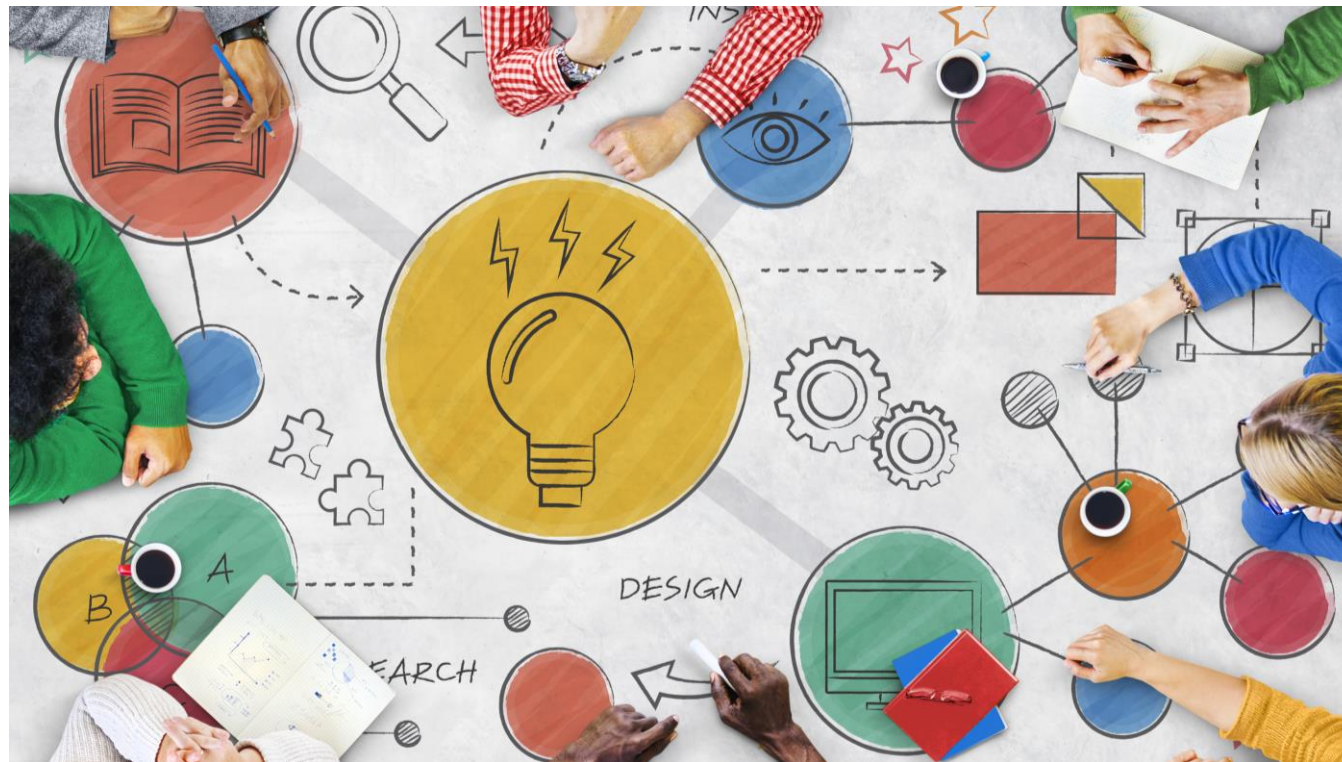


Planning a water quality monitoring programme



Session 1: How to plan a water quality monitoring programme

Designed for citizen science volunteer coordinators



School of Earth and Environmental Sciences
Ysgol Gwyddorau'r Ddaear a'r Amgylchedd



Natural Environment Research Council

**Things
you'll need
to think
about**

Your purpose of monitoring

Your monitoring goals and objectives

The data you want to collect

The resources you have available

Your monitoring programme design



What is your overarching purpose of monitoring?



Educating and engaging yourself/ the general public



Improving scientific understanding of water quality



Influencing decision makers to address the issues

What are your specific monitoring goals and objectives?



