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Frank H. Winter, Volume Editor

Donald C. Elder, Series Editor

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Chapter 21

Apollo Thirtieth Anniversary: Two Views Part 1: Was the Apollo Program a “Dead End?”*

Marsha Freeman[†]

Introduction

Since the first manned landing on the Moon 30 years ago, news commentators, political analysts, and sociologists have tried to convince the American people that there has been no long-term visionary mission for space exploration since the Apollo program because no one wanted one. The American people “lost interest” in space, they state, while other, more Earthly problems replaced exploration as a major national concern.

In order to make this argument convincing, a number of myths have been concocted for popular consumption. For example, we are told that excitement about space exploration would necessarily diminish after Apollo because the program announced by President Kennedy in 1961 was a “dead end;” that Apollo was only devised to counter the Soviets during the Cold War; that the Great Society announced by President Johnson in 1965 could be accomplished only by taking money away from the space program, (or vice versa); that Americans lost interest in space because the leadership of NASA had no vision for the post-

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[†] 21st Century Science & Technology, Washington, D.C., U.S.A.

Apollo era; and that the optimistic view of the early 1960s that no frontier was out of reach had to be replaced by more “realistic,” down-to-earth fears of overpopulation, environmental death, and limits to growth, in direct and conscious juxtaposition to the limitlessness of space exploration.

Not one of these statements is true. Yet together, they have helped shape American economic, social, and foreign policies for the past quarter century.

Arguments for exploration by the scientists, administrators, and public supporters of the space program in the 1960s were increasingly overpowered by a growing demoralization in America, fueled by political assassinations, urban riots, and the Vietnam War, all of which flourished thanks to the loss of a commitment to a positive program for the future. There has been alarm over this state of affairs, but little understanding of how to return to the spirit of Apollo, when it was assumed that we and our progeny would explore space. Recapturing the spirit of Apollo requires overturning the entire set of axioms and postulates of the past 25 years.

The Promise of Apollo

When President John F. Kennedy announced on May 25, 1961, that this nation should “land a man on the Moon and return him safely to the Earth” within the decade of the 1960s, he was certainly motivated by the need to match and then surpass the Soviet Union’s capabilities in space for national security and national prestige and to recover from his recent political fiasco with the Bay of Pigs invasion. But there was more to the Kennedy initiative than a single goal with a deadline.

That landing a man on the Moon was not Kennedy’s idea of the end of the space effort is evidenced by the other three programs for which he requested increased funding in his “Special Message to the Congress on Urgent National Needs,” which highlighted the lunar program. These included funding for a “satellite system for worldwide weather observation ... accelerating the use of space satellites for worldwide communications,” and, most important, “an additional \$23 million, together with \$7 million already available, to accelerate development of the Rover nuclear rocket.” As Kennedy stated, “This gives promise of someday providing a means for even more exciting and ambitious exploration of space, perhaps beyond the Moon, perhaps to the very end of the solar system itself.”

For Kennedy, the goal was U.S. leadership in space, which would be a continuing mission. It was not his intention that after (hopefully) beating the Soviets to the Moon, the United States would fold up its tent and end the manned

space program. The lunar landing program became a “dead end” with no equally challenging long-range mission to follow it, only because the political forces that had opposed and attacked the program from its inception were becoming hegemonic by 1965, and Kennedy was no longer there to put the full force of the presidency behind the space program.



Figure 1: President Kennedy’s Apollo program was never a “dead end.” Here, the President talks with Harold Finger, at left, the manager of the space nuclear propulsion program, at the Nevada Test Site on 8 December 1962. The nuclear rocket program was designed for manned missions to Mars (NASA Photo 62-ADM-26).

