The limits of doomsday predictions

Extrapolation is a risky business in the most exact of sciences; applying the technique to world systems of economic and population growth begs for a fight. Last year, a study conducted for the Club of Rome, entitled *The Limits to Growth*, attempted to model such a world system, and the controversy that followed (SN: 3/25/72, p. 202) has again erupted into print.

Conducted at the Massachusetts Institute of Technology by Dennis and Donella Meadows and colleagues, the study somewhat modified the poet's conclusions about doomsday—the world, it seems, ends first with a bang, then a whimper. Pushed to produce too much, the earth's fertility is depleted, pollution from endlessly growing industries grows unbearable and eventually food supplies, industrial goods and services all suddenly collapse, taking society along with them.

The authors never attached exact numbers to the models that represent various sets of assumptions and they emphasize the lessons of global dynamics to be learned, rather than attempting to predict what actually will happen. But their warning is unequivocal: Without stringent controls on population and economic growth, society will surely enter the "collapse mode."

Now a new report argues that these drastic conclusions may have resulted from a simple typographical error. The author, Thomas J. Boyle of McGill University, says that when he picked up a copy of the MIT team's computer program and ran it himself, he discovered that a decimal point had been misplaced in a key number. After correction, he claims, the predicted pollution crisis does not occur. His arguments are published in the Sept. 21 NATURE.

Boyle also takes issue with two basic assumptions of the Meadows model: first, that over-intensive farming leads to irretrievable loss of soil fertility, and second, that industrial output tapers off only at extremely high levels of consumption. By assuming diversion of capital to land development and moderation of demand for food and goods, his research leads to the conclusion that "affluence without restrictive social policies is apparently attainable." By the year 2100, population can stabilize at six billion with growth halted in all sectors of society.

Donella Meadows, contacted by SCIENCE NEWS at Dartmouth College, where she and her husband now teach, said the typographical error "does not affect our conclusions in the least." Boyle, it seems, had obtained an early, working version of the computer program from a graduate student, and the Meadows did not know of his work until they received a draft of the NATURE article. Later published versions of the program, now being used by researchers throughout the world, she said, had never included the error.

Boyle disagrees. "I think it [the error] completely changes the logic of the book," he told SCIENCE NEWS. The assumption underlying the Meadows work, he said, is that technological advances, such as providing unlimited energy, cannot solve the problem. In Boyle's model, increased affluence is automatically accompanied by self-regulation—government controls to keep land from being depleted, decreased birth rate similar to what is seen in developed countries now, and moderation of demand for goods and services. "I think we're already seeing this happening in the United States," he concludes.

Both sides agree that economic and population growth must stop, but whether the leveling off comes at an acceptable standard of living without great overcrowding remains a central point of contention. Also, the type of social controls that the different models demand to achieve stability must be straightened out before such simulations can be used to decide policy.

But should it be used? Despite the authors' caveats, *Limits to Growth* has been interpreted as implying the urgent need for stringent societal controls over personal life. Boyle fears that his article will likewise be misinterpreted as indicating everything will be all right. Rather than that, he says, the point to be taken is just how limited such projection schemes are. "You tell me what you want and I can generate it from the program."

Ironically, both parties to the feud are dedicated conservationists. "I believe the world's in trouble," says Boyle, "but not from what that program says." Donella Meadows sees symptoms of the awful collapse already visible, and cites the example of starving people south of the Sahara eroding away their scarce resources by overgrazing what meager fields they have left. Research like this, she says, "can tell you the direction to go."

Certainly global systems modeling has increased appreciation of how interconnected are the many factors affecting human survival, and controversy has been a mainspring of research for centuries. But whether the present level of argument either advances the state of the art or illuminates at all so important an issue as planetwide plans for survival is doubtful.

Go-between for growth hormone in humans

In 1957 growth hormone was found to stimulate skeletal growth indirectly rather than directly. Some chemical in the bloodstream appeared to serve as intermediary. In 1967 Judson van Wyk and his endocrinology team at the University of North Carolina School of Medicine decided to see what the intermediary might be. They separated human plasma (the fluid part of blood) and have finally come up with a peptide (part of a protein) which, in tissue studies, acts as the intermediary in the action of growth hormone.

Van Wyk announced his team's findings last week at a human growth hormone symposium sponsored by the National Institute of Arthritis, Metabolism and Digestive Diseases. The name of the substance is somatomedin, which means it mediates somatotrophin. Somatotrophin is another name for growth hormone. Since other pituitary hormones have mediators, it makes sense that growth hormone has a go-between.

Aside from its intrinsic scientific merit, the isolation of somatomedin may have widespread clinical value. Although growth hormone appears to have at last been successfully unraveled by Choh Hao Li of the University of California at San Francisco (SN: 5/6/72, p. 303), it will probably be seven years or so before the hormone is synthesized and made widely available for treating children who do not grow properly. Meanwhile, the only growth hormone treatment for such children is extracts of human growth hormone obtained from pituitary glands at autopsy. There is not nearly enough of it to go around, according to Salvatore Raiti, director of the National Pituitary Agency (part of NIAMD). In fact, growth hormone treatments must be limited to children taking part in research projects. Now somatomedin looms as a possible alternative to either synthetic or natural growth hormone in treating such children.

Yet as van Wyk says, "From two tons of plasma we got less than a milligram of somatomedin." That's only about four-hundredths of an ounce. With that tiny amount of material they have to figure out the amino acid sequence of somatomedin. Only then will they be able to synthesize somatomedin for clinical testing. □