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Earth rises above the Moon's horizon, photographed from the Apollo 17 spacecraft in 1972.

SUSTAINABILITY

Earth, the long view

Emma Marris relishes a joyous vision of planetary stewardship over the long haul.

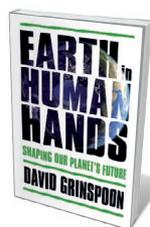
David Grinspoon thinks on scales of billions of years and millions of planets. He studies the climates of Venus and Mars, but his latest book, *Earth in Human Hands*, is concerned with our home world. Interestingly, the very, very big picture turns out to be a lot rosier than the short-term forecast.

The things that seem apocalyptic to many environmental scientists become biogeochemical blips in the long story of Earth. The plastic we've dumped into the ocean? A new kind of rock in the geological record. Climate change? A mistake that we should be able to start correcting within a century. Lost species? Minor casualties on the road to a much more stable and less extinction-prone biosphere. We might lose our current coral reefs, writes Grinspoon, but we'll probably get them back in a million years or so.

He does not dismiss the environmental disasters that have accompanied humanity's rise to a population of seven billion. Instead, he sees our mistakes as a key test of our maturity as a species. We aren't evil, he asserts,

"just confused" — "like an infant staring at its hands". The big question is, will we grow up? Climate change and other challenges may be the test of our ability to turn into the planetary managers we must eventually become, if we are to last much more than a few millennia.

For Grinspoon, the fact that we have become so numerous, moved so many species from continent to continent, changed the chemical composition of the soil and rerouted the planet's water does not call for a retreat, but rather for a conscious switch from inept global blundering to coordinated, rational management. To do this, we'll have to learn much more about how Earth works, and for that we'll need the insights we can glean from other planets and a bit of temporal expansion in our world(s) view. For example, our climate models can be informed by conditions on the inferno that is Venus. Eventually, we



Earth in Human Hands: Shaping Our Planet's Future
DAVID GRINSPOON
Grand Central: 2016.

as a species will need to think on timescales of millennia to deal with major climate fluctuations caused by the Milankovitch cycles — Earth's movements towards and away from the Sun thanks to the tiny gravitational pulls of the Moon, Jupiter and Saturn.

The switch will probably eventually include geoengineering, he says — but not short-term planet hacks such as shooting sulfur particles into the atmosphere or fertilizing the sea with iron filings, of which he is deeply sceptical. He advocates subtle tweaks such as using synthetic photosynthesis in the distant future, mainly to keep the planet from straying from the current balmy interglacial period into another ice age. This wouldn't be a climactic gamble in a time of crisis so much as long-term terraforming.

Grinspoon's writing is clear, informal and funny. He is clearly a book-lover as well as a fan of the cosmos, and he has mined vintage popular-science books as well as science fiction for exciting ideas and key quotes. The result can feel like a pub conversation with a well-read, quick mind. I would have liked a few more concrete examples of what he wants us to do in the near and long term. Nevertheless, the vision of taking responsibility for Earth in a joyous and optimistic way is striking.

Traditional conservationists who prefer the idea of humanity shrinking its population and impact are sure to see Grinspoon's call as the height of arrogance. Indeed, he says that the idea of introducing an Anthropocene epoch to the geological timescale does not go far enough in marking the difference that our species could make to Earth's trajectory. Epochs demarcate time on the order of a few million years. Grinspoon foresees that human management will usher in a whole new eon, a sweep of half a billion years or more, for which he has already coined a label: the Sapiezoc.

Maybe thinking in these grand terms isn't such a bad idea. Grinspoon doesn't want us to manage Earth just for our own pleasure, but for all the species on board. He advocates "planetary intelligence": merging our sense of selves with the whole biosphere, living and nonliving, to guide our planetary management. In this view, we are Gaia, he argues, and Gaia, it is worth remembering, has been around for three billion years — more than one-fifth of all time.

It is clearly time for us to start acting our age. We can begin by cleaning up the messes we've made — cutting emissions, sucking carbon out of the air, protecting places and species. And then we can start making plans for the next couple of million years. As Grinspoon writes, "Someday, we may be the best thing that ever happened to life on Earth." ■

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