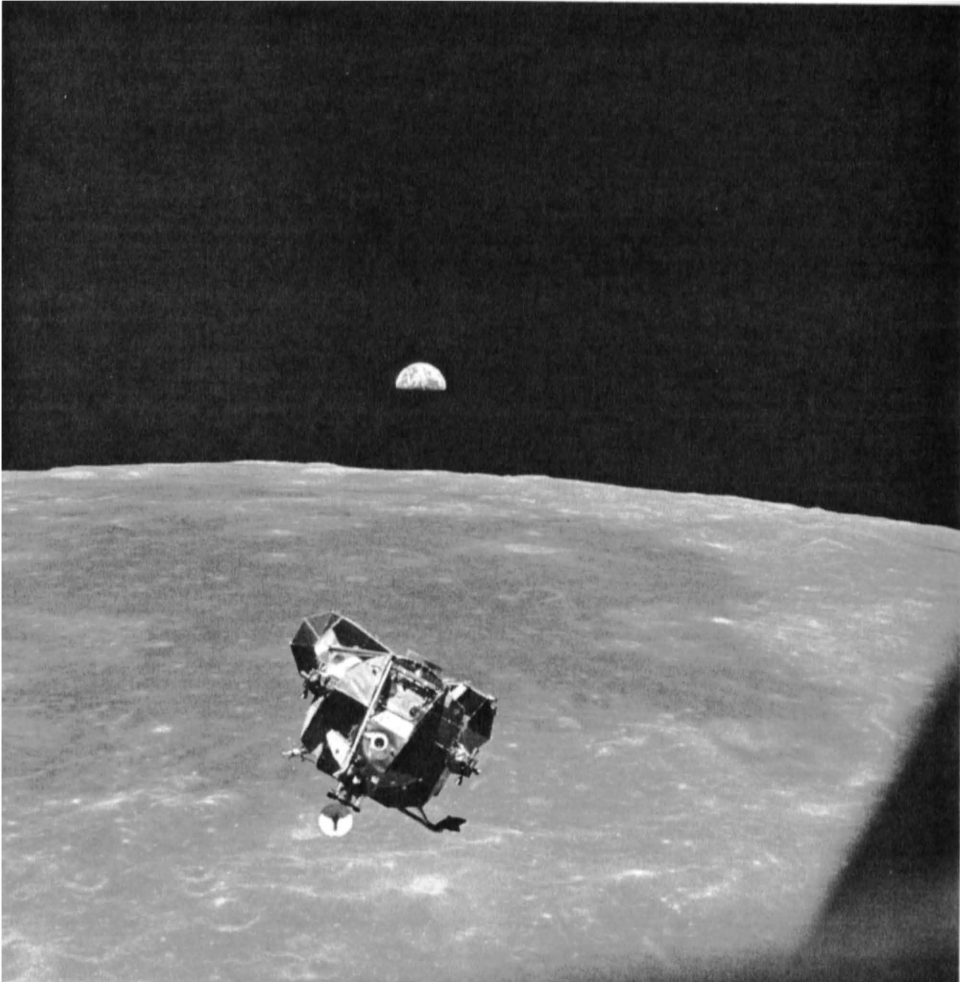


Figure 2: Man's landing on the Moon was one of his greatest achievements. Here, the Apollo 11 Lunar Module ascent stage is photographed from the Command/Service modules by astronaut Michael Collins as it makes its docking approach for the return to Earth in July 1969 (NASA Photo 69-H-1271).

The Tragedy of Lyndon Johnson

Today, Lyndon Johnson is most often identified with the Great Society program and the Vietnam War, but the fact that there has been a civilian space program in the United States since 1958 is in large part the result of his efforts. When Sputnik made its debut on October 4, 1957, Johnson was the majority leader of the Senate and chairman of the Senate Armed Services Subcommittee

on Preparedness Investigating. Johnson's subcommittee began hearings on the Soviet threat and the U.S. military's plans for space a month after Sputnik. Dr. Edward Teller advocated a trip to the Moon as a response to the Soviet lead in space, and Wernher von Braun expressed his support for developing the large rockets to take the spacecraft there.

At opening hearings before the Special Committee on Space and Astronautics on the bill creating NASA on May 6, 1958, Chairman Johnson stated:

“Space affects all of us and all that we do, in our private lives, in our business, in our education, and in our Government.... We shall succeed or fail [depending on] our ... success at incorporating the exploration and utilization of space into all aspects of our society and the enrichment of all phases of our life on this Earth.”

