

"Losing Earth" Full Text Summary

1.1: 'This Is the Whole Banana' (Spring 1979)

In spring 1977, Rafe Pomerance and Betsy Agle, coworkers at the non-governmental environmental organization Friends of the Earth, read an EPA publication where the author "noted that the continued use of fossil fuels might, within two or three decades, bring about 'significant and damaging' changes to the global atmosphere" (11). Pomerance was surprised that the two of them had not heard of this issue since they were environmental lobbyists. He contacted geophysicist Gordon MacDonald to learn more about the greenhouse effect.

In 1977 and 1978, MacDonald and other members of JASON, an elite team of scientists, wrote a report on the long-term impact of carbon dioxide on climate. This report indicated that as concentrations of carbon dioxide in the atmosphere increased, so would the global temperature, resulting in worldwide catastrophes. The report had been shared widely among U.S. government agencies, but no action was taken by scientists or policymakers. Pomerance and Gordon began presenting this information to government officials and members of the press to raise the profile of the issue. President Carter's Office of Science and Technology Policy decided to commission a group of scientists headed by Jule Charney to study whether the situation was as dire as MacDonald predicted.

1.2 The Whimsies of the Invisible World (Spring 1979)

James Hansen was a scientist at NASA's Goddard Institute for Space Studies in Manhattan who studied how the concentration of carbon dioxide impacted the surface temperature of Venus and other planets. As NASA expanded its study of earth's atmospheric conditions, Hansen utilized new data on Venus's atmosphere from the Pioneer spacecraft to create computer models of how humanity impacted the Earth's atmosphere.

1.3 Between Catastrophe and Chaos (July 1979)

Jule Charney and the group of scientists he selected to review all available science on the greenhouse effect met at Woods Hole, MA in July 1979. While researchers had raised the specter of global warming in the past, they had also emphasized the uncertainty of their predictions. Uncertainty is an integral part of climate science modeling since it relies on predictions and/or approximations. This is why the JASON prediction of global warming ranged from two to three degrees. "Charney's scientists were asked to quantify that uncertainty" (17).

Before the meeting, Charney asked Hansen to use computer simulations to model a future with double the amount of carbon dioxide in the atmosphere. Hansen's simulations predicted a four degree Celsius global temperature increase, twice as much as the prediction made by scientist

Syukuro Manabe, who was the first to model the greenhouse effect. Another computer modeler at Woods Hole, Akio Arakawa, thought the best estimate lay between Manabe and Hansen's models. He predicted that "global temperatures would increase between 1.5 and 4.5 degrees Celsius with the most likely outcome a warming of three degrees" (20).

The Charney report, "Carbon Dioxide and Climate: A Scientific Assessment," was published a few months later. It stated that when the amount of carbon dioxide doubled, the planet would most likely warm by three degrees Celsius. The report was accepted by the federal government, the scientific community, and the oil and gas industry as settled fact.

1.4: 'A Very Aggressive Defensive Program' (Summer 1979-Summer 1980)

After the release of the Charney report, multinational oil and gas corporation Exxon created its own carbon dioxide research program to understand how much of the problem the company could be blamed for and how future restrictions on carbon emissions could impact its business. Exxon had already been studying the carbon dioxide problem and its scientists had published a study on the relationship of fossil fuel consumption and concentrations of carbon in the atmosphere in 1957. The American Petroleum Institute also investigated the issue and concluded that the burning of fossil fuels led to global warming.

However, members of the oil and gas industry did not act on this information during the mid-twentieth century. They argued that people would learn to live with global warming and that if nobody in the U.S. government or the environmental movement worried about rising global temperatures, neither should they. These companies had other critical issues to worry about and people were concerned that reducing or halting energy production would slow economic growth. The acceptance of the Charney report changed the industry's perspective because companies feared that blame for warming would fall on them and new policies designed to combat the greenhouse effect would impact their business.

Government agencies, scientists, and politicians did begin to respond to the Charney report in 1980. The first congressional hearing on the greenhouse effect was held in April, President Carter directed the National Academy of Sciences to study climate change in June, and the National Commission on Air Quality invited climate experts to propose policy at a meeting in October. "It seemed that some kind of legislation to restrict carbon combustion was inevitable" (21).

