Japanese environment

Rediscovery of pollution

Tokyo

PUBLIC outcry over pollution has almost vanished in Japan as the once notorious Tokyo smog becomes just a memory of the 1970s: the feeling is that the really big problems have been beaten.

The White Paper (policy statement) just released from the Environment Agency thus comes as something of a shock, detailing a host of new and more insidious problems.

There is no doubt that major battles have been won in the control of air pollution. Ten years ago, photochemical smog warnings were issued on close to 300 days of the year and some 5,000 victims a year were being registered in Tokyo alone. In 1965, things got so bad in Yokkaichi, a refinery port close to Nagoya, that all primary school children in the most polluted parts of town were issued with special face masks — not that they appeared to be effective. Now, nitrogen dioxide levels in the air are steadily declining in most parts of the country, despite increased traffic, and smog alerts are down to some 130 days a year.

Where new problems are arising is in the pollution of rivers and lakes and in the mass movement of population to new satellite cities with an infrastructure ill-prepared to receive them. Japan's largest lake, 674 square kilometre Lake Biwa, provides a classic example. The population of Shiga prefecture, in which the lake is located, is growing very rapidly as people move out of the nearby Osaka and Kyoto conurbations in search of a better environment and industries are relocated where land is cheaper.

The resulting effluent pouring into the lake, coupled with acid rain from the huge industrial areas nearby, is now rapidly turning it into a graveyard. The shallow southern half of the lake is in a state of almost total eutrophication, and the northern half is plagued by "red tides" — freshwater algal blooms. Attempts to cut the input of phosphates, by banning sale and use of phosphate detergents, for example, began in 1980 but came too late; it is unlikely that the lake water will show major improvement this century.

Similar problems are seen in many other lakes and rivers, and pollution is spreading into underground waters. Analysis of water in wells shows that some sites are contaminated by carcinogenic organo-chloro compounds at 600 times the levels recognized as safe by the World Health Organization, a serious problem given that 30 per cent of Japan's drinking water comes from underground sources and that the sources of pollution are virtually untraceable with present understanding of underground water flow.

All this highlights the way in which movement of population from the countryside and giant cities into suburban satellite cities, accompanied by an increasing

reliance on automobiles, has not been accompanied by adequate attention to sewerage and water supplies. "A glut of Walkmans and a shortage of sewers" was how experts from the Organisation for Economic Cooperation and Development recently summed up Japan's emphasis on private rather than public expenditure. Noise, traffic jams and garbage disposal problems are also becoming more severe in the new cities as they inherit the crises of the larger cities, and with Japan's urban population expected to reach 70 per cent of the total by the end of the century, there is little hope of a let-up in the pressure. But creating new urban infrastructures, or the greater dispersal of population and industry that the white paper calls for, cannot be achieved without massive expenditure that the government seems unwilling to make.

To cope with deterioration of lake and marshland, the Environment Agency has introduced legal limits on the levels of phosphorus and nitrogen effluent that can be discharged by industry. Japan is the first nation to attempt to control both factors. Initially stringent limits were, however, reduced after opposition by the Ministry of International Trade and Industry (MITI), highlighting the Environment Agency's own lack of power. Although the agency was originally intended as a single comprehensive pollution control body, when it was set up in 1971 it found that ministries with regulatory powers over pollution, particularly MITI, were unwilling to relinquish them. The result is that the agency is a watchdog without teeth: it can plan and co-ordinate policies but is not responsible for enforcing them, except in the case of wildlife protection.

In this area, the Environment Agency has just shown a willingness to respond to international concern by setting up a new "Headquarters for Wildlife Protection Measures". Severe criticism of Japan from abroad, reinforced by the visit of Prince Philip, Duke of Edinburgh, in his capacity as president of the World Wildlife Fund (see *Nature* 311, 698; 1984), for failing to obey the Washington Convention prohibiting the import of endangered species, was the chief stimulus to the establishment of the new office. The number of customs houses through which wildlife can be imported has been reduced to nine and officials are given training in spotting illegal imports.

