

ingly inhospitable planet, for example, by genetically engineering "supercucumbers" to thrive in severe heat or "injecting" sulfur dioxide into the stratosphere to reflect the sun's rays back into space. But the closer we move toward finding salvation in a "macromanaged" world, the more we hasten the end of nature.

But is there any way to quantify this dire forecast?

As it happens, McCloskey and Spalding, chairman and researcher, respectively, at the Sierra Club, recently completed a survey of the world's remaining wilderness. They report that one-third of the globe

(about 19 million square miles) still belongs to nature. However, 41 percent is found in the Arctic or Antarctic and only 20 percent in the temperate regions. Most of the settled continents, except Europe, are between one-quarter and one-third wilderness. The United States is only five percent wilderness; nearly two-thirds of Canada, one-third of the Soviet Union, and one-quarter of China remain wild.

Of the dwindling stock of wilderness, less than 20 percent is being protected. But there is still a chance, these authors believe, "to maintain some measure of balance between 'man and nature.'"

Water Wars

"Trouble on Tap" by Sandra Postel, in *World*Watch* (Sept.-Oct. 1989), 1776 Mass. Ave. N.W., Washington, D.C. 20036.

Like the proverbial free lunch, the bottomless well is becoming a thing of the past. From the American West to the North China Plain, governments are struggling to come to terms with the fact that there is only so much water to go around.

The situation is most severe in the arid Middle East, reports Postel, a vice president of the Worldwatch Institute. Israel's Meir Ben-Meir, former minister of agriculture, predicts that a war over water is "unavoidable if the people of the region are not clever enough to discuss a mutual solution to the problem of water scarcity." Egypt's foreign minister, Boutros Ghali, fears a war over access to the waters of the Nile. Rapidly growing Egypt, which relies on the Nile for virtually all of its water, has water-sharing agreements with Sudan, where the Blue and White Niles meet, but not with other nations farther upstream. What happens when upstream users such as Ethiopia and Tanzania begin drawing on Nile headwaters more heavily?

In India, the problem is not so much scarcity as poor management of water. The government has spent \$12 billion on dams to capture runoff during the June-September monsoon season, but it has also allowed massive deforestation in many watersheds. As a result, underground aquifers are not being replenished.

Now, many neighborhoods in New Delhi receive running water only sporadically.

Mismanagement of a different sort plagues the Soviet Union. To irrigate the orchards and cotton fields on the fertile plains of Soviet Central Asia, Moscow has tapped two rivers that feed the Aral Sea. As the Aral shrinks, drying salt is swept by the wind onto nearby farmland, where it settles like a poison. Restoring the sea to its pre-1960 condition would require a 60 percent reduction in land under irrigation, a loss worth \$30 billion annually.

"Common to these tales of shortage is the near-universal failure to value water properly," says Postel. Allowing users to buy and sell water rights, as they now can in much of the American West, is part of the solution. That will encourage a more rational use of water in places like California, where irrigated cattle pastures consume as much water as all of the state's 28 million residents. (Even the Soviet Union is planning to begin charging water users by 1991.) Conservation should also increase. Lining irrigation canals with impermeable materials, drip irrigation, and other techniques can cut farm water use by 20 to 30 percent. A California conservation effort is expected to save enough water to serve 800,000 people. (In the United States, a family of four consumes about

160,000 gallons annually.)

But economic incentives alone won't do the job, Postel believes. Population control, reforestation, and political negotia-

tions will be needed in many parts of the world. Ultimately, water shortages are going to force many governments to rethink national needs and wants.

ARTS & LETTERS

Birth of a Genre

"Astounding Story" by Frederik Pohl, in *American Heritage* (Sept.-Oct. 1989), 60 Fifth Ave., New York, N.Y. 10011.

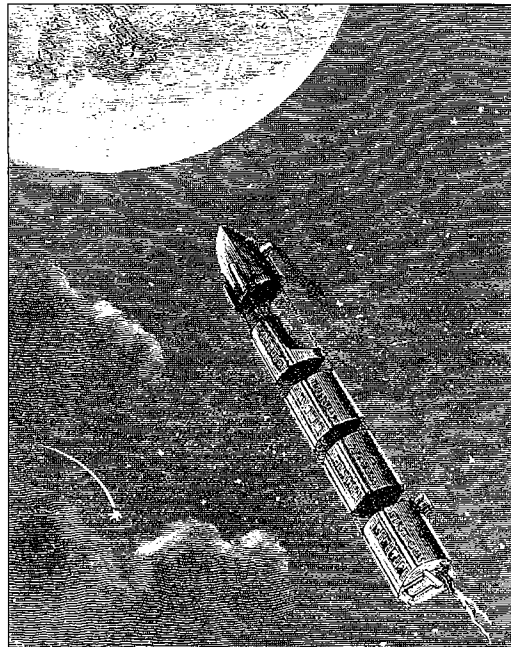
Americans today are swamped by information and speculation about science and technology. It was not always so. Fifty years ago, there was no Carl Sagan, no *Nova* (indeed, no television), no *Discover* magazine. Radio and newspaper coverage of science was skimpy. Pohl, a noted science fiction writer, speculates that "a majority of the world's leading scientists today were first turned on to their subjects by reading science-fiction stories."

Science fiction traces its ancestry as far back as Jonathan Swift, but it developed as a distinct genre only during the 1930s in pulp magazines such as *Amazing Stories* and *Astounding Stories of Super-Science*. Book publishers ignored science fiction and Hollywood's few ventures into the field bombed. The genre was transformed after 1937, when a young writer named John W. Campbell took over as editor of *Astounding Science Fiction* magazine (later renamed *Analog*). Campbell insisted that his writers deal with more than scaly green space monsters and exotic machinery; he said he wanted "stories which could be printed as contemporary fiction, but in a magazine of the 25th century." From *Astounding's* stable of writers came such now-famous science-fiction novelists as Robert A. Heinlein, Isaac Asimov, and Arthur C. Clarke.

Their day finally arrived after World War II, when book publishers realized that science fiction was different from other pulp genres. Unlike readers of westerns and war stories, science fiction's consumers were a devoted bunch, enthusiastically forming fan clubs and thronging sci-fi conventions. In other words, they were a natural market. From near-zero in 1945, the

number of science fiction novels published soared until, by the 1980s, nearly one new novel in four was either science fiction or fantasy.

Along the way, the genre shed its image as the sole property of pimply teenaged boys. Academic critics like Leslie Fiedler began paying attention to it as early as the 1950s; today, for better or worse, seminars on science fiction are a regular feature of the Modern Language Association's annual meetings. By the 1960s and '70s, mainstream writers such as Kurt Vonnegut and Doris Lessing were trying their hands at science fiction.



Modern science fiction was pioneered by Jules Verne (1828-1905). Among his bestsellers was *From the Earth to the Moon* (1873).