Goals are your overall ambitions for monitoring, they are usually long-term



Objectives are realistic milestones you can work to achieve in the short-term

Designing a successful monitoring programme

Set your monitoring goals and objectives

Design your monitoring network

Run your monitoring programme

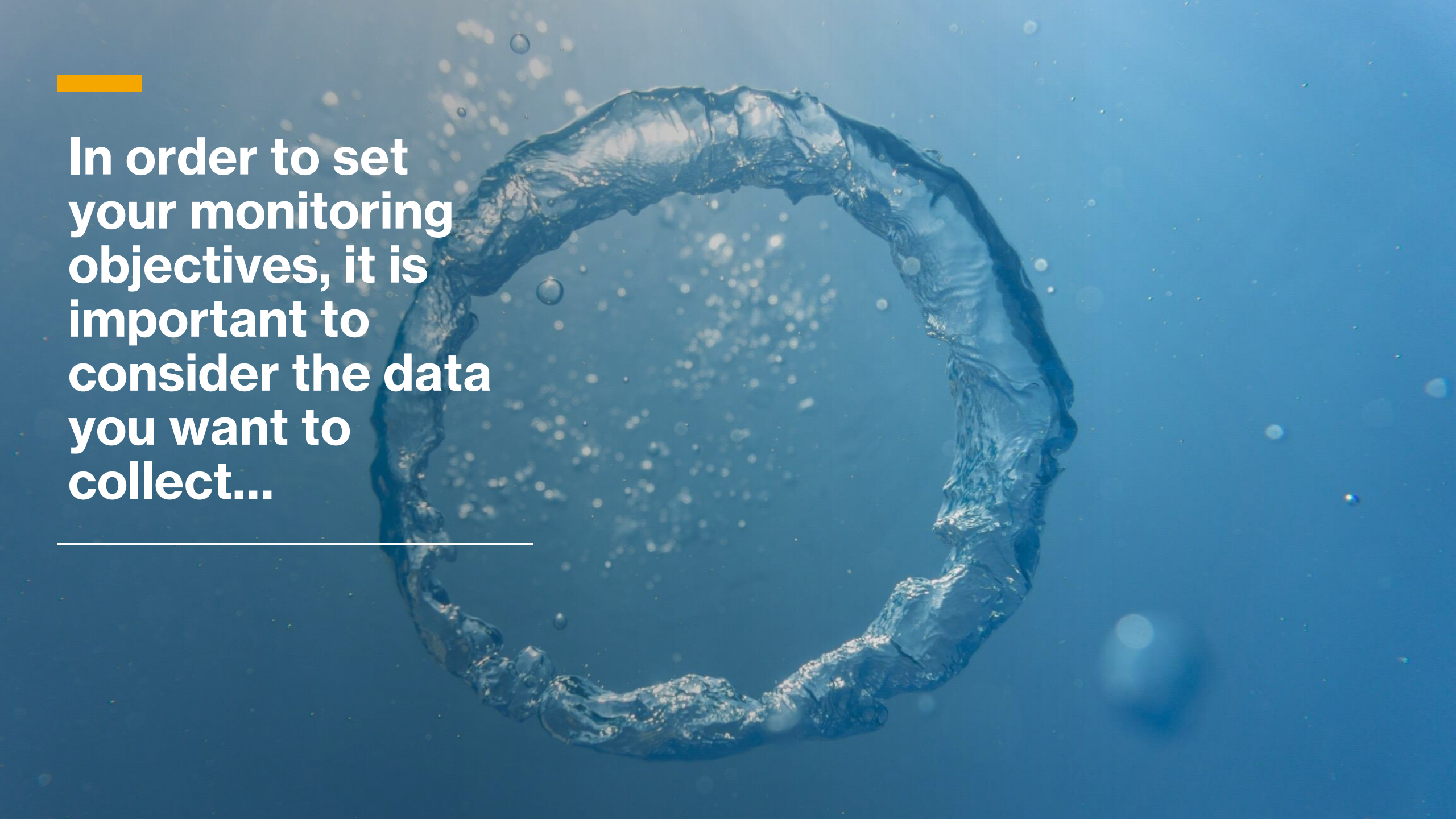
Analyse, share and review the data

Have you monitoring objectives been achieved?

NO

YES



A circular splash of water in a blue background with bubbles. The water forms a ring shape, and there are many small bubbles scattered throughout the scene.

**In order to set
your monitoring
objectives, it is
important to
consider the data
you want to
collect...**

What water quality information are you interested in?



Ecological health
- physical, chemical and biological



Drinking water
- physical, chemical and biological



Recreational or bathing water
- biological factors



Other
- known contaminants of concern

What would you like your data to do?

1

Show general trends and patterns in water quality

2

Highlight key issues or solutions that will be the focus of further research

3

Present evidence that “proves” the nature and severity of a problem

**Who are your
target data
users?**


Citizen scientists?