But through the circumstance under which he assumed the presidency, Lyndon Johnson would eventually give in to the pressure to downgrade space exploration as a national priority.

The assassination of President John F. Kennedy in November 1963 and the subsequent cover-up of responsibility for the assassination were a turning point for the nation. The cover-up, based on the idea that “lone assassin” Lee Harvey Oswald shot the President, protected those who had strong policy differences with Kennedy, over which, he was most likely killed. The policies for economic growth and aggressive acceleration of the space effort that Kennedy initiated were left to be carried forward by a weaker president.

After Kennedy's assassination, Lyndon Johnson was determined to fulfill the martyred president's goal of landing a man on the Moon. At the same time, however, the escalation of the war in Vietnam would preclude the level of expenditure on space exploration necessary to prevent Apollo from becoming a dead end. The take-down of the most impressive peacetime mobilization of the nation's scientific talent, manpower, and industrial might started as early as 1965, as the Vietnam War escalated.

In 1965 when Johnson went before the Congress to ask for a supplemental Defense appropriation for the Vietnam buildup, his economic advisers suggested that an unpopular tax increase would be needed to keep up with the expenditures. Johnson rejected this idea, perhaps believing Secretary of Defense Robert “body count” McNamara's assurances that the war would be over by June 30, 1967. Without the tax increase, however, the federal deficit began to spiral upward.

In March 1965, the first U.S. combat forces were sent to Vietnam. By the end of that year, there were 185,000 troops there. President Johnson requested and got from Congress a supplemental budget increase of \$13.8 billion in addi-

tion to the \$6 billion that had been appropriated for fiscal year 1966 for Vietnam. The next year, the White House requested \$20.6 billion and again came to Congress for supplemental funds in order to support a war that now involved 385,000 troops. The expenditures threw the plans for a \$100 billion Federal budget into turmoil; the total defense spending of \$58 billion surpassed that of 1943. The Government was faced with trying to deal with the fiscal chaos developing due to the Vietnam expenditures. On September 8, 1966, President Johnson announced cutbacks in spending to pay for the war.

The money spent for the Vietnam War was more than four times that of the space program in fiscal year 1966. Although these funds accounted for more than half of the budget deficit of \$8 billion projected by Johnson's economic advisors, the war funds were not going to be cut. The NASA budget was the second largest area of proposed increase in Federal budget and, therefore, a very visible target for cutbacks by fiscal conservatives.

The pressure on Lyndon Johnson to cut NASA spending, and even delay the lunar landing, began within weeks of his becoming President. For those who make the claim that the Apollo program had a "blank check," it is important to note that an agreement had been made between President Johnson and Senate fiscal conservatives that the space budget would be held to a \$5 billion ceiling to control the deficit. While at times jeopardizing the Apollo program itself, and delaying any advanced planning, this compromise was necessary to enable the President to garner support for other legislation.

The Apollo Dead End

Before 1965, no policy maker even considered that there might *not* be long-range goals in space after the accomplishment of the lunar landing. Advanced planning was an activity of the space agency from its very beginning. Congress clearly supported this effort, appropriating \$70 million for future studies between 1962 and 1965.

In 1965, when NASA Administrator James Webb was ready to make recommendations for the post-Apollo program for President Johnson, there was increasing concern about expenditures for the escalating Vietnam War. The President was no longer interested in future programs that entailed increasing costs. Webb, on the other hand, was now facing the serious situation of layoffs at NASA centers as key Apollo tasks were completed. Johnson asked Webb to postpone any post-Apollo program plans.

Webb had never thought of the lunar landing program as the only goal of the space program. At a briefing in 1965, Webb “dismissed the idea that the lunar landing was any kind of end in itself,” according to historian Arnold Levine. What NASA had developed, he stressed, was the “capability to fire, to launch, to get into orbit.” Planners at NASA, such as Wernher von Braun and George Mueller, were looking toward a manned landing on Mars. Webb, however, perceived that the President was determined to carry through on Apollo but was not ready to make any further commitments. Webb knew that NASA could not plan “unilaterally” and that post-Apollo programs were political decisions that had to be made by the White House and Congress.

