

Bit Protect It

for anyone who loves the Earth

“It from bit. Every ‘it’ — every particle, every field of force, even the spacetime continuum itself — derives its very existence from the apparatus-elicited answers to yes-or-no questions, binary choices: bits.”

— John Archibald Wheeler, 1989

“Bit protect it.”

— Jed Anderson, 2026

Jed Anderson

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Everything in the world can be described.

The river is wide. The smokestack makes grey smoke. The forest is growing. The wind is blowing north.

If you can say it, you can write it down. If you can write it down, you can turn it into yes-or-no questions, the way children play Twenty Questions.

*Is the river blue? **Yes.** Is the river polluted? **No.** Is the smoke dangerous? **Yes.**
Is the wind blowing our way? **No.***

Each yes-or-no answer is called a bit. Bits are the smallest pieces of knowing. Everything we can know about the world can be written down as bits.



Everything in the world takes energy to change.

To move a rock, you have to push it. The rock pushes back. You have to work. That work is energy.

To clean up oil that has spilled into a lake, you have to gather all the oil, carry it away, and break it apart into safe pieces. That takes a lot of energy. Imagine pushing a thousand rocks up a thousand hills. That is about right.

The energy it takes to change the world has a floor. There is a smallest amount, set by the way atoms hold onto each other, and no cleverness can go below it. The floor has been the same since the universe was young. It will still be the same in ten thousand years.



Knowing also takes energy — but only a little.

To know that the river is polluted, you need something to look at it — a sensor, a camera, a measurement. To remember what you learned, you need a memory. Both use a little bit of energy.

How much? So little that you need very careful science even to notice it. Less than a breath. Less than a whisper. Less than the beat of a moth's wing.

Knowing one thing about the world is about two hundred times cheaper, in energy, than changing one thing about the world.

For whole rivers, whole airsheds, whole forests, knowing is about ten billion billion times cheaper than changing. A one with nineteen zeros after it. A number so big there is no ordinary word for it.



Why is knowing so much cheaper than changing?

Because knowing can squeeze. And matter cannot.

Imagine you wanted to describe every grain of sand on a beach. You could spend your whole life counting. But if all you needed to know was — is this beach sandy? — that is one question. One bit.

Knowing lets you throw away the parts that do not matter. You keep only what you need. That is called compression.

Matter cannot be compressed the same way. If you want to clean up every grain of sand, you have to touch every single grain. There is no shortcut.

Knowing compresses. Matter does not.



A tiny being named Maxwell's Demon.

In 1867, a Scottish scientist named James Clerk Maxwell imagined a tiny being standing at a little door between two rooms of air.

In the air of both rooms, some molecules moved fast — that is what makes things warm — and some moved slow — that is what makes things cool. All mixed together.

The tiny being had one small superpower. It could see each molecule coming. When a fast molecule was heading toward the right room, the being opened the door. When a slow molecule was heading toward the left room, the being opened the door. The rest of the time, the being kept the door shut.

The tiny being never pushed a single molecule. It only watched, and chose when to open the door.

After a while, without doing any work at all, the right room was warm and the left room was cool. The being had made order where there had been disorder — only by knowing.

For a hundred years, this puzzle bothered scientists. It looked as if the being were breaking the law of physics that says things mix and fall apart. How could a little being with eyes and a door reverse that law?

In 1961, a scientist named Rolf Landauer solved the puzzle. The being was not breaking any law. Every time it remembered a molecule and forgot it, the being paid a tiny price in energy — a price just large enough to balance the order it had created. The laws of physics were safe.

But something much larger had been revealed.

Knowing can do real work in the world. Not only by preventing harm — by directing matter itself.

By knowing which door to open, and when, the tiny being really did sort hot from cool. Really did create order. Really did rearrange the world. The cost was small. The effect was real.

This is a law of nature. It was proved in 1961, and has been confirmed many times since, in real laboratories with real particles.

Knowing is not passive. Knowing is active. Knowing can configure — can shape — can heal — can make whole.



What “Bit Protect It” can mean.

This is why “Bit Protect It” is bigger than it first sounds.

