IMAGE	SOUND
	NARRATOR:
LOGO "MAN BUILDS MAN DESTROYS"	A series of programmes about this planet and what people are doing to it.
DENNIS MEADOWS ON CAMERA	MEADOWS: I don't think we can sustain current growth trends much beyond, say, the lives of children who are being born today.
PHILIPPE DE SEYNES ON CAMERA	DE SEYNES: I do believe myself that we need growth and we need a lot of growth because two-thirds of humanity live in a condition of squalor which we wouldn't want to remain, and it is only through growth that they can progress.
DENNIS MEADOWS ON CAMERA	MEADOWS: Over half the world's population is poorly fed. That is simply because they have grown beyond the capability of their land area to support them. We have serious pollution problems in this country because our population has grown past the limits of our environment's ability to absorb it. We are at the limits of growth now.
RONALD KUTSCHER ON CAMERA	The cornerstone of economic growth is the growth in productivity or the more efficient way in which we do things. Therefore, if we seriously are talking about limiting economic growth we'll have to do it with a series of laws and rules that so restrict us that we would have created a nightmare society.
TRAFFIC SUPER TITLE LIMITS TO GROWTH	

NARRATOR VO:

TOOLS

For each thing -- there is a proper size; an optimum size to accomplish its purpose most effectively. Size is related to function. Behavior is affected by size.

BABY-CHILD-ADULTS

As a human being grows, he develops... matures... gains greater control over his functions... learns to perfect his abilities. After about two decades, human beings reach an end to growth, sometimes in a most pleasing fashion. But physical completion does not necessarily mean an end to the development of abilities and skills, knowledge and maturity.

Some growth is unwanted, harmful and feared. Resumption of biological growth in a mature individual, growth that proceeds without limit -- is what we call cancer.

CELLS

The sizes of most cells are limited. In most cases, the largest cell is no more than twenty times bigger than the smallest cell. The reason is that as a cell grows its volume expands faster than its surface.

Sufficient nutrients no longer can be supplied through the cell walls... and hence a limit to growth.

MOUSE AND ELEPHANT

There is a far greater range in sizes among mammals— an elephant is 125 thousand times larger than a mouse. But note the change in proportions that the enlargement demands - the elephant's huge legs, necessary to support its bulk.

As height and weight are increased, legs must become ever wider — until further growth becomes impractical.

NIGHT SKY

Elsewhere, however, the limits to size ... the limits to growth... are not so clear. The cosmos reaches out some eleven or twelve billion light years, but no one knows if the universe is expanding beyond these frontiers. Yet how can infinity have a limit? Is there a limit to knowledge, to enterprise, imagination, creativity? A limit to the growth of love? A limit to a people's welfare... to their escape from poverty?

A MONTAGE OF SCENES OF AFFLUENCE AND ECONOMIC NEED

When we come to economics, there is no agreement today whether there should be limits to growth. How have we come to believe that biggest is best, that standard of living must rise forever — to be matched only by rising expectations?

STILLS OF MIDDLE AGES, RENAISSANCE

Our present-day market system developed slowly, beginning in the 13th century. People in the Middle Ages never thought in terms of advancing themselves, of improving their standard of

COLUMBUS

ADAM SMITH

EARLY INDUSTRIAL
REVOLUTION

living, of gain and acquisition. A farmer tilled his lord's land in exchange for food for his family. The nobleman regarded his land as the immutable family estate. To be sure, there were a few adventurers such as Christopher Columbus who exclaimed, "Gold is a wonderful thing! Whoever possesses it is master of everything he desires." The concepts of land, labor and capital -- all for rent or sale -- evolved slowly. The first explanation of this strange new system came in 1776 when Scottish philosopher Adam Smith published THE WEALTH OF NATIONS. The wealth, to Smith, was not gold, but goods consumed by people.

Even though a merchant wanted to make unlimited profits, Smith observed, he could not raise his prices too high lest all his customers shop elsewhere. If a worker demanded too high a wage, he would go unemployed. The chaotic freedom of the capitalist system was regulated by supply and demand, governed by an "invisible hand" of self-interest and competition. Smith noted the enormous gains in production achieved by division of labor and by expansion of markets through reinvestment of capital. He saw no reason why such growth could not go on indefinitely.

MALTHUS

POVERTY

Because, said Thomas Malthus, it will be overwhelmed by human population, which grows faster than the production of food and goods. The losers in the race are eliminated by the mass killers -- poverty, disease, famine, war -- the apocalyptic horsemen curbing overpopulation.

