environmental sciences

New hope for Venice . . .

The "Queen of the Adriatic" is drowning. Initially from natural causes and now five times faster because of human factors, Venice is slowly sinking into the lagoon that made it famous. The city of canals rests on an island whose base is being compacted as water is drawn off through an increasing number of wells. To make matters worse, channel dredging has exposed the city to more damage from waves that once broke on outlying shoals and from storm-created surges from the sea. Meanwhile, airborne sulfur oxides from local industries are eating away at sculptured marble facades and monuments, and oil spills, industrial wastes and agricultural chemicals increasingly befoul the lagoon.

The Italian Government has committed itself to a long-range effort to save Venice, Scientific aspects of the work, reported in EUROPEAN SCIENTIFIC NOTES, are directed by the Laboratory for the Study of the Dynamics of Large Masses (like the lagoon), located on the banks of the Grand Canal. Through sonar mapping of the lagoon, developing mathematical models for the prediction of flood patterns in the city and establishing a network of data collection stations, the laboratory hopes to develop new techniques to help engineers already busy at work building seawalls, rehabilitating buildings and installing a new sewage system.

. . . and for Borobudur

An ambitious program of restoration for the great temple complex at Borobudur in Java has been announced by the Indonesian Government. The world's largest Buddhist sanctuary, Borobudur was built in the 8th century, and its structure has been badly eroded by the effects of time, weather and tropical vegetation. Restoration will involve dismantling terraces and balustrades of the temple so as to drain the ground underneath. Then new supporting structures will be built to restore the monument to its original appearance.

About two-thirds of the roughly $9 million restoration costs will be borne by foreign sources, principally UNESCO.

Protection for the chronically ill

A paper delivered to a seminar on the health effects of air pollution (SN: 11/3/73, p. 281) may have stirred up more of a furor than its author anticipated, but it has also reopened a neglected debate. At the seminar, the medical director of Alcoa aluminum company, Bertram Dinman, proposed moving chronically ill persons out of polluted areas rather than spending the huge amounts of money that would be required to protect them through pollution abatement. Specifically, he suggested providing clean air shelters during pollution alerts and paying persons with chronic heart or lung diseases to move from polluted urban centers.

Environmentalists immediately charged that Dinman was simply trying to move away "expendable" persons while allowing industry not to clean up its mess. Affected persons —including those with asthma, emphysema, chronic bronchitis and serious heart disease—make up almost 10 percent of the population, they point out, and forcing them to move from their chosen homes, in order to preserve their health, seems vaguely un-American.

But Dinman has raised an inevitable question. As BUSINESS WEEK noted, the cost of removing the last 3 percent of air pollution could be as much as removing the first 97 percent, and there is no single threshold that can be considered "safe." As Dinman implies, society will some day have to choose where to draw the line.

earth sciences

A galloping glacier alert

What is perhaps the largest glacier in mainland Canada has begun advancing rapidly, and U.S. Geological Survey scientists are warning of a serious threat of floods downstream from it in Canada and Alaska next summer.

The 44-mile-long Tweedsmuir Glacier straddles the British Columbia-Yukon border, about 169 miles northwest of Juneau, Alaska. USGS glaciologist Austin Post first spotted the surge of the glacier in early October while he was conducting his yearly photo reconnaissance flights over major glaciers of North America. By comparing his photos with earlier photos and with images from the ERTS-1 satellite, Post and his colleagues were able to determine that the front part of the glacier had just begun to advance. It now seems to be moving much faster than the normal rate of a few inches to a foot per day for glaciers.

The danger is that the glacier will block the Alsek River at the already narrow channel called Turnback Canyon. This has happened occasionally in the past, backing up the river into a lake as much as 13 miles long. "We believe the 1973 surge may again close off the river, most probably during the coming winter," says Post. "If this should occur, sudden—perhaps repeated—releases of the lake when the ice dam fails in the summer could cause hazardous flooding in downstream channels, and in Dry Bay, Alaska."

Ocean rainfall overestimated

Two scientists have found that far less rain falls over the North Pacific Ocean than previous estimates indicated. The question is important; knowledge of precipitation patterns over the oceans is necessary to fully understand the circulation of the ocean and atmosphere and the exchange of energy between them. These interactions affect weather worldwide.

Oceanic rainfall has to be estimated, because there are so relatively few stations to take regular readings. Simple extrapolation of land rainfall amounts seaward has proved inaccurate. R. K. Reed of NOAA's Pacific Oceanographic Laboratories in Seattle and William P. Elliott of Oregon State University's School of Oceanography applied another method that makes use of quantitative relations between reports from land, ships and ocean weather stations.

Using the technique, Reed and Elliott found lower amounts of rainfall (by about 8 inches a year) over most of the North Pacific Ocean than previous estimates.

"Our findings," they report in the Oct. 20 JOURNAL OF GEOPHYSICAL RESEARCH, "certainly suggest that a full reassessment of oceanic precipitation patterns is in order."

The 'punched up' volcanoes of the Pacific

One hypothesis for the formation of the undersea volcanoes known as seamounts is that they are "punched up" through a plate of oceanic crust moving over a fixed hot spot in the earth's mantle.

Two such undersea edifices south of Alaska, the Kodiak Seamount and the Giocomini Guyot, have been dated at 22.6 million years and 19.9 million years, respectively. The older of the two is in the Aleutian Trench, about to be subducted. The younger is 178 kilometers to the south. They are the northwesternmost in a chain of seamounts running obliquely across the older northeastern Pacific floor.

Using the hot-spot hypothesis and the ages and separation of the two seamounts, geologists Donald L. Turner, Robert Forbes and Charles W. Naeser calculate a motion of the Pacific plate of 6.6 centimeters per year during the formation period. Their report is in the Nov. 9 SCIENCE.