The first effects of the Vietnam War spending increases hit NASA in the Fall of 1965. For the fiscal year 1966 budget, under consideration in 1965, the administration initially proposed a NASA budget of \$5.26 billion, which was \$10 million more than the Congress had appropriated the previous year. Budget Director Charles Schultz reported in November that projected fiscal year 1966 expenditures were running about \$8 billion above the \$99.7 billion that had been budgeted in October at the start of fiscal year 1966, largely as a result of Vietnam. Schultz recommended a cut of \$300 million from NASA, and for the first time, Johnson backed a space program cut. Administrator Webb warned that these cuts, which were made in the post-Apollo applications program, would have serious consequences in the aerospace industry and would meet opposition among Congressional supporters of the space program.

In FY67, the White House budget request of just slightly over \$5 billion brought NASA spending down to less than what it had been in 1964. Within the administration, Webb fought to keep the space science and planetary missions, as well as Apollo, but he had to go along with cuts in the unmanned Mars mission. By mid-1966, as reported by historian Robert Divine, Webb warned that the reduced budgetary level would lead to letting go “some 200,000 people ... from NASA operations, plus 60,000 from research and development and an additional 5,000 to 10,000 from construction by July 1, 1967.”

These were not idle threats designed for dramatic effect. In Huntsville, the takedown had already started. By 1965, the design and engineering work on the Saturn V rocket were complete, and that year, 200 people from the Marshall Space Flight Center were transferred to the Manned Space Center in Houston. On the same day that the first Saturn V rocket lifted off the launch pad in Florida, carrying the Apollo 4 mission into space—November 9, 1967—Wernher von Braun learned that a reduction-in-force would cut 700 people from Marshall.

During deliberations for the Johnson administration’s fiscal year 1968 budget, Webb tried to regain the momentum that had been derailed the year be-

fore. Requesting a \$6 billion NASA budget that he knew was unrealistic from the standpoint of the fiscal pressures on the White House, Webb warned that another NASA budget in the \$5 billion range would leave him “no choice but to accelerate the rate at which we are carrying on the liquidation of some of the capabilities which we have built up.” According to Robert Divine, Webb told the President that while the Apollo program could be kept on course at that level of funding, “there has not been a single important new space project since you became President.”

Budget Director Schultz’s response to Webb is instructive. It was not necessary, he said, to do in space everything that was technically feasible (which Webb had never proposed) and it was not necessary to maintain the level of skilled industrial manpower that NASA had created. “The space program,” Schultz said, “is not a WPA,” referring to the Works Projects Administration—Roosevelt’s Depression-era program for public works.

Schultz compared the \$5 billion space budget to the \$2 billion being spent on public education and the \$1.7 billion on the war on poverty, as if these expenditures all produced comparable results. Despite Webb’s appeals and his personal good working relationship with the President, Johnson sided with Schultz, and the NASA request for fiscal year 1968 was set at just slightly over \$5 billion.

By the summer of 1967, when the NASA appropriations bill was still under consideration on Capitol Hill, the full force of Vietnam expenditures hit. The budget deficit loomed at \$29 billion, and deep cuts would have to be made to pay for the war. Schultz said it was necessary to cut the space program appropriation for fiscal year 1968 to \$4.5 billion. Schultz also recommended that the 1970 Kennedy deadline for Apollo be abandoned so as not to sacrifice future programs, but Johnson refused to renege on that commitment. The result was the emasculation of any post-Apollo effort. Apollo was quickly becoming a dead end.

The 1969 NASA budget only continued the downward trend, with a final appropriation of \$3.9 billion. The Apollo Applications program, which would have continued Saturn V launches to the Moon and built space infrastructure in orbit around the Earth, was eventually pared down to consist mainly of a temporary space station called Skylab.

The spending for the Vietnam War had dictated the near-elimination of the post-Apollo space program. It also led to mass protests and the decision of Lyndon Johnson not to run for reelection. But with the public, it was the Great Society, and specifically the War on Poverty, that was used as the political club against the space program and also the civil rights movement.