FOUR HORSEMEN OF APOCALYPSE

LATE INDUSTRIAL REVOLUTION

In the 19th century, something occured which neither the optimistic Smith nor the pessimistic Malthus foresaw. The unexpected products of the Industrial Revolution. Dehumanizing things such as child labor and the factory system... but also the capacity to produce food and goods at a faster rate than population expanded. Industrial populations grew to a greater extent than Malthus would have thought possible. His forecast of doom never came to pass.

CROWDS

MARX

Karl Marx perceived in the capitalist system not the collapse of population, but of the system itself which would fall because of its exploitation of workers. A new proletarian class would seize power.

Capitalism would fall because it must always keep growing in order to maintain profits against competition and rising wages. Ultimately, this growth resulted only in big businesses, monopolies, which crushed Adam Smith's balancing force of competition.

SOVIET RUSSIA

Marxist predictions seemed to fit reality more closely than those of Malthus. In Russia and later other states of Eastern Europe, capitalism

GERMANY AND ITALY

disappeared into socialism. In Germany and Italy, it became submerged in fascism. And even in countries where it prospered, the cycles of boom and bust culminated in the Great Depression of the

PRESIDENT HOOVER

1930's. In the United States, President Hoover tried to cure the Depression with the classic prescription of Adam Smith -- leave the economy alone and it will get better. Instead it got worse.

KEYNES

England's John Maynard Keynes explained what had gone wrong. Slumps began when conditions discouraged

DEPRESSION FOOTAGE

business investment. Retrenchment of business meant unemployment and less consumption, and thus smaller production. The way out of this vicious cycle, Keynes said, was through new investment. If business is not in a position to make such a move, then government must "prime the pump" until business once again can resume growing. This policy was carried out by the Roosevelt

BOMBER PLANT

Administration. With the demands of World War Two came, once again, a full-blast economy.

MASS PRODUCTION

Keynes saw that despite the periodic ups and downs, the steady trend of capitalism was upwards. If this growth continued for another three generations, he calculated, by the year 2030 the

APPLIANCES

economics of scarcity would be conquered. For the first time in history, there would be plenty for all. In the United States the annual Gross National Product soared above one trillion dollars, affording Americans a standard of living and peaks

ASTRONAUTS ON THE MOON

of accomplishment undreamed of even a generation earlier. Economists believed they saw in steady growth the cure-all to the age-old ailments of starvation, disease, ignorance and poverty. Growth was the passport to the good life.

NATURE SCENES

Ecology stems from the same Greek word as economics. However, the two sciences coexisted in complete isolation, studying two separate world... Economics, the human world, Ecology, the science of nature. Ecologists observed that when a population of virtually any life form starts out, it grows slowly at first. Growth accelerates until it approaches the limits of supporting resources -- space, sunlight, food, water. Then the population stops growing, and goes on in a "steady state"

LOCUSTS

that is dynamic but does not get larger. A plague of locusts that grows beyond the available resources simply destroys its supporting environment and perishes.

COMPUTERS

The separate and seemingly unrelated worlds of ecology and economics were bridged recently in

FORRESTER

an unlikely manner - by scientists using computers.

Management professor Jay Forrester of the Massachusetts Institute of Technology had started out by studying the dynamics of industrialized systems. Then he turned to investigate the behavior of another kind of complex system, a city -- what makes it grow, and decline, and stagnate. At the prompting of the Club of Rome, an international group of leading industrialists, scientists, educators, Forrester's computer model was applied to the world. The findings gained wide publicity in the LIMITS TO GROWTH written by a team headed by professor Dennis Meadows. The basic findings of this controversial book are that human population and industrial growth will come to a screeching halt one way or another within the next century -- just about the time that economist Keynes expected the economic millenium of plenty for all.

BOOK:
URBAN DYNAMICS

BOOK:
THE LIMITS TO GROWTH

The mechanism that would blast the dreams of economists, said Meadows and colleagues, is exponential growth. Meadows gave an example of the hard-to-foresee nature of this kind of growth. Suppose you own a pond on which a water lily is growing. The plant doubles in size each day and if allowed to grow, would cover the pond in 30 days, choking off all other life. You do not

LILY POND ANIMATION

become aware of the danger until the lilies cover half the pond. That happens on the 29th day — you have one day to save your pond.

AUTO SAFETY FILM

The problem is that when a danger is perceived in a complex system, it can not be dealt with immediately. Delay can be fatal as any driver well knows. There is always delay between perception of danger and the driver's reaction. Then there is further delay before the car responds to his command. The faster a vehicle is going, the longer it takes to change direction or to bring it to a stop.

CROWDS

Similarly, a population of human beings cannot stop growing overnight. It will keep growing until the number of potential mothers begins to dwindle.

