The Future

Leisure to come

Faced with burgeoning use of public recreation lands and hoping to plan facilities for even greater demand in the future, the U.S. Forest Service has conducted a study of what experts in biology, environment, population dynamics and related fields think will be the leisure activity of coming generations of Americans. The results indicate a more plentiful, but less spontaneous type of relaxation awaiting us.

By 1985, the experts say the number of people permitted to use wilderness areas will be restricted. Workers will have more leisure time—because of a 4-day, 34-hour work week—and the Government may offer economic incentives to private landowners to open their land for the increasing rush of recreation seekers.

By 1990, overnight camping will be by reservation only; public outdoor areas will be paved with "wear-resistant" footpaths and bounded by electronic guide systems and fences. To spread out vacationers, public schools will probably have to operate on staggered schedules.

Truly artificial outdoor environments may arrive by the turn of the century, with enclosed, all-weather city parks, nighttime lighting to extend recreation hours, and captive rearing projects for rare and endangered species. Workers will retire at 50 and attempts will be made to control population growth through tax incentives. Only biodegradable chemicals will be discharged directly into the environment.

By 2050, "the last acre of wilderness land" will be set aside and man-made islands will have to be built to handle recreation needs.

Energy: Doing more with less

While most projections of future energy needs concentrate on developing new sources, avoidance of a real "crisis" will depend on fundamentally changing life-styles, according to Glenn T. Seaborg, writing in the February FUTURIST. "We are not yet in an energy crisis," says the Nobel laureate who for several years headed the Atomic Energy Commission, "and we need not ever reach that point of no return where we have no options open."

Until about 1985, he says, the search for immediately available new energy must concentrate on coal and conventional nuclear power, with some specialized applications of solar and geothermal energy. Soon after the turn of the century mankind should be able to switch to "the ultimate energy sources," nuclear fusion and solar power.

But equally important will be the changes in daily life: the formation of the "recycle society," imbued with a "conservation ethic." In short, we must learn "ephemeralization" (Buckminster Fuller's phrase)—doing more with less. New technologies will provide the key to this success, Seaborg adds, with new forms of communication, transportation and durable goods replacing the inefficient, wasteful paraphernalia of present-day life.

What price the oceans?

As a guide for sea-related legislation, the Senate Commerce Committee authorized a study to find out just how much those parts of the oceans controlled by the United States are worth. The results: In 1973, direct economic output totaled about $7.5 billion, which is expected to rise to $33-$44 billion by the turn of the century. The largest return will come from mineral resources, led by gas and oil.

Physical Sciences

Strengthening neutral weak currents

Neutral weak currents are a topic of revolutionary interest to physicists these days. The term refers to elementary-particle processes under the governance of the class of force physicists call the weak interaction that proceed without an exchange of electric charge between the participating particles. Such processes were forbidden by the older theory of the weak interaction and unseen experimentally until a year or two ago. The newer theories of the weak interaction demand the existence of neutral currents, and since these theories are unified field theories, steps on the way to uniting all the forces and fields of particle physics in one theoretical frame, their confirmation is of utmost importance.

Several predicted consequences of neutral weak currents have lately been seen, and many physicists are beginning to believe in them. Another consequence is now reported in the March 3 PHYSICAL REVIEW LETTERS. It concerns work done at the Fermi National Accelerator Laboratory by B. C. Barish of California Institute of Technology and nine others from Caltech and FermiLab. The experiment sent beams of high-energy neutrinos against nuclear particles and looked for events in which no muon came out. (A neutral-current interaction should produce no muon; the other sort, a weak charged current, should.) They found "a clear signal of events with no apparent final-state muon," thus strengthening the case for the neutral currents.

Measuring interstellar masers

Among the more curious astrophysical objects are the celestial masers, patches of the interstellar gas clouds that radiate radio waves by stimulated emission, like the maser amplifiers of terrestrial radio systems. Masers need a continuous stream of energy from an outside source to pump their molecules to high-energy levels, from which they then radiate. The celestial masers are thus located in or near highly energetic bodies, possibly nascent or young stars.

Mark J. Reid and Duane O. Muhleman of the Owens Valley Radio Observatory have used very long baseline interferometry to study five hydroxyl masers (type II OH/IR objects) associated with Mira-type variable stars. They report in ASTROPHYSICAL JOURNAL (196:L35) that the masers are quite large, up to 100 billion kilometers across. Masers of this particular type tend to form in the dust shells surrounding M-type Mira variables that have temperatures about 2,000 degrees K. and radii of about a billion kilometers, they suggest.

A superconducting polymer

The first polymeric system to exhibit superconductivity (complete loss of electrical resistance) is reported in the March 10 PHYSICAL REVIEW LETTERS by R. L. Greene and G. B. Street of the IBM Research Laboratory in San Jose, Calif., and L. J. Suter of Stanford University. The substance is the crystalline polymer polysulfur nitride [$(SN)_x$], which becomes superconducting below a temperature of 0.26 degrees K.

The present discovery is particularly exciting to the discoverers because the substance is a "quasi-one-dimensional" system, meaning that motions and structures in one dimension dominate what happens. Studying superconductivity in one dimension should introduce significant simplifications into attempts to understand the phenomenon.