The Other War

Once elected President, Lyndon Johnson decided that he would set his own agenda for the country, not only in the space arena but also in other domestic programs. During President Kennedy's brief time in office, he had initiated legislation for federal aid to education, Medicare, a civil rights bill, and other federal social programs, much of which had been stalled in the Congress. Eradicating poverty, which Kennedy had seen firsthand while campaigning in 1960 in rural America, was a goal already on the agenda when Johnson became President in November 1963.

Using his political skill in the legislative process, Lyndon Johnson was able to have Kennedy's Civil Rights Act finally passed into law during the 1964 presidential campaign. The Congress also passed Johnson's Economic Opportunity Act. In his eyes, these important domestic programs would fight the Great Society's unconditional "war on poverty" to win it. In his State of the Union address in 1964, Johnson gave special attention to the War on Poverty, announcing that \$500 million would be allotted for it in the next budget. A month later, he announced the appointment of R. Sargent Shriver, President Kennedy's brother-in-law, to head the Office of Economic Opportunity (OEO).

There were two major approaches put forward to eliminating poverty in the nation. One, represented by more traditional liberal Democratic Party elements, was to provide job training, enhanced education, and job opportunities for those who had been left out of the mainstream of American economic activity. This approach led to programs such as Head Start, the Job Corps, and Upward Bound. This philosophy was expressed by the Council of Economic Advisers in its 1964 report:

"Conquest of poverty is well within our power. The majority of the nation could simply tax themselves enough to provide the necessary income supplements to their less fortunate citizens.... But this 'solution' would leave untouched most of the roots of poverty. Americans want to *earn* the American standard by their own efforts and contributions."

The second approach was for "income transfer"—basically a handout to the poor—managed primarily through the welfare and food stamp programs. Although this approach was promoted through the new OEO, it was not President Johnson's concept of how to uplift the poor through the War on Poverty.

It has been said that a major failing of the War on Poverty was that neither the President nor the Congress was willing to put the money into it that eliminat-

ing poverty would have required. Funding averaged about \$1.7 billion per year between 1965 and 1970, which was hardly significant in terms of the overall federal budget or the magnitude of the problem.

The more important and long-lasting reason for the failure of the effort, and the disillusionment of the President, was that a new breed of social planners and manipulators was taking the reins of economic and social policy. Readily available illicit drugs, mind-deadening rock music, the disillusionment spread by the Kennedy assassination and the War in Vietnam, and the realization that as the space program wound down the economy had no place for new scientists and engineers, created a dramatic shift in cultural values.

The Office of Economic Opportunity and the poverty programs of the 1960s did more than simply divert attention and resources away from the viable, high technology solutions to the problem. They started a war against the traditional urban Democratic Party machines upon which people had depended for the delivery for social services for decades; they undermined the federal direction of economic programs; and they fed the urban riots that wrought havoc upon the stunning accomplishments of the civil rights movement.

This war was carried out from the top down by a group of postwar institutions directed by sociologists, economists, social planners, and academics whose goal was the manipulation of sections of society. One of the institutions that developed such social control policies was the Tavistock Institute for Human Relations in London. The British Empire had a long history of subjugating nations, not primarily through the deployment of troops, but through the social manipulation of populations.

The basic idea was that societies were controllable by division into sub-groups by income, race, profession, nationality, tribe, sex, religion, or age, each with separate “interests.” Each group should concentrate on fighting the others for what was becoming, in reality, a shrinking pie of economic resources.

In the early 1960s, these social control theories were combined with the resurrection of the Malthusian perspective that mankind had reached its “limits to growth,” and that next on the agenda was the “post-industrial society.” Since the historical existence of the United States had discredited the Malthusian doomsday prediction that population growth would cause the extinction of the human race, selling the “limits to growth” idea to the American public, especially at a time when the burgeoning space program was resulting in unbridled optimism, required that this quackery somehow be made to appear “scientific.”

