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Predictions for 2020

We live in a period in the world's history where more people than ever have become aware of our mounting environmental and social problems. Over many years, the results of releasing pollutants into air and groundwater, overpopulation, poverty, and undereducation about these hazards have manifested themselves as the poorer quality of life for at least three-fifths of the world's people. How interesting it is to note that for a species that dislikes comparing itself to animals, humans compete for food, relationships, resources, and power just as dogs and ants do. The only difference is that we have brought more energy into the picture--missiles, atom bombs, hydrogen bombs--and instead of killing others to eliminate tangible competition, we have learned to kill others over abstract, intangible concepts such as politics, economics, and especially religion. Mankind is complex; its problems are complex. The solutions to those problems will not be simple ones.

Based on our week-long "world conference," predictions on the status of the world in 2020 are:

1. **The world will experience another major war.** It will not only be over the control of certain resources, but also over religion. History has shown that religion, above all other physical and socioeconomic factors, has been the most common cause of fights and wars.

2. Although the rate of population growth will decline, **population growth itself will continue to increase exponentially.** The most immediate solution to the world's overpopulation problem would be for all women to stop having children for about 50 years or so; in this period, the population will have stabilized at its current value of 5.9 billion, and as members of the current population die off, the population will begin to decrease, as we need for it to. However, the world is not willing to do this, and so the population base will continue to increase, meaning exponential growth continuing well past 2020.

3. Since we do not have enough time to perform research on the safety of all the chemicals we use in our lives, **incidents of illnesses with unspecified or uncertain causes will continue to rise.**

4. Unless someone finds a way to market fusion or solar energy (assuming the technology for these power sources has become practical to use) better than oil, **oil will likely still be the conventional energy source of 2020.** History has shown that people are hesitant to change their lifestyles in any way, unless if they can be convinced that this change will be beneficial. If fusion and/or solar energy can be presented to the public in an appealing way, then perhaps oil will become phased out quickly.

5. **No bases on the Moon or Mars will have been built by NASA by 2020**; NASA will be unable to provide the time and funding.

6. **The Earth will still exist in 2020**; the Millennium will not have signified doomsday.

7. **Widespread poverty will still exist in the world**; as more and more countries are adopting a capitalistic outlook, there will be a greater gap between the rich and poor.

8. **A cure for AIDS will have been found, but likely not for cancer.** Cancer will have become greater of a mystery to us, since there are almost an endless number of cancer-causing mutations that can be caused by chemicals and other environmental and hereditary factors, and it takes only one cancerous cell to cause death.

9. **The overall quality of the air will have become improved between now and 2020;** the ozone layer will have begun to rethicken and efforts to control air pollution will have stopped a continued rise in the rate of air pollutant release. Though the rate of release will have declined (like the global population), the amount of air pollutants in the atmosphere will still continue to increase. Perhaps the increased CO2 levels in the atmosphere will trigger greater vegetation growth, which will stimulate nitrogen-fixing and other bacterial growth, and some of the atmospheric pollutants can be pulled from the atmosphere and become locked into organic compounds. By this means, the world should come very close to ending the air pollution problem.

10. **Mass extinction of species will continue to the year 2020, and perhaps beyond.** Humankind is the dominant creature on Earth; humans have gained this position by eliminating competition. We do not get along well with other forms of life; out of a sudden emotional whim we will squash a bug, topple an anthill, shoot squirrels, hunt deer, or catch a big fish just to have the catch broadcasted to thousands of viewers so one can gain recognition and status within the human social group. We will do what we want. We will have our order, even if our order goes against the fabric of Nature. We will have our thriving economies, our increased pollution, our empty forests caused by acid rain, our declining fisheries, crop fields, and overall standard of living. We will have our shopping malls, businesses, subdevelopments, high-rises, and million-dollar dreamhouses, and each time our human-created world gets larger, the world of Nature where all other species coexist gets smaller. We probably will not have succeeded in transforming the Earth into one giant human monoculture by 2020, but that may come close to happening sometime within our lifetimes. Let us hope that this never happens.

Conclusion

To conclude these predictions, let us examine even more closely the seriousness of the burden we place on the Earth as a result of our overpopulation. The following passage was taken from the essay "Exponential Growth" written by Albert A. Bartlett of the Univ. of Colorado at Boulder, and was published in Fundamentals of Physics, Halliday and Resnick, 1988. The growth of bacteria in a bottle is a sobering analogy to the growth of our population on earth. The figures presented below are unfortunately underestimates when applying the analogy to humans; whereas bacteria reproduce by doubling, a woman may have as many as twelve children (possibly more) in her lifetime. Steady growth in a finite environment cannot continue for long periods of time, and this is a fact that has been largely ignored by the global community. We are like cancer, multiplying and using up our body's resources at an increased rate. Eventually, we cause our body to become ill, and when it dies, we will die too.

Steady Growth in a Finite Environment

"Bacteria grow by doubling; one bacterium divides to become two; the two divide to become four; the four divide to become eight, etc. Suppose we had bacterial that doubled in number this way every minute. Suppose we put one bacterium in an empty bottle at 11:00 a.m. and later we observed that the bottle was full at 12:00 noon.

Here we have our example of ordinary steady growth with a doubling time of one minute in the finite environment of one bottle. Let's examine three questions.

1. At what time was the bottle half full?
Answer: at 11:59--because the bacteria double in number every minute!

2. If you were an average bacterium in that bottle, at what time would you first realize that you were running out of space?

[This table] shows the last minutes in the bottle and may help you to decide on your answer to this question.

Time	**Fraction Full (used)**	**Fraction Empty (available)**
11:55	1/32	31/32
11:56	1/16	15/16
11:57	1/8	7/8
11:58	1/4	3/4
11:59	1/2	1/2
12:00	1	***Zero***

3. Suppose that at 11:58 some of the bacteria realize that they are running out of space so they launch a great search for new bottles. Their search yields three new bottles, which is three times as much resource as they had known previously. Surely this will make them self-sufficient in space! How long can the growth continue because of this tremendous discovery? The answer is given [on the following page].

If we plan to have continued steady growth in our rates of consumption of finite resources of fossil fuels, then this example shows that enormous discoveries of new reserves will permit the growth to continue for only very short periods of time.

Time	Bottles Filled	Bottles Unfilled
12:00	1	3
12:01	2	2
12:02	4	***Zero***

In 1977, James Scheslinger, the U.S. Secretary of Energy, noted that in the energy crisis, 'we have a classic case of exponential growth against a finite source.' The economic trauma of the period of the energy crisis in the late 1970's was followed by a period of declining prices and apparent abundance of fossil fuels. During this time the arithmetic seems to have been forgotten."

Hopefully, by 2020, *we will have remembered*.