- Floating oil
- Scum deposition

Monitoring Scenarios

- From fixed sites (long term data)
  - Fixed interval
  - Varied interval (flow or time dependent)
- From random sites
- From specific sites after an event

Concentration data

- Parameters often monitored:
  - pH
  - Conductivity
  - Dissolved oxygen
  - Nitrates
  - Phosphorus
  - Bacteria
  - ….

- Traditionally, measurement of concentrations involves taking water samples

- Sampling:
  - Composite
  - Discrete
    - Grab
    - Fixed interval (time, volume)

SAMPLING METHODS

1. **Grab sampling-** Grab sampling is the most common form of sampling flowing water because it is reliable and easy to do.

Ways to take grab samples

- No special equipment is needed. Usually, a sampling container is used to take the sample.
- The container can be dipped directly into the water or a sampling rod can be used to collect the water and fill the container.
- Samples are then packed in a cooler box with ice and taken for testing.

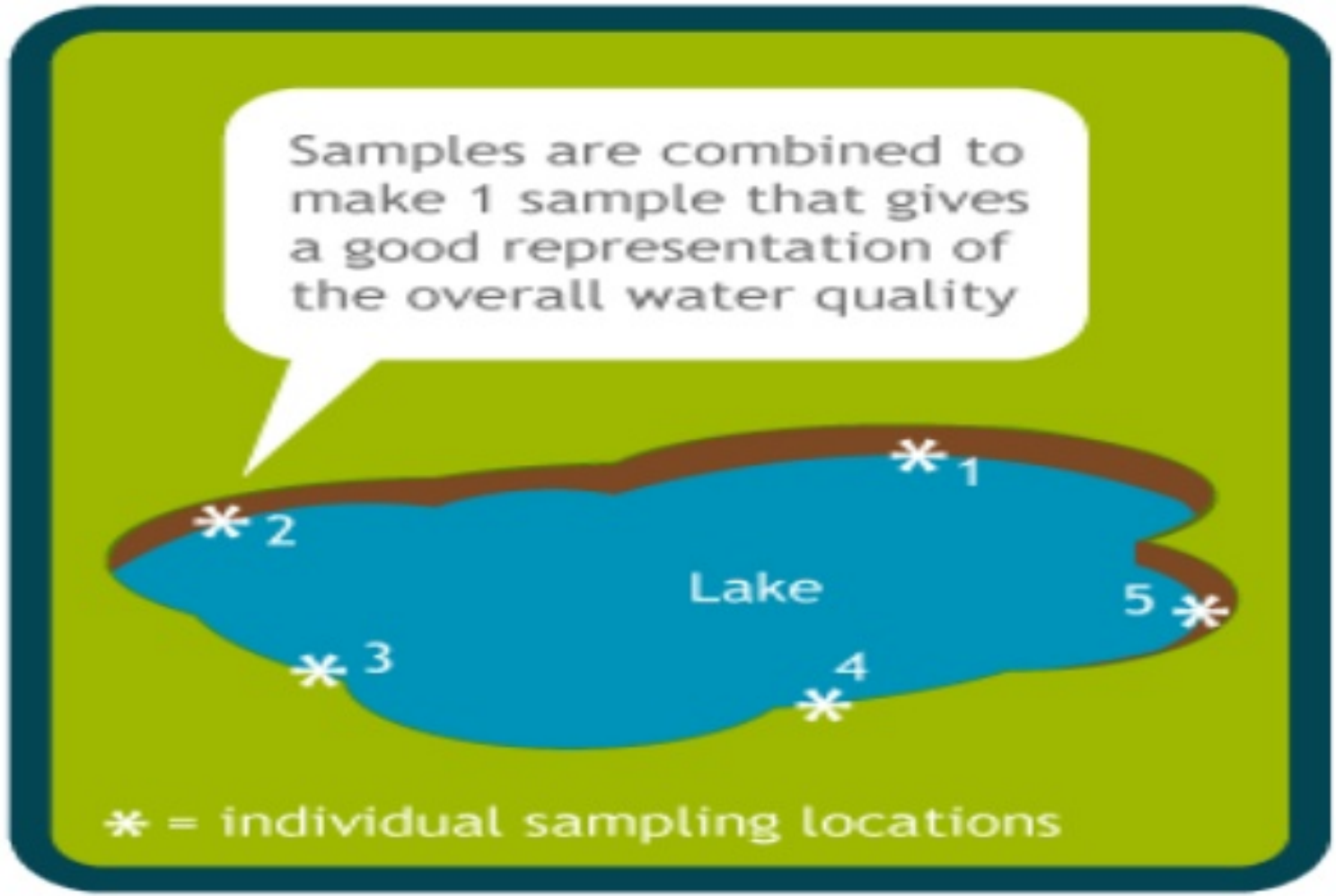
Grab Sampling…..



Composite Sampling

- Composite sampling involves taking a number of small samples, called sub-samples, over a period of time.
- These are then combined to reflect the overall condition of a water body, like a lake.
- These sub-samples are often referred to as aliquots. In the field, aliquots of 200 ml are used to make up an overall sample of 1 000 ml.
- Composite sampling is used frequently.

Composite Sampling….



Water Quality Parameters

Physical Parameters

- pH
- Temperature
- Colour
- Turbidity
- Conductivity
- Total Solids
- Suspended Solids
- Total Dissolved Solids

Chemical Parameters : Inorganic Parameters

- Acidity
- Alkalinity
- Hardness
- Total Hardness
- Calcium Hardness
- Magnesium Hardness
- Sodium
- Potassium
- Nitrate
- Ammonical Nitrogen
- Ammonia
- Nitrate Nitrogen
- Nitrite Nitrogen
- Chloride
- Residual Chloride
- Sulphate
- Fluoride
- Silica

Water Quality Parameters

(ii) Nutrient & Organic Parameters

- Phosphate
- Dissolved Oxygen
- Chemical Oxygen Demand
- Biochemical Oxygen Demand
- Phenols
- Oil & Grease

Microbiological Parameters

- Total Coliform
- Faecal Coliform
- Faecal Streptococci
- Total Plate Count
- Chlorophyll

Elements Including Heavy Metals

- Magnesium
- Calcium
- Aluminium
- Zinc
- Iron
- Manganese
- Nickel
- Copper
- Lead
- Chromium
- Cadmium
- Cobalt