1.5: 'We Are Flying Blind' (October 1980)

The meeting to create U.S. climate policy convened in Florida at a hotel locals call the Pink Palace. The group included policy experts, scientists, government officials, an Exxon senior researcher, and Rafe Pomerance. They had three days to create a policy addressing climate change from scratch. Everyone seemed to understand the urgency of the problem and the need to develop a solution at the meeting, but nobody could agree on what to do. How could you end fossil fuel production without the collapse of the economy? What energy technologies

would take the place of coal, oil, and gas? How much atmospheric carbon dioxide would be safe? Once policy was proposed, would the issue be politicized?

The EPA moderator running the meeting, Thomas Jorling, suggested that the group avoid proposing specific policy since they were having so much trouble agreeing on anything. Instead he suggested that others could worry about the specifics of climate and energy policies. Pomerance worried that if they did not suggest any concrete policies, nothing would ever happen, but most of the others seemed content with Jorling's idea: "If changes did not occur for a decade or more . . . those in the room couldn't be blamed for failing to prevent them. So what was the problem?"(26) As a compromise, Pomerance requested that the group consider modest ideas like a carbon tax or organizing an international summit on climate change before they began drafting the final statement.

When the experts regrouped to write their final statement, they could not even get past the first paragraph's language about the likelihood of climate change occurring. Despite agreeing on the existence of global warming, the role of atmospheric carbon dioxide, and that climate change would have profound effects on the earth and its inhabitants, they never drafted any policy proposals or even a second paragraph. The final product of the meeting was a weakly worded statement questioning whether enough was known about climate change to make policy recommendations. Only Jorling signed it. Pomerance left convinced that strong leadership was needed before anyone would act on the issue, and he hoped to find someone to fill that role.

1.6: 'Otherwise, They'll Gurgle' (November 1980-September 1981)

Four days after the Pink Palace meeting, Ronald Reagan was elected president and he began to roll back environment protections by appointing officials to the Interior Department and EPA who supported fossil fuel production and deregulation. Even moderate and liberal members of the Republican Party worried about the administration's aggressive deregulatory policies.

While the Reagan administration aimed at eliminating environmental protection laws and regulations, policy experts and the press continued to discuss the Charney report, though with little regularity. Pomerance knew that in order to push a legislative solution, climate change needed more news coverage. In August 1981, he read about a forthcoming paper on global warming by James Hansen and called to ask for a meeting.

During their meeting, Pomerance realized that Hansen had a talent for translating complex science into plain English. Hansen could be the voice that the climate change movement needed to raise the profile of the issue. He would also benefit from bringing visibility to his work.

The Reagan-appointed director of the Department of Energy's Carbon Dioxide Program, Fred Koomanoff, had already summoned Hansen to Washington to justify his departmental funding.

Hansen was worried that his office would be defunded as part of the administration's effort to slash the federal budget and undermine federal environmental policy and research.

1.7: 'We're All Going to Be the Victims' (March 1982)

The White House's plan to eliminate the Carbon Dioxide Program gave a young congressman from Tennessee named Al Gore an opportunity to hold a congressional hearing on the greenhouse effect. Gore became interested in the greenhouse effect during college, and as the chairman of an oversight subcommittee in the Committee on Science and Technology, he could quickly put together a hearing designed to shame the White House into continuing to fund the program. Gore knew that political theater needed both a hero and a villain. He intended for Hansen to serve as the hero scientist while Koomanoff played the villain bureaucrat. Both were asked to testify at the hearing.

On March 25, 1982, Hansen testified for the subcommittee and a thinly populated audience. Both the Republicans and Democrats in attendance agreed that the greenhouse effect was a problem, but while Republicans pushed for action, the Democrats on the subcommittee argued for more studies. The invited experts sided with the Republicans because they believed that the longer politicians waited to act, the worse the outcome would be. Researchers could debate about whether observable climate changes would occur in one decade or in a few decades. However, from a geological perspective where time is often measured in intervals of million of years, the difference between ten and thirty years was negligible. The time for action was now.

