Collecting eDNA from water, soil, sediment and air

How to collect, filter and preserve environmental DNA samples for 16S amplicon, metabarcoding and shotgun metagenomics, with contamination controls.

1. Water

Collection

- **Grab sampling:** collect a fixed volume (for example 5–8 L) into a sterile, DNA-free bottle. Use a depth sampler (for example Van Dorn) for deeper water.
- **Filtration (preferred):** filter as soon as possible through a 0.22–0.45 µm membrane using a peristaltic pump, hand vacuum pump or syringe filter. Remove the filter with sterile forceps into a sterile 2 mL tube.
- **No filtration available:** freeze the water directly at −20 to −80 °C.

Preservation

Keep filters in Longmire's buffer, ethanol or RNAlater in the field, or freeze at −20 to −80 °C.

Problem	Cause	Solution
Contamination	Equipment, bottles, human DNA	Gloves, sterile disposables, field blanks
DNA degradation	Sunlight, heat, delay	Filter quickly; keep cold or in buffer
Clogged filters	Turbid water, algae	Pre-filter, use several filters or less volume
Low DNA yield	Dilute or old samples	Larger volume; replicate samples

2. Soil and sediment

- Wear sterile gloves and use clean, sterile scoops. Remove surface debris (leaves) and collect about 5–10 g from 0–10 cm depth.
- Put into sterile tubes or Whirl-Pak bags. In variable sites, take several sub-samples and pool them.
- Freeze at −20 or −80 °C as soon as possible, or use a soil preservation solution or silica gel in the field.

Problem	Cause	Solution
PCR inhibitors	Humic acids, organic matter	Inhibitor-removal extraction kits
Cross-contamination	Shared tools between sites	Disposable or sterilised tools
Uneven results	Soil is patchy	Composite samples and replicates
Degraded DNA	Heat, microbial activity	Keep cool; process quickly

3. Air (advanced)

- Use an air sampler with HEPA or PTFE filters; volume depends on flow rate and time (for example 30 L/min for 30 minutes).
- Store filters on dry ice or in preservative, then at −80 °C. Wear full protection (mask, gloves, hair net): airborne DNA is very low and easily contaminated.

4. Good practice for all eDNA samples

- **Controls:** include a field or filtration blank (sterile water handled like a sample).
- Change gloves between samples; sterilise reusable equipment with bleach or ethanol, or use disposables.
- **Replicates and records:** collect replicates and note GPS, weather, time, temperature, pH and turbidity.
- **Transport:** keep on ice or in a cool box until frozen; avoid freeze–thaw.

Source	Method	Amount	Storage
Water	Filtration, 0.22–0.45 µm	0.5–5 L	–20 °C or buffer
Soil	Sterile scoop, tube	5–10 g	–80 °C or buffer
Sediment	Core or scoop	10 g or more	–80 °C or buffer
Air	HEPA / PTFE filter	Depends on airflow	–80 °C

Questions before sending samples? WhatsApp / phone +880 1308-222824 · bdgenome@yahoo.com · bdgenomes.com/guides/edna-environment/