The availability of the computer and computational methods—developed largely through the space program for the analysis of huge amounts of data—was now applied not to rocket engines and lunar trajectory calculations but to human

beings. Complicated and scientific-looking computer printouts would *prove* to a skeptical American public—these social control institutions hoped—that humanity was in danger of running out of resources, polluting itself to death, destroying its limited agricultural land, and of packing itself in like sardines.

To ensure that this social control program would succeed in destroying the optimism and the raised expectations that had come to all Americans—and especially minorities—through the space program and civil rights movement, President Johnson’s War on Poverty was turned into a war of each against all. The Community Action Program under the Office of Economic Opportunity in the Johnson administration was an effort to supposedly “empower” poor people through community control. Such social experiments in mobilizing the poor were started in the 1950s under the auspices of the Ford Foundation.

Local control pitted black communities in New York City against the primarily white teachers union, where the issue was *not* how to improve the quality of the children’s education, but who would exercise political control. The fights were over who would choose the teachers, not whether or not they were qualified; who would pick the textbooks, not what the content should be; and so on. The issue of quality education was not even part of the picture.

Community control diverted momentum from the 1950s civil rights movement, substituting for integration of minorities into the mainstream of American economic life, a black nationalist ideology based on “empowering” black people to control their own poverty. And it waged a war against the Democratic President and the urban political machines that represented minorities and the poor in government.

Less than a year after the Office of Economic Opportunity was established, according to historian Mark Gelfand, “a former Roosevelt aide and Johnson friend was warning the President that the local community action agency was staging protests against Democratic leaders in the District of Columbia.”

With the outbreak of the riots in U.S. ghettos, Johnson was distraught. Hadn’t he tried to improve the conditions of black citizens through his civil rights legislation, education programs, and War on Poverty? His 1965 Voting Rights Act was landmark legislation to bring black people into the political deliberations of the nation. Why would people turn to violence, which could only defeat the gains they had made? The distortion of the War on Poverty into a war against society fueled the propaganda that would politically kill the promise of Apollo.

Opposition to the space program began as soon as it did. In early 1961, before President Kennedy had even announced the acceleration of the space program to achieve the lunar landing, social planners at Washington’s Brookings

Institution proposed that the space agency focus attention on the social “implications of peaceful space activities for human affairs.”

The promulgator of this report to NASA was sociologist Donald Michael, whose ideas on the subject made him a natural for membership in the Malthusian Club of Rome, which he joined later in the decade. Michael states that NASA should have a “social sciences research capability” and proposes specific areas of research for NASA on the “consequences of its own activities.”

Studies should examine, for example, the “disillusionment and cynicism” of the scientists and engineers in the programs, who feel that they are being “used by politicians.” (!) Finally, he says, studies should fill the “pressing need” to discover and assess “the reasons for the expressed indifference and hostility” to the program (!) in the non-space community.

Under pressure, NASA provided grants for studies on the impact of space on society. One such grant, made in 1962, and managed through the American Academy of Arts and Sciences, resulted in a series of two books and accompanying reports involving researchers affiliated with the London Tavistock Institute. *Social Indicators* was published in 1966. The author, Bertram Gross, was then associated with Lyndon Johnson’s Council of Economic Advisers and a promoter of the Great Society. He later went on to edit Tavistock’s journal (*Human Relations*). In the foreword to *Social Indicators*, Earl Stevenson of the Academy states:

“Such measures of social performance are all the more important in a ‘postindustrial’ society, one in which the satisfaction of human interests and values has at least as high a priority as the pursuit of economic goals...”

In the preface, Gross writes that the book is a “symptom of a widespread rebellion against what has been called the ‘economic philistinism’ of the U.S. government’s present statistical establishment.... It may be regarded as a humanist effort to develop more open spaces (not merely on the Moon or beyond) in the minds of people on this planet.” Referencing his view of the Johnson initiatives, Gross cites one statement of purpose: “The Great Society looks beyond the prospects of abundance to the problems of abundance ... where is the place for man?.... The Great Society is concerned not with how much, but how good—not with the quantity of our goods but the quality of our lives.” Real economic opportunity to uplift the poor population was to take second place to “feeling good about yourself.”

