THE STANDARD

Monitoring & Minimizing Human Impact

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

DCI — DISCIPLINARY CORE IDEA

ESS3.C · Human Impacts on Earth Systems

> *Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.*

Human activities change the environment in measurable ways. Water gets withdrawn from aquifers. Land gets converted from wetland to pavement. Pollutants enter air, water, and soil. As population and per-person consumption grow, the impacts usually grow with them. The exception is when the activity or technology is engineered to reduce that impact. **The standard is about that engineering work.**

SEP — SCIENCE & ENGINEERING PRACTICE

Constructing Explanations and Designing Solutions

> *Apply scientific principles to design an object, tool, process or system.*

Students aren't writing an opinion piece on the environment. They're applying scientific principles to design a method. That method has to do two things: monitor a specific impact with measurements, and minimize that impact with a testable solution. **If the design can't be measured or tested, it's not engineering yet.**

CCC — CROSSCUTTING CONCEPT

Cause and Effect

> *Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.*

Cause and effect is the lens. Students have to connect a specific human activity to a specific environmental change, then connect their solution to a specific reduction in that change. Correlation is not enough. Two things changing at the same time doesn't prove one caused the other. **The design has to isolate the cause it's targeting.**