1.8: 'The Direction of an Impending Catastrophe' (1982)

The hearing was a public relations success for Gore, but Hansen's carbon dioxide research remained unfunded. While he remained a government employee, Hansen was contacted by a possible source of external funding: Exxon. The oil company had committed more money to global warming research and offered to fund a climate change summit organized by Hansen. Edward David Jr., the president of Exxon's research division, gave the keynote address in which he "pledged that Exxon would revise its corporate strategy to account for climate change, even if it were not 'fashionable' to do so. As Exxon had already made heavy investments in nuclear and solar technology, he was 'generally upbeat' that Exxon would 'invent' a future of renewable energy" (32). Congressional Republicans rejected many of the White House's plans to roll back EPA regulations and expand fossil fuel production. In addition, public awareness of the carbon dioxide issue was increasing. Hansen hoped that all of these factors would force the Reagan administration to reexamine its energy and environment policies and lead to policies designed to combat climate change.

2.1: 'Caution, Not Panic' (1983-1984)

After the release of the Charney report in 1979, President Carter asked the National Academy of Sciences to conduct a comprehensive analysis of the greenhouse effect. Over the next three

years, about 100 experts, including members of the Charney group, created a new report. The Reagan administration said it had not been ignoring the carbon dioxide problem, it had just been waiting to consider climate policy until the report was published. Companies like Exxon and General Motors, and activists like Rafe Pomerance, also eagerly awaited the report.

The 496-page report, "Changing Climate," was distributed on October 18, 1983. While it was comprehensive, there was no significant new information in it. The report provided the same results and conclusions presented in the Charney report and other government publications on the greenhouse effect. In the document, committee chairman William Nierenberg, wrote that urgent action was needed, but in public, he downplayed the immediacy of the problem and argued that future generations would be better equipped to handle the challenges brought by climate change.

The press chose to focus on Nierenberg's downplaying comments rather than the content of the report, so the message the American public received was that while global warming might be a problem in the future, nothing had to change in the present. The Reagan administration "used Nierenberg's optimism as reason to ignore the EPA's 'unwarranted and unnecessarily alarmist' report and warned against taking any 'near-term corrective action' on global warming" (38). The lack of response to the report also impacted the fossil fuel industry's stance on carbon dioxide research and energy development. Exxon reverted back to focusing on carbon-based fuels, as did other oil, gas, and coal companies and industry groups. Though "Changing Climate" concluded that the greenhouse effect existed and it would cause global temperatures to rise resulting in climate change, the messaging that nothing could be done at the present led politicians, the public, and companies to drop the issue or continue to ignore it.

2.2: 'You Scientists Win' (1985)

While concern about the greenhouse effect receded, a new atmospheric disaster emerged in the public consciousness. A group of British scientists wrote a paper about the decreasing concentration of ozone in the atmosphere, which could lead to a rise in skin cancer, a decline in agricultural products, and the end of the marine food chain. The alarming concept of a hole in the ozone layer (despite there being no specific hole) scared people. The accompanying visuals, including colored imaging that showed a dark void over the South Pole, cemented the concept that the atmosphere had been ripped or torn by man-made chlorofluorocarbons (CFCs) used in refrigerators and aerosol cans. Intergovernmental agencies like the United Nations Environment Program had already tried to reduce CFC emissions, but only after the public became concerned about the ozone hole were they successful. Despite protestations from companies that used CFCs in the U.S., the Reagan administration proposed a 95% reduction in CFC emissions as part of an international treaty. Public pressure had been successful in driving political action on the environment, even in the face of corporate resistance.

Many of those involved in the fight for ozone policy thought that they could use the momentum to fight for carbon dioxide reduction policy too. At one international meteorological meeting in 1985, those in attendance took the unusual step of discussing

climate change policy in addition to the science of climate change. They wanted people to use their research to take action, not just sit by while the world warmed. The final report from the meeting warned that while some warming would happen no matter what, aggressive national and international policies could prevent the worst consequences. The ozone problem and the international treaty to reduce CFC emissions could serve as a template for a global treaty to cut carbon emissions and limit global warming.

2.3 The Size of the Human Imagination (Spring-Summer 1986)

Rafe Pomerance, now with World Resources Institute, reluctantly decided to use the ozone issue to revive discussion of carbon dioxide policy. He was concerned that if both issues were presented together, people would conflate the two issues. Despite his concern, Pomerance persuaded Senator John Chafee to hold back-to-back hearings on ozone depletion and carbon dioxide in June 1986. A new animated simulation of the "ozone hole" over the South Pole provided a more powerful visual of the problem. If "earlier colorized images were crime-scene photographs, Watson's video was a surveillance camera catching the killer red-handed" (42). Despite the fact that ozone researchers used a simulation just like the Charney group had used to predict global warming, the visualization of the simulation made the results seem not only conclusive but of the utmost urgency.