The white paper itself, however, pays scant attention to international issues. Although it charts the destruction of tropical rain forest in South-East Asia — destruction in which Japanese logging companies and Japan's voracious demand for timber have played a large part — it does not call for any action other than membership of standard international environmental organizations.

Alun Anderson

French universities

New watchdog barks well

Paris

UNDER a dozen glittering candelabra that must each weigh a ton, beneath the frescoed ceilings of the Elysee Palace and surrounded by much of the academic elite of France, President François Mitterrand last Friday gave his full dignity to the latest effort to reform the French university system, the establishment of the Comité National d'Evaluation des Universités, or CNEU.

The purpose was serious, and the guests were hopeful, especially the director-general for the universities at the ministry of education, M. Jean-Jacques Payan, whose cheerful face has been proclaiming lately that he thinks his job now done. The 75 French universities, many created shortly after the 1968 student revolt, and mostly egalitarian and left-wing in spirit, have been opened up to once-hated industry and now, through CNEU, to competition among themselves.

The committee "responds to an evident need" said President Mitterrand on Friday. "It signifies for our country an innovation of major importance." It represents the increasing autonomy of the French universities (sweet words to the relatively powerless university presidents) whose counterpart is "the objective evaluation of their strengths and weaknesses" (rather more bitter words for the feebler institutions).

CNEU will be "entirely free" to make its own judgements and will report each year to the President. M. Mitterrand said, "I expect reports to have concrete effects" on the decisions of the French administration. (CNEU will not directly control and divide funds as does, say, the British University Grants Committee.)

The French universities, described by M. Henri Tézenas du Montcel, who resigned as president of the University of Paris (Dauphine) to write a critical book on his *alma maters*, as those "foggy and smoky" places, are now required, said M. Mitterrand, "to be more transparent and to develop the best among them".

The universities must obey three principles, he said: autonomy, which the President expanded to mean obedience to the recently-introduced system of research contracts agreed between the ministry of education and each university, assessed *a posteriori*; "emulation", a soft word for "competition" in which each university must attempt to emulate the best elsewhere; and quality, "the condition of success in scientific competition... and world technology, which greatly depends on the success of our universities and scientists". On this success the French people depend. And the President depends on CNEU to help increase the quality of the univer-

sities "and therefore the chances for France".

M. Laurent Schwartz, like M. Tézenas du Montcel an old critic of the French universities, is presiding over CNEU, but had raised himself from his sick-bed to deliver his opening address last Friday. He pronounced himself "sensible to the solemnity" that the French President was giving to the installation of his committee, and promised to make of CNEU "an instrument fundamental to the success of the French universities".

According to Schwartz, French universities have been subjected until now to little real objective evaluation, either internally like the US universities, or externally, like the British. In France, there has been only piecemeal evaluation by the research councils, or by the national university promotions committee (the Conseil Scientifique des Universités). CNEU would introduce global evaluation, something "much more ambitious".

"The question is to make known to each establishment, to the minister of education and to public opinion how the universities are doing branch by branch and globally." The better a university does in its evaluation, the more autonomous it should expect to become. CNEU would not distribute money directly, as that might result, in the long term, in "equipartition".

The regulations defining CNEU give it an "entirely new" freedom of movement, said Schwartz. It will have "absolute independence". Many organizations in France are governed by strict rules penned out in minute detail. But "the decree that establishes our committee leaves us on the contrary complete freedom to evaluate as we wish". If only, dreamed Schwartz, this atmosphere of confidence and liberty could extend to other organizations — such as the universities themselves.

"We must combat taboos and corporatism", said Schwartz. "We must understand and make understood: that demands courage and objectivity. We will force ourselves to have them. The grandeur of our task is impressive but is also fascinating."

The 15 members of CNEU will not carry out all the evaluations, but will appoint outside independent experts, said Schwartz. CNEU will use international experts as much as possible "as is done throughout the world". CNEU will not evaluate individuals, but will work at the level of groups and above. It will consider both research and teaching together, "for to separate research and teaching would kill both".