Local communities?

Landowners?

Decision makers?

Scientists?

A close-up photograph of a person's hand holding a silver pen and writing on an orange sticky note. The person is wearing a grey long-sleeved shirt and a ring. The background is a blurred office setting with other sticky notes in various colors (yellow, purple, green) on a whiteboard or wall. The text is overlaid on the left side of the image.

**Questions
you'll
eventually
need to answer
to help set your
objectives...**

What type of data do you want to collect?



Which and how many parameters do you want to measure?



How reliable/ high quality does the data need to be?



How much data do you want to collect?



What geographical region do you want to monitor?



How many sampling sites do you want to monitor?



How frequently do you want to monitor each sampling site?

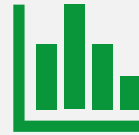


How long do you want to monitor for?

What are you planning to do with the data?



How do you plan to record and store the data?



How do you plan to review and analyse the data?



How do you plan to share the data with others?



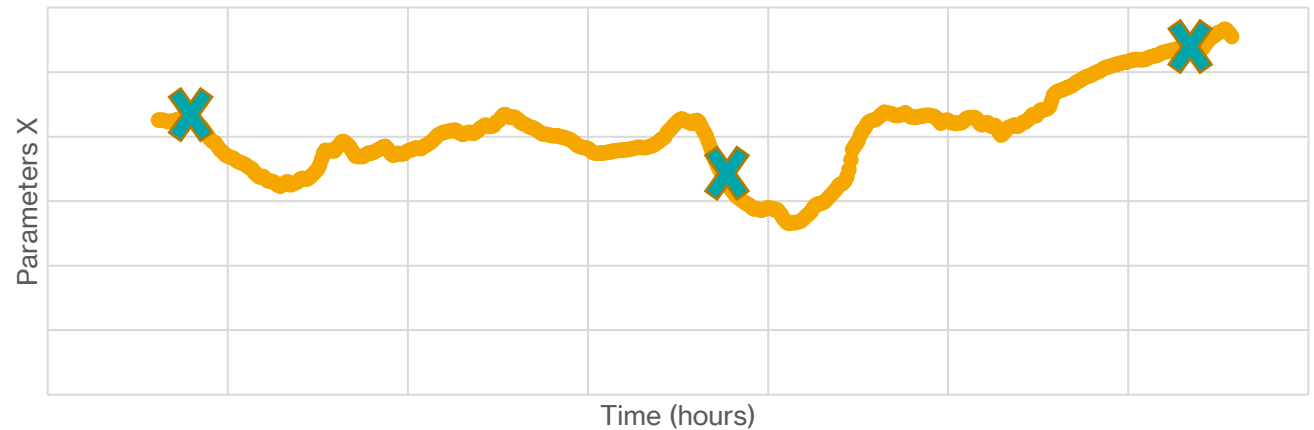
Thinking
more deeply
about data...

Data considerations for monitoring

Spatial coverage



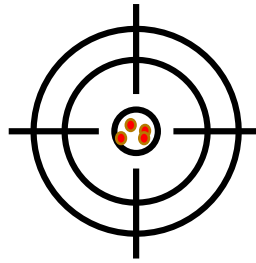
Temporal coverage



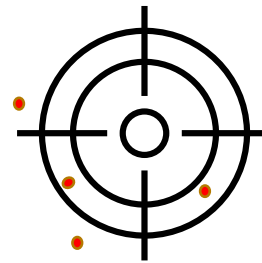
...And data quality....

What do we mean by data quality?

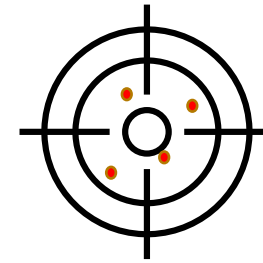
- Accuracy
- Precision
- Resolution
- Range