As Pomerance suspected they would, people did conflate the two crises. However, their confusion actually worked in his favor. Despite the fact that the scientists' testimony did not present any new information on the greenhouse effect, the hearing was packed and the newspaper headlines the next day emphasized the urgency of the problem. In his opening statement, Senator Chafee urged governmental action on climate change and to reach out to the Soviet Union to craft an international treaty restricting carbon emissions. Other experts and politicians at the hearing echoed the need for immediate action. Pomerance marveled at the broad attitudinal shift and attributed it to the visualization of the ozone hole. The old saying is that people believe what they can see, and in this case, that seemed to be true.

2.4: 'Atmospheric Scientist, New York, N.Y.' (Fall 1987-Spring 1988)

After signing the Montreal Protocol of 1987, a treaty limiting the use of CFCs, most people believed that the next treaty to be signed would be a limit on carbon emissions. Congress held eight days of climate hearings across three committees in the Senate and the House and both bodies began deliberating on legislation. At a conference on climate change in October 1987, James Hansen noted that the event was sponsored by BP America, General Electric, and the American Gas Association. The 250-person audience included veteran climate scientists, politicians, activists from environmental organizations including Rafe Pomerance, executives from fossil fuel and energy companies, and officials including Fred Koomanoff and his counterparts from Western Europe and the Soviet Union. Speakers expressed the hope that these various stakeholders could work together to address climate change and researchers presented their latest work. A solution seemed possible.

However, Hansen's optimism was short-lived. He was scheduled to testify before the Senate Committee on Energy and Natural Resources in early November and he had submitted his formal statement for approval by the White House's Office of Management and Budget (OMB). Usually the agency rubber-stamped his document and sent it back, but this time the White House demanded he change his testimony, censoring scientific findings about global warming with no explanation. Hansen refused to make the changes, so a NASA administrator suggested he testify as a private citizen. The OMB could restrict a government witness but had no control over what a private citizen said.

At the hearing on November 9, 1987, Hansen was introduced as a scientist from New York and he was prepared to tell the committee that "although his NASA colleagues endorsed his findings, the White House had insisted he utter false statements that would have distorted his conclusions" (46). However, none of the senators asked him why he appeared as a private citizen rather than as a NASA scientist. While he was ultimately able to present his research, the censorship bothered Hansen. It was evidence that someone in the White House hoped to prevent a debate over climate change legislation even though the effort had broad support with politicians from both parties.

In March 1988, 42 Republican and Democratic senators demanded President Reagan call for an international treaty on carbon emissions. In May, the president signed a joint statement with the leader of the Soviet Union that included a vow to cooperate on global warming, but no specific policies were included. Despite all the hearings, the cooperative conferences, public support, and bipartisan calls for action, nothing had actually happened to change energy consumption and reduce carbon emissions.

2.5: 'You Will See Things That You Shall Believe' (Summer 1988)

The summer of 1988 was unbearably hot and dry. Wildfires spread across the country. Droughts left crops withered and riverbeds dry. Temperatures soared. On June 22, James Hansen told Rafe Pomerance that the most recent temperature data indicated that 1988 was on pace to be the hottest year ever. He planned to incorporate this information in his testimony the next day as proof that global warming was happening.

2.6 'The Signal Has Emerged' (June 1988)

Hansen believed that the heat was not random, but rather a signal of climate change. He planned to say as much at the Senate hearing on June 23, 1988. He was the first speaker and star witness at the hearing, and his statements were clear. He said that "the warming trend could be detected 'with 99 percent confidence,' and that the greenhouse effect 'is already happening now.' But he saved his strongest comment for after the hearing, when he was encircled in the hallway by reporters. 'It is time to stop waffling so much,' he said, 'and say that the evidence is pretty strong that the greenhouse effect is here'" (47).