A bit — a tiny piece of knowing — can do many things for the Earth. Not only one.

Bit can prevent. If we know a bad thing is about to happen — a spill, a leak, a dangerous rise — we can stop it before it begins. An apple tree that never grew the bad apple takes no work to clean up.

Bit can find. If we know exactly where something is wrong — exactly which stretch of river, exactly which plume of air — we can act there, precisely, and leave the rest alone. A doctor with an X-ray fixes what needs fixing and does not disturb what is already well.

Bit can direct. Like Maxwell's tiny being at the door, knowing can sort mixed things back into place, separate what should be apart, reconfigure what has become chaotic. We do not push each molecule. We choose the right moment, in the right place, and the world rearranges itself.

Bit can regrow. A gardener who knows what seeds, what soil, what season, can plant very little and grow a whole garden. The knowing does the heavy lifting; life does the rest. A forest need not be built tree by tree. It needs to be known well enough that it can become itself again.

Bit can orchestrate. A conductor never plays a note. The conductor knows what the music should sound like, and with small gestures directs a hundred musicians to make something none of them could make alone. A planet-scale intelligence is like this — not a controller, not a forcer, but an orchestrator of knowing.

Each of these is information doing real work, at small cost. Each of these is a way a bit protects an it.

*To protect is to prevent, to find, to direct, to regrow,
to orchestrate. All of these, at the floor of physics, can
be done by knowing.*



We can build a nervous system for the Earth.

We now have something new in the world. We have computers that can think. We have sensors everywhere — in the air, in the water, in the soil, in the sky. We can see almost everything. We can know almost everything.

If we put all this knowing together — sensors, computers, and the right kind of thinking — we get a kind of nervous system for the whole planet. People have started to call it Environmental Superintelligence.

Not so the planet can be controlled. So the planet can be known. So we can act, together, at the right moments, in the right places — like Maxwell's tiny being at the door, but on the scale of the Earth, and in the service of life.

This is the work. It is beginning. It is ours to build.



There is one beautiful equation.

A child does not need to memorise it. But it is beautiful, so here it is:

$$\Delta G = \Delta H - E_{\text{bit}} \cdot \Delta H_{\text{Shannon}}$$

It looks like nothing. What it says is this:

Whatever we want the world to be, the cost is what it takes to move its pieces minus what it takes to know about them.

The first part is expensive. The second part is cheap, and is getting cheaper every year.

Whoever knows more will move less. Whoever moves less wisely will protect more. And whoever knows most carefully — like the tiny being at the door — will be able to configure, restore, and regenerate what no amount of pushing could ever fix.



The whole thing in one sentence.

There is a proposition at the heart of this. It is small enough to fit in one line.

The Earth is protected, restored, and made whole by knowing — far more than by doing.

This is not an opinion. It comes from physics. The laws of physics are the same for a child blowing on dandelion seeds as for a star being born. They work everywhere. They are fair. They cannot be argued with. And they say, quietly but clearly, that knowing is cheaper than doing — and getting cheaper — while doing stays expensive forever. And beyond that, knowing can do what doing alone cannot: it can configure, it can orchestrate, it can heal.



Bit protect it.

A bit is a tiny piece of knowing. An it is anything in the world worth protecting — a river, a forest, a child, a sky.

A bit can prevent harm before it begins. A bit can find harm with surgical precision, so that almost nothing else must be disturbed. A bit can direct matter into its right place. A bit can help what has been broken grow back. A bit can orchestrate the whole of a living world toward thriving.

The shortest true thing the physics will let us say is this:

Bit protect it.

A tiny piece of knowing, carefully placed, can protect — and heal, and restore, and orchestrate — a thing much larger than itself.

For anyone reading this who loves the Earth — of any age, in any place — the invitation is simple. Know it. Watch it. Understand it. Tell others what you see.

Choose to know more, so the whole living world has more of a chance, in more of the ways knowing can help.

That is the whole thing.

Onward. Upward.

A companion to Bit Protect It: An Informational Theory of Environmental Stewardship.

The scientific paper contains the derivations, the mathematics, and the falsifiers.

This companion contains only the truth, in ordinary words.