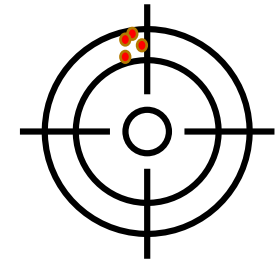
Accurate and Precise



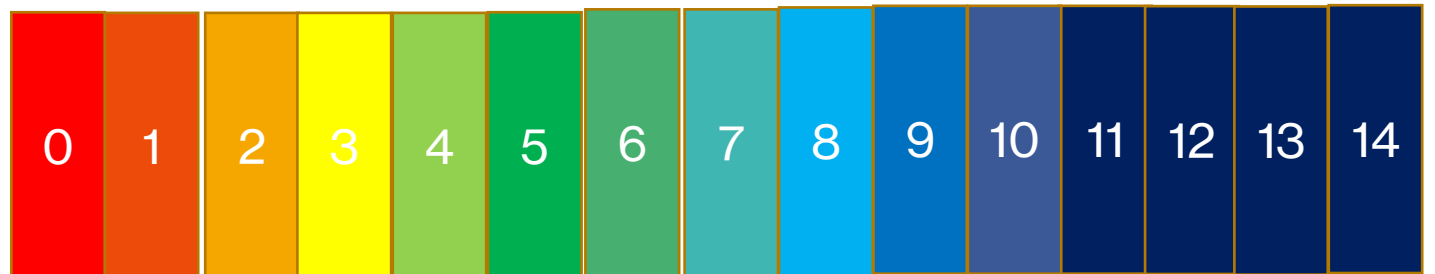
Not Accurate or Precise



Accurate but not Precise



Not Accurate but Precise



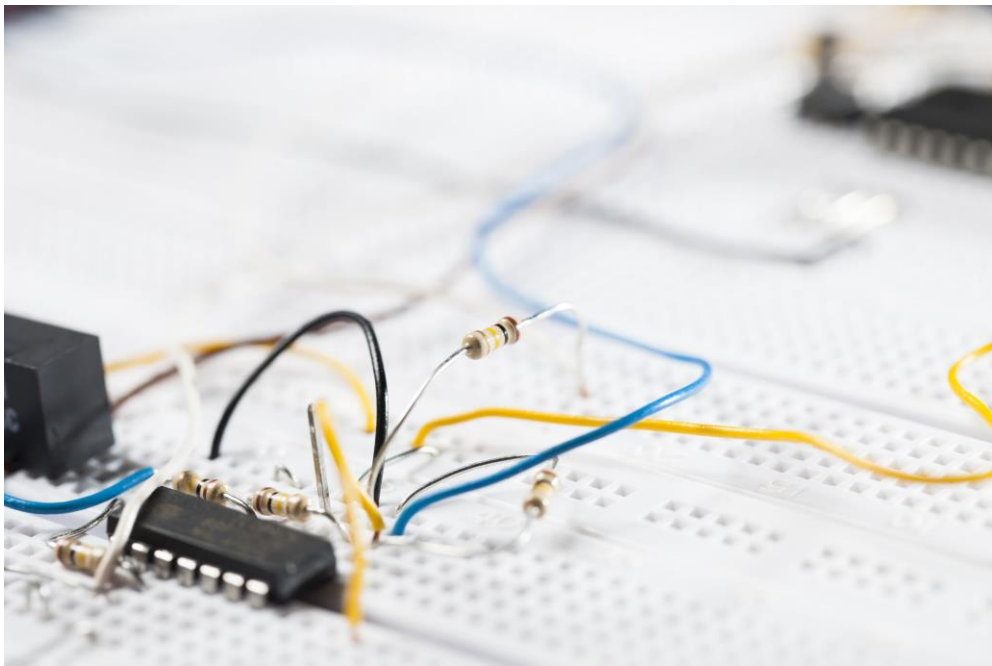
pH Scale

Range= 0-14

Resolution on colour chart= 1 pH unit

What affects data quality?

Equipment error



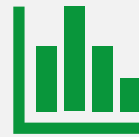
Human error



Types of data



Qualitative – a measure the presence or absence



Semi-quantitative – an estimate of the amount



Quantitative – an accurate determination of concentration



What's the difference between citizen science and professional monitoring?



Credit: Richard Greatrex, FOUW





Professional monitoring

- Professional scientists
- Analysis in the field or collecting samples for lab analysis
- Expensive kit and labour-intensive testing
- Fewer people involved

→ Spatial coverage

→ Temporal coverage*

→ Data quality





Credit: Richard Greatrex, FOUW



Credit: Moragn Jones, WSA

Citizen science monitoring

- Trained volunteers
- Analysis in the field or collecting samples for lab analysis
- More feet on the ground
- Cheaper kit and quicker testing