2.7 'Woodstock for Climate Change' (June 1988-April 1989)

There was hope after the hearing that legislation with specific targets for reducing carbon emissions would be passed. Rafe Pomerance proposed a 20 percent reduction by 2000, which he believed was plausible based on current technology and knowledge. He brought up this proposal with everyone he met at Canada's Conference on the Changing Atmosphere a few days after the Senate hearing. By the end of the conference, all 400 scientists and politicians at the meeting signed the final statement calling for a 20 percent reduction in carbon emission by 2005.

As a result of Hansen's testimony and the conference statement, public awareness of the greenhouse effect increased. In Congress, action to determine the amount of carbon emitted by Americans and how it could be reduced by 20 percent was proposed. Global warming became an important subject on the presidential campaign trail and George H.W. Bush, the vice president and Republican presidential candidate, embraced it. Fossil fuel companies resigned themselves to the likelihood that new taxes or regulations were imminent. Thirty-two climate bills had been introduced by the end of 1988 and it seemed inevitable that one or more would be signed into law.

Other countries acted too, with either domestic legislation or calls for an international treaty on the atmosphere. The United Nations also got involved in the climate policy effort. At a meeting of the Intergovernmental Panel on Climate Change (IPCC), James Baker, the new Secretary of State, declared that the world "can probably not afford to wait until all of the uncertainties about global climate change have been resolved" (51). This urgency was shared by much of Congress. In April 1989, 24 Republican and Democratic senators asked President Bush to cut emissions in the U.S. and follow through on the promises he made about environmental policy on the campaign trail.

2.8: 'You Never Beat the White House' (April 1989)

While many American politicians had accepted the science presented on the greenhouse effect and climate change, not all of them had. John Sununu, Bush's chief of staff, had a distrust of scientists who mixed their work with politics. Sununu, who had a PhD in mechanical engineering from MIT, "still thought of himself as a scientist" (51). However, he "lacked the reflexive deference that so many of his generation reserved for the class of elite government scientists" (51) and opposed most climate change policy and regulations that limited carbon emissions, which he thought would stifle economic growth.

Sununu had an ally at the White House's Office of Management and Budget, Director Richard Darman, who alerted him to Hansen's upcoming testimony at a hearing called by Senator Gore. Just as before, Hansen submitted his prepared statement for clearance by the OMB and Sununu did not like what he had to say. At the same time, he was also battling with the EPA administrator about America's role in creating international climate change policy. The EPA

administrator leaked the argument to the press, further infuriating Sununu and making him even angrier about the effort to pass carbon emission policies.

2.9: 'A Form of Science Fraud' (May 1989)

In late April 1989, Hansen was preparing to testify at a new hearing called by Al Gore. He wanted to clarify that global warming would not just cause more heat waves, but also other extreme weather events such as floods. When he received his remarks back from the OMB, he was surprised to find that the editing and deletion was much more extensive than it had been on previous reviews. Hansen told the OMB liaison that he would let the White House have its way, but came up with a plan to let people know about the censorship. Hansen wrote a letter to Gore explaining that the edits "not only render[ed] his testimony meaningless but [made] him sound like a moron" (54). Gore shared the letter with the press, and when Hansen arrived in DC, the story was on the front page of the paper.

At the crowded hearing, Hansen read the edited statement and Gore asked him why it made no sense. Hansen said he had not written it. Gore then accused the Bush administration of science fraud for altering the content of the remarks. Another government scientist testifying also admitted that the White House tried to change his remarks with unscientific statements. After the hearing, the press swarmed Hansen and Gore. Gore told them that "they're scared that Hansen and the other scientists are right and that some dramatic policy changes are going to be needed, and they don't want to face up to it" (55).

The censorship got more attention than Hansen's testimony would have on its own. The press attacked the White House for interfering with the presentation of scientific findings and for not addressing climate change. The White House blamed the censorship on a low level official and sent Darman to apologize personally to Gore. However, Gore suspected that neither the low level official nor Darman was responsible, but rather someone high up in the administration.

2.10: The White House Effect (Fall 1989)

The Bush administration tried to figure out whether there was a way to reverse the bad press that resulted from the censorship scandal. Sununu signed a statement endorsing a proposal for an international treaty and a workshop to improve understanding of the science and economic cost of emissions reduction. Rafe Pomerance was not convinced that this was a step toward actually doing something, but the press generally praised the statement.