In the early phase of the space program, the fear was expressed that NASA would swallow up the nation’s limited supply of scientists and engineers. When

NASA started programs in 1962 to help educate and train the next generation of scientists and engineers, researchers at the Tavistock Institute warned that the space program was producing “redundant” and “supernumerary” scientists and engineers! “There would soon be two scientists for every man, woman, and dog in the society,” one report complained.

To the average American, to the Johnson administration, and even to many intellectuals, all of this “social theory” and search for the “inner self” in the post-industrial society was touchy-feely New Age nihilist hogwash. Most people were more interested in taking part in the adventure of getting to the Moon, in the upward mobility and economic opportunity the new aerospace and related industries made possible, and in preparing their children for a future in which it would be commonplace to explore space. For Tavistock to convince the skeptical majority it would be necessary to put the aura of “scientific authority” behind the zero-growth ideology that in reality had been discredited time and again through each period of advance of human society.

The Club of Rome, established at a meeting of 30 individuals from ten countries in April 1968, was the vehicle through which the depraved economic and social theories lobbed against the space program and all technological advances would be made “popular.”

In 1972, a report for the Club of Rome’s project on the Predicament of Mankind was published under the title *The Limits to Growth*. Crammed with charts, graphs, and hard-to-understand graphics, the point of this book was to convince the uninitiated that the use of computers to project the fate of mankind made “scientific” the otherwise intuitively discordant idea of limits to growth. The Club of Rome researchers concluded that there are “five basic factors that determine, and therefore, ultimately limit, growth on this planet—population, agricultural production, natural resources, industrial production, and pollution.”

To try to scare the average citizen, the report projects the exponential growth of population by comparing the reproduction of humankind to the growth of a colony of yeast cells or the growth of water lilies that quickly fill up their pond. The rest of the book argues for drastic population control measures by trying to explain why it will be impossible to provide a decent standard of living for these teeming masses, (especially in the Third World).

The ability of the world to feed itself will reach its limit quickly, according to Meadows, because “opening more land to cultivation is not economically feasible” requiring too many capital inputs from industry. Even if industry could keep up with the demand, the pollution produced from this increased production would choke mankind’s ability to breathe, drink water, and so on, say these prophets of doom.



Figure 3: German-born space pioneer and NASA official Dr. Wernher von Braun countered the “limits of growth” concept in his writing and public speeches in the early 1970s, attacking certain historians and “social philosophers.” In this photograph, von Braun is examining a camera to be taken on the Apollo 15 mission, on 17 May 1971 (NASA Photo 71-H-860).

Limits to Growth asserts that there is a diminishing supply of non-renewable resources, such as raw materials. Never mind that the history of the human race has been to supersede the inevitable exhaustion of raw materials using the tools of scientific inquiry and technological applications.

There Are No Limits to Growth

Early in the Space Age, the most thoughtful participants realized that the attacks on space exploration represented a diametrically opposing philosophical view, not simply a criticism of particular programs. Two such participants—Wernher von Braun and Krafft A. Ehrlicke—took on the New Age opponents on their own terms.



Figure 4: Space visionary Krafft Ehrlicke, left, insisted that it is man’s destiny to explore—it is an “extraterrestrial imperative.” He was interviewed by Walter Cronkite on 26 September 1966. In this photo taken at the television studio, Ehrlicke is explaining his model of a space vehicle powered by thermonuclear fusion propulsion (Photo from Krafft Ehrlicke, Courtesy of Marsha Freeman).

First, both visionaries explained, the space program itself would make possible the solution to many of the economic and social ills in society that social planners were so concerned would be sacrificed by spending money on space exploration.

Von Braun and Ehrlicke realized that the constant drum beat against progress in general, and the space program in particular, was intersecting the growing disillusionment of young people with the population war in Vietnam, providing fertile ground for their rational “back-to-nature” ecology movement, which proposed no concern for *solving* any of the problems of the environment but only a withdrawal from reality.