→ Spatial coverage

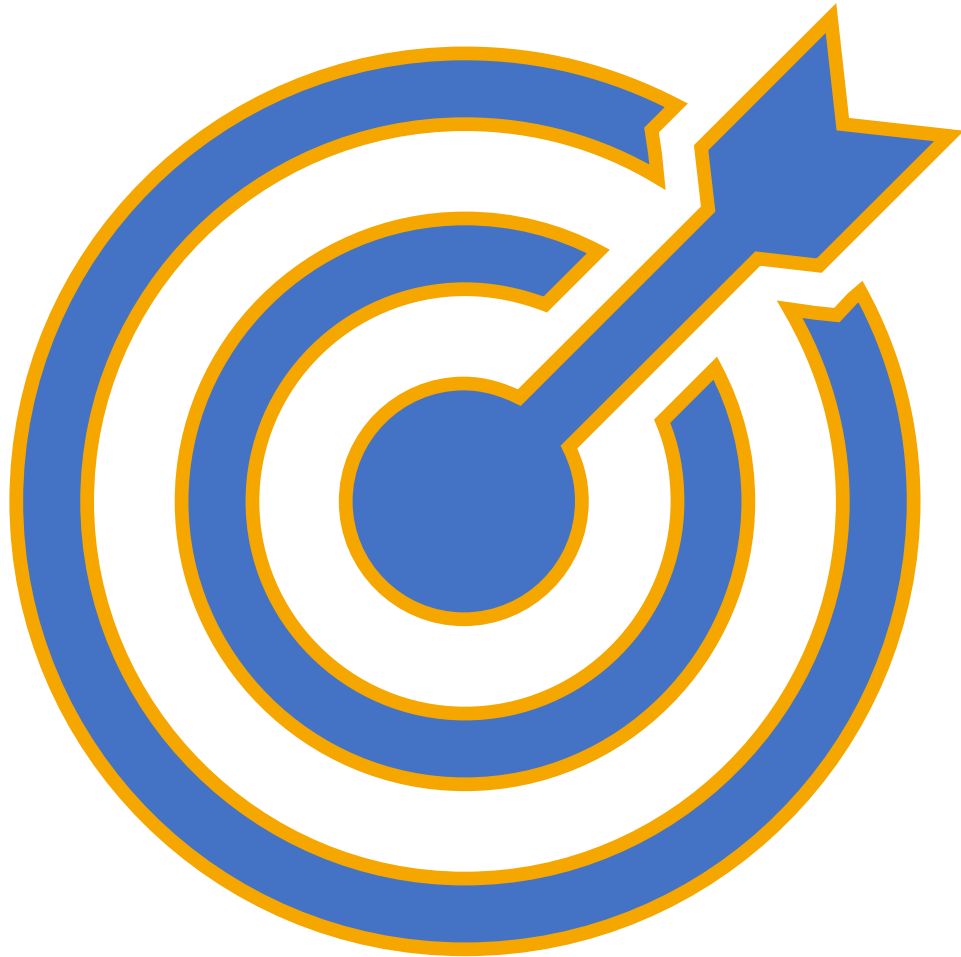
→ Temporal coverage*

→ Data quality



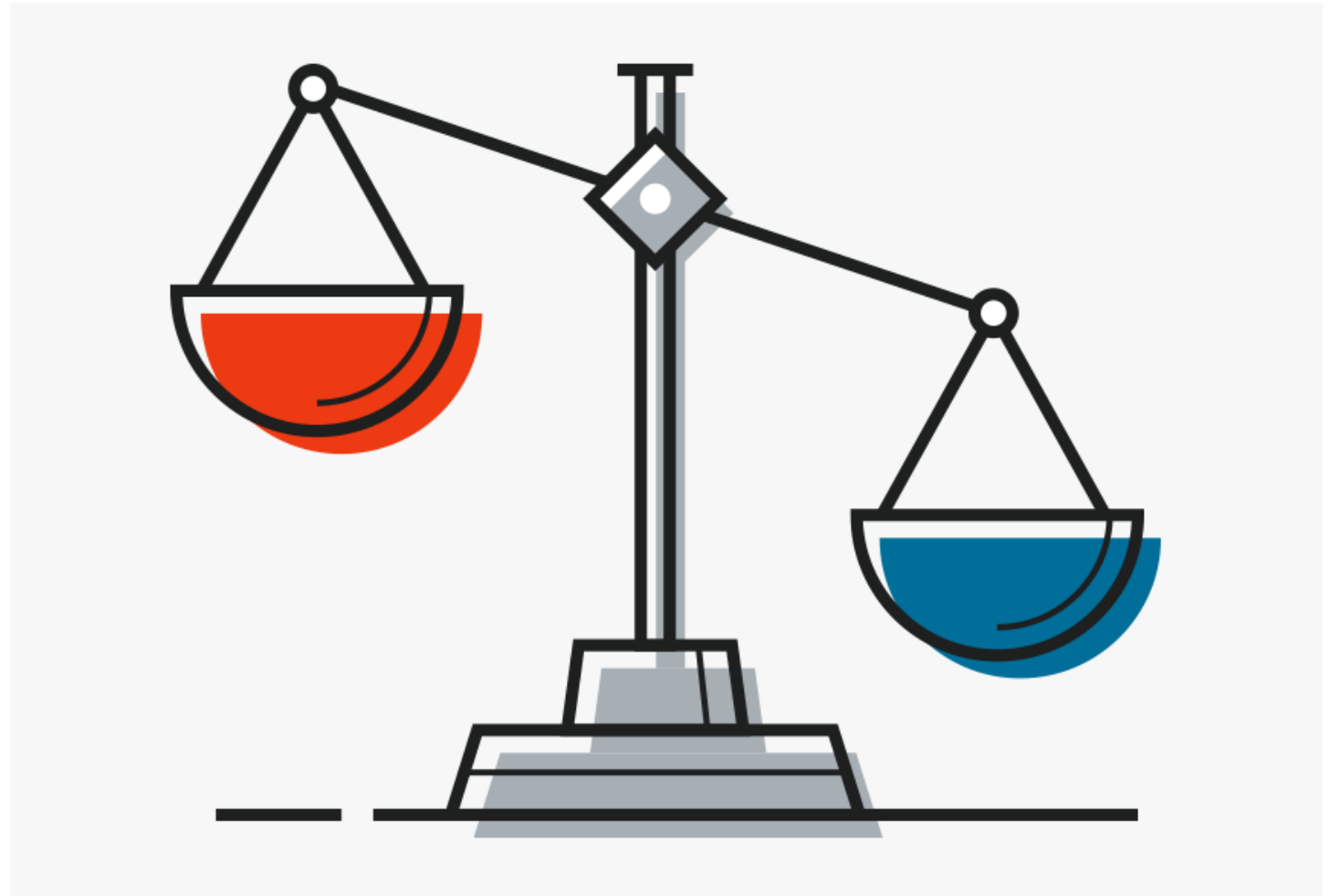
How can we make citizen science data better quality?

- Ensure volunteers are using monitoring equipment correctly
- Ensure methods are standardised
- Use better quality monitoring equipment
- Use methods that requires fewer steps for volunteers to undertake
- Assess the monitoring error



**Setting
achievable
monitoring
objectives**

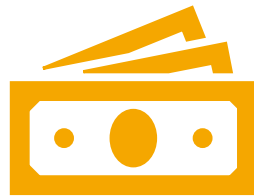
Monitoring objectives are a balance between your ambitions (monitoring goals) and the resources available



What resources do you have available?



Time



Money



Expertise

Get to know your volunteers



- Number of volunteers
- Time commitment
- Level of expertise or experience
- Willingness to learn new skills
- Willingness to travel
- Monitoring motivations

Get to know the support available



- Finance
- Expertise
- Tools
- Training

Once you know the resources available and the data you want to collect, you can set the objectives and begin planning the details of your monitoring programme...



What parameters and monitoring methods are you going to use?



Where and at how many sites are you going to monitor water quality across your region?



How frequently are you going to monitor water quality and how long will you monitor for?



How are you going to store and share the data?



How are you going to analyse the data?



How are you going to recruit, train and maintain volunteers?

**Upcoming
sessions in
this training
series...**





Session 2 – Selecting water quality parameters and monitoring methods

- Understanding water quality parameters
- Selecting the most appropriate water quality parameters
- Understanding the monitoring methods available
- Selecting the most appropriate monitoring methods and equipment for your monitoring programme

Session 3 – Using online data platforms

- Storing and sharing data
- Introduction to online data platforms
- Epicollect basics: How to add, view, download and share data
- Advanced Epicollect : How to create groups and forms

Session 4 – Planning a collaborative water quality monitoring programme for the Wye

- Monitoring collaboratively
- Site selection
- Sampling frequency
- Monitoring parameters and methods
- Data recording
- Data sharing
- Data analysis



Session 5 – Train the Trainer

- Volunteer management, motivation and retention
- Citizen science volunteer coordinator responsibilities
- What to cover and how to run a volunteer training session