Sununu still did not acknowledge the greenhouse effect. He decided to study the issue himself and concluded that the models were imprecise and the people warning about climate change were wrong. The relationship between Sununu and the head of the EPA soured to the point of open hostility. At the same time, President Bush was indifferent on the issue and he avoided briefings on science issues. Any time the issue of climate change arose, he deferred to Sununu. Many EPA scientists believed this meant that they had lost their chance to create policy that would cut greenhouse gas emissions.

2.11: 'The Skunks at the Garden Party' (November 1989)

In November 1989, 400 officials from 65 countries met in Noordwijk, a Dutch resort town, to discuss the framework for a global treaty on greenhouse gas emissions. Most of the delegations were prepared to endorse the Dutch proposal to freeze emissions at 1990 levels by 2000. Rafe Pomerance had not been invited, but he showed up along with three other activists nonetheless. Their mission was to pressure those in attendance to endorse the proposal of a more ambitious target: a 20 percent reduction of emissions by 2005. The activist group was granted access by a sympathetic Dutch official.

While the Bush administration told the press that it wanted to play a leadership role in the proceedings, most expected that Bush's science advisor in attendance would oppose the idea of a binding international treaty. Pomerance planned to stage a publicity stunt each day in order to embarrass the American delegation and promote support for a treaty. However, he still worried that the battle was lost. The White House's opposition and the censoring of science was a bad sign. Recent reports indicated that the U.S. was by far the largest producer of carbon emissions. Further delay in action could push a climate treaty back to 1990 or 1991, and by then it might be too late to prevent catastrophic global warming.

The activist group was not let into the final negotiation meeting at the conference. All the scientists and staff were also asked to leave so only the environment ministers or directors from each country remained. The meeting lasted all night and into the morning the next day and in the end, the U.S. along with Japan, the Soviet Union, and Great Britain made the conference abandon its goal of freezing emissions. Instead, the final statement proclaimed that many countries supported emission stabilization, but it did not provide any hard limits or levels. Technically it was progress, but in reality it would make no impact on carbon emissions. As before, it was all talk and no real action to combat the greenhouse effect and climate change.

Epilogue

"More carbon has been released into the atmosphere since the final day of the Noordwijk conference, Nov. 7, 1989, than in the entire history of civilization preceding it" (64). Despite all of the investment in research on climate change and attempts to limit greenhouse gas emissions nationally and globally, the amount of greenhouse gas emitted each year continued to rise. Countries have either failed to follow through on their climate policy commitments, or have not made any binding commitments at all.

At the same time, many fossil fuel companies led the effort to suppress climate science and undermine it using a disinformation campaign that emphasizes uncertainty. Lobbying groups representing business associations, the fossil fuel industry, the electrical grid industry, and the automobile industry worked with industry-friendly politicians and scientists skeptical of global warming to change the public narrative on climate change and weaken support for climate policy. Since the publication of the Charney report in 1979, climate science had been

considered settled fact, but in the late 1980s and 1990s, these groups chipped away at the authority of climate scientists so that the public began to view climate change as a controversial hypothesis. While many industry groups have turned away from this strategy, the effects of it still damage the credibility of climate scientists and hamper the conversation around climate policy.

Recently, there have been efforts to assign blame for the effects of global warming to the government or oil companies. The concept behind these lawsuits and investigations is that someone knew about the greenhouse effect and did nothing. However, the real issue is that everyone knew about climate change and nothing happened. The U.S. government knew, the fossil fuel industry knew, the automobile manufacturers knew, scientists knew, environmental activists knew, and the American public knew that an increase in atmospheric carbon dioxide would raise global temperatures and that would have consequences on the Earth's climate. This information was widely available, not hidden by corporations or the government. Still, there was no will to prevent it from happening because "human beings, whether in global organizations, democracies, industries, political parties or as individuals, are incapable of sacrificing present convenience to forestall a penalty imposed on future generations" (66).

The consequences of climate change are no longer in the future. They are upon us. Without a significant economic, technological, and political investment in stabilizing carbon emissions and reducing atmospheric carbon dioxide, the planet will continue to warm to catastrophic levels. Only if people are willing to invest in the issue is it possible to keep planetary warming to two degrees. The only question is whether we are ready to make that commitment.