"CNEU will not behave like a policeman" said Schwartz. "Evaluation is totally contrary to Napoleonic control. We shall not be checking that the universities follow all the rules. On the contrary, we shall see if the universities can innovate, if they can launch audacious projects: we shall support initiative and not conformism or retreat."

Robert Walgate

Japan in space

David keeps Goliath guessing

Tokyo

THERE seems no limit to the ambitions of Japan's Institute of Space and Astronautical Science (ISAS), the tiny academic cousin of the government-run giant National Space Development Agency (NASDA). Despite a shoestring budget and home-grown solid-fuel rocket technology, the agency is determined that Japan should be the third country to send a satellite to the Moon.

ISAS has just revealed that it is drafting a detailed programme to launch Japan's first Moon observation satellite in fiscal year 1989. Under the plan, a satellite will be placed in Earth orbit and, after a day for accurate orbital alignment, will be blasted off for the Moon by a "kick motor". On its first pass, the satellite will be slung past the lunar surface at an altitude of about 6,000 km, one month later reaching an apogee of well over 1 million

km. Thereafter, it will be catapulted back towards the Earth-Moon system and, after a second "near miss" of the Moon, will enter a highly eccentric Earth orbit stretching across the Moon's path. Two months and four Earth orbits later, the satellite will then whip off on another two-month loop around the Moon, or so the theory goes, but according to ISAS's "gunnery lieutenant" Hiroki Matsuo, professor of orbital dynamics, much more detailed calculations will be required before he can predict exactly where Japan's first Moon shot will end up.

Given ISAS's resources, it is a wonder that this organization can even contemplate a lunar mission. Japan is unique in having two space organizations, each equipped with its own satellites, rockets and launch sites. The larger NASDA, affiliated to the Science and Technology Agency, is in charge of the development of applications satellites and their launch vehicles, while ISAS, affiliated to the Ministry of Education, Culture and Science and operating on a fraction of NASDA's budget, carries out research and development of scientific satellites and launch vehicles. NASDA uses

liquid fuel rocket technology developed almost entirely under US licence but ISAS has its own "home-made" solid fuel launchers.

In the 1960s, when ISAS was part of Tokyo University rather than a national institute, the Japanese government asked the institute to limit the size of its rockets, to avoid competition with NASDA and to prevent the academic organization getting too big for its boots or so it said. By the early 1970s, ISAS had already reached the 1.41-m limit on the tail diameter of its rockets, since when its MU-series rockets have been getting taller and taller but no wider, at least at the base. With the Moon shot, however, ISAS is reaching the limits of ingenuity in what it can do with its present launchers.

To kick the lunar probe out of Earth orbit and off to the Moon, ISAS plans to add a 500-kg fourth stage to the MU-3SII used in the successful launching of the Halley's comet test satellite, *Sakigake* (see *Nature* 17 January, p.175). Add to this the 170-180 kg weight of the satellite and the payload capabilities of MU-3SII will be stretched to the full, whence ISAS's cunning plan makes gravity do most of the work. Launch dates and total budgets for the programme have not yet been agreed but ¥160 million (\$0.6 million) has been approved for systems design in the current fiscal year.

Unlike previous programmes, the lunar programme, codenamed MUSES (MU Space Engineering Satellite), is aimed largely at engineering studies of control of the speed and orbit of the satellite and, according to Professor Matsuo, no scientific instruments will be carried on the first satellite, MUSES-A. However, a possible successor, MUSES-B, may carry a scientific package to be dropped to the lunar surface.

But the big question in the minds of the institute's members is what more can be done with present launch facilities. Among the projects under consideration are a solar physics project for observations of solar flares that would, ideally, be carried out at the next solar maximum in 1991, but which would clash with a plan, in conjunction with the US National Aeronautics and Space Administration, to launch a satellite from the space shuttle which would follow a similar profile to MUSES-A. So the solar physics project will probably be scheduled for 1992.

Also under consideration is a project to examine diffuse X rays following on the successful series of X-ray satellites, while the institute also has more grandiose ambitions to send satellites to the planets which would be beyond the capabilities of MU-3SII. Using NASDA launchers would help, but NASDA has its hands full while ISAS cherishes its independence.

David Swinbanks