PEOPLE - RESOURCES

The world population is doubling every 35 years. Consumption of iron and energy and industrial output have been doubling about every 10 years. Unless this population and industrial growth is brought under control, the M.I.T. studies show, there would be disaster by the mid-21st century from exhaustion of resources, pollution or lack of food. After nearly two centuries, Malthus — who had been buried so often — was resurrected

HEADLINES

The attack on economists' belief in the utility and necessity of growth provoked a spirited defense.

RESOURCES

United Nations experts accused THE LIMITS TO GROWTH of underestimating the reserves of coal, oil and natural gas. New and better methods of exploration, a U.N. report said, would reveal, as needs arise, far greater deposits — particularly under the seas. Energy sources such as oil shale and tar sands had been ignored. Also, with increasing technology, energy tends to be used more economically, foreshadowing an end to its exponential growth. The longer lives of

SUN FOOTAGE

these non-renewable energy resources would give technology more time to tap such virtually unlimited sources as solar, nuclear fusion, and geothermal energy.

IRON PITS

These United Nations experts also said that the limits-to-growth people were badly mistaken in believing that other minerals will be used up in the next century. New technologies will enable us for the first time to locate hidden ore deposits and to utilize lower grade ores.

WATER

Only in the area of fresh water resources do the U.N. experts see a problem developing for mankind in the decades immediately ahead.

POVERTY AREAS

Finally, most economists believe that continued economic growth is essential in order to eradicate world poverty. As the standard of living goes up,

DEVELOPING NATIONS

a greater percentage of the population receives more benefits. Some of these economists pointed to improvements that have begun to appear from industrial investment in developing nations. The director of the African Institute for Economic Development and Planning, however, has pointed out that such foreign-investment industry may be of small domestic benefit, turning out goods wanted in developed countries, but useless in satisfying native needs.

INTERCUT RICH-POOR

Growth, says Meadows, exaggerates the gap between the haves and the have-nots. Before the industrial revolution, there were no great discrepancies in living standards. By 1850, incomes in industrialized nations were twice as high as they were in the rest of the world. A century later, the ratio was 10 to 1. By 1960, 15 to 1 and may reach 30 to 1 by the turn of the century.

Meadows believes there would be a better chance to narrow the rich-poor gap by removing the very pressures generated by growth. The trouble is, he says, the idea of a no-growth society is too novel for economic traditionalists. When highways become jammed, we build more highways. When oil reserves are depleted, import oil. If electric power grows short, build more plants and develop nuclear power. People are hungry, buy fertilizer and develop fast-growing strains of wheat. But, says Meadows, there is another strategy. Cut use of autos, use less electric power, have fewer children, limit growth.

HAYDEN PLANETARIUM

The expansionist rationale, Meadows says, is based on a belief that man is so intelligent that there really are no problems he cannot solve if he puts his mind to them. A surprising technological suggestion to bypass the limits to resource consumptio is offered by space scientists. At the Hayden Planetarium in New York City, astronomer Kenneth Franklin:

KENNETH FRANKLIN ON CAMERA

FRANKLIN:

Since 1935 nearly twenty million people have watched us simulate the universe. Now we have the universe available to us to control, so in a sense for the first time ...

STILLS OF STARS

... we are going to have to use the moon in order to bring some of it back here to the earth. We are going to have to go to the moon to use techniques of mining that we can't use here on the earth because it will disturb our biosphere in a way we don't want to do. We are going to have to go into space with manufacturing processes that we simply cannot do here on the earth in order to provide materials that we need for our future that are impossible to obtain in any other way. Instead of disturbing our environment we can use the rest of the solar system. Ultimately we will be able to go out to the other planets to bring back materials from them that we find that we need here. To go to the comets, to go to asteroids, to bring materials back that they have that we might find ourselves some day in short supply.

FRANKLIN
ON CAMERA

We can do all this when we have a technology to go, and that technology is at hand.

NARRATOR VO:

CITIES

Thus the two views of our future. In the words of Meadows:

"Technological optimists see only rising life expectancies, more comfortable lives, the advance of human knowledge, and improved wheat strains. Malthusians see only urban ugliness, destruction of the land, extinct species, increasing gaps between rich and poor and rising populations. Just possibly there can be a resolution of this double vision of the world. There is increasing consensus that there are limits to the growth of human population. Some economists are beginning to include the quality of life in their calculations,

TRAFFIC

subtracting such minuses as traffic jams and

WOMAN AND CHILD

pollution and assigning values to the unpaid work of housewives and other such formerly ignored assets.

SHOPPING

More ecologists are getting interested in economics - those singularly human activities that determine how our species behaves.

Both ecology and economics derive from the greek word oikos, meaning house or place to live. It would seem that both ecologists and economists must come to share a unified view of our home, for obviously, it is only one world.

SUPER CLOSING CREDITS