Von Braun opened a speech before the Aviation and Space Writers Association on May 27, 1971, by discussing,

“a problem that disturbs me.... I speak of the climate of irrational hostility that seems to be growing in this country—especially among our college and university students—regarding science and technology.... But it isn’t the young people, the students, who are really to blame for this attitude of hostility to science and technology.... They are simply misguided by certain social philosophers, cultural historians, and the like, whose teachings and published works provide only a very lopsided view of science and technology pictured as causing the downfall of man.”

Von Braun named “historian and philosopher” Lewis Mumford who, he reports,

“inveighs angrily and brilliantly against the ‘megamachine’ of science and technology.... When Arnold Toynbee, equally famous as historian and philosopher, asks whether ‘spacemanship folly’ isn’t also a crime because it wastes that ‘slender surplus product that man has succeeded in wringing out of nature within the past 5,000 years...’ he adds a moralistic fervor to the revolutionary spirit of the young... The point Toynbee wants to make is that spacemanship not only is a folly, it is also a crime against mankind.”

Struggling against the rising tide of cultural pessimism and the destruction of the magnificent space capabilities he had helped to create over the course of 40 years, von Braun in 1969 presented a 20-year plan for the post-Apollo period for NASA. As the goal for the decades after Apollo, he proposed a manned mission to Mars, a plan he first penned in 1948. Krafft Ehricke had a similarly optimistic view. In 1957, anticipating the challenge to mankind’s concept of his material and spiritual existence, Ehricke laid out his three laws of astronautics, as follows:

“Nobody and nothing under the natural laws of this universe impose any limitations on man except man himself. Second law. Not only the Earth, but the entire Solar System, and as much of the universe as he can reach under the laws of nature, are man’s rightful field of activity. Third law. By expanding through the universe, man fulfills his destiny as an element of life, endowed with the power of reason and the wisdom of the moral law within himself.”

In a December 1982 article in *Fusion* magazine, Ehrlicke wrote:

“Meadows and Forrester ... in their book *Limits to Growth*, compare the growth of mankind to the mindless and senseless multiplication of lilies in a pond. I never considered mankind a lily in a pond, senseless and mindless.... [*Global 2000 Report*], a warmed-over version of the original limits to growth nonsense, contains outright misinformation and, like its infamous predecessor, totally ignores the human capacity for limitless growth. Growth, in contrast to multiplication, is the increase in knowledge, in wisdom, in the capacity to grow in new ways.”

Ehrlicke spent the last decade of his life preparing an extremely detailed blueprint for the industrial development of the Moon—his “post-Apollo” program. Human civilization would move into the Solar System, building cities with tens of thousands of people who would be driven by the “extraterrestrial imperative” to create new worlds. They would develop new resources and technologies. The Earth would never again be a “closed system.”

What kind of cultural outlook is required for the exploration and development of space? Writing in 1971, Ehrlicke found its roots:

“For me the development of the idea of space travel was always the most logical and most noble consequence of the Renaissance ideal, which again placed man in an organic and active relationship with his surrounding universe and which perceived in the synthesis of knowledge and capabilities its highest ideas.... The concepts of ‘limit’ and ‘impossibility’ were each relegated to two clearly distinct regions, namely the ‘limit’ of our present state of knowledge and the ‘impossibility’ of a process running counter to the well-understood laws of nature.”

The inability of the Johnson administration to plan for the decades after Apollo, and the refusal of the succeeding Nixon administration to put economic growth ahead of fiscal austerity at a time of economic crisis, was in no way a reflection on the Apollo program initiated in 1961.

Apollo was not a “dead end” to the President who initiated it, the space agency that carried it out, or the American public, which still finds that accomplishment the definition of what it means to be proud to be an American. The dead end has proven to be the ideology of limits to growth, the cynical and mind-deadening anti-science counter-culture, and the cultural pessimism that increasingly has replaced the technological optimism of space exploration, at least in the

mind of policymakers and the media. When that cultural decline of the past quarter century is reversed, it will be possible to re-embark on the program of space exploration that was the real promise of Apollo.

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