$30.6 million, of which it paid only $1.7 million. When this question was raised at a public hearing in 1979, an Air Force spokesman responded that the Air Force's structural engineers were not convinced that all of the alleged sonic boom damage was actually caused by sonic booms. "The claimant obviously thought and probably unintentionally, you know, thought the damage was sonic boom damage and the structural engineers disagreed," he remarked.

In the end, the EPA gave the Air Force's final environmental impact statement for New Mexico and Texas its highest rating, rejecting arguments that the statement was deceptive. An EPA spokesman says the agency looked at the statement to see whether the booms will affect peoples' hearing—and concluded they will not—and also to determine "how people feel about the noise." The second criterion, he remarks, "is very subjective." He notes that, "While we're not thrilled with the Air Force comments [on the criticisms of its initial environmental impact statement], we decided to accept them."

The Air Force submitted essentially the same draft environmental impact statement for its planned 3000-square-mile "supersonic operations area" in eastern Nevada and western Utah near the Gandy mountain range. The EPA approved this statement also, although, according to Bargen, "the same scientific errors and deception" occur in this statement.

In fact, Bargen points out, the Gandy range statement is mostly a copy of the Texas and New Mexico one. This copying of the other document led to the absurd statement that the residents living below the proposed supersonic area whose homes are below 5000 feet mean sea level will not be bothered by the booms. As Bargen notes, "no regions of habitation exist below the [supersonic area] that are under 5000 feet mean sea level." The Air Force has not yet submitted its final environmental impact statement for the Gandy range, and the residents of central Nevada are still waiting for the Navy's draft environmental impact statement on the proposed 5900-square-mile supersonic operations area there. But in the meantime, says Robbins of Dixie Valley, "We've been subjected to 175 to 180 booms in the past 2 years. The Navy planes fly overhead from 8:00 in the morning until 9:30 at night. We feel like we're in a combat zone and the Navy hasn't even started yet." (The booms are, presumably, accidental.)

Although the Air Force and Navy are required by law to submit environmental impact statements before beginning any supersonic operations over populated areas, they are not required to get high ratings for their statements from the EPA. The ultimate decision on whether to go ahead with their plans is the military's alone. The role of the EPA, says Air Force general council Douglas Heady, "is to comment on the technical adequacy of the environmental impact statement. EPA does not have a veto or approval role."

As the Air Force prepares to begin its supersonic flights in New Mexico and Texas, it believes it has reached the best possible agreement with the citizens of those areas. According to Vest, the Air Force arrangement means that "the process [of citizen comments] works. The Air Force takes it seriously." But the citizens are not so sanguine. They see the agreement as a means to gather ammunition in what they foresee as a long fight to get the military to stop supersonic flights over populated areas. The claims by the Air Force that the booms will not be unbearable, says Tackman, are "a fairy tale." The key, he says, is to "get good monitoring and verification [of the booms]." Then, he emphasizes, "we will have proof."

—GINA KOLATA

World Bank Puts Priority on Africa Program

Problems of how to inject science and technology into development projects are acute in Sub-Sahara

The mood at the annual meeting of the World Bank late last month in Washington was one of relative optimism as the crisis conjured up by the Third World debt burden recedes. The debt scare, however, has substantially influenced the policies and organization of the World Bank and of other agencies involved in development assistance. One result is that the bank's effort to infuse science and technology into development projects has lost some visibility.

The recent merging of a separate science and technology unit into a reorganized office of environment and scientific affairs, for example, has prompted speculation among outsiders that science and technology is being downgraded. But the bank's current arrangements for injecting science and technology into its projects are less an issue than is the question of how the function will be performed in the longer term. The bank is now undergoing the most ambitious self study in its history with a view to laying out changes in its operations for the rest of the decade and beyond.

Trends in bank thinking are defined most clearly in a new action program for Sub-Sahara Africa,* the only major region in which per capita income and per capita food production fell in the past decade. The bank's prescription calls not only for increased capital flow—it urges a boost of some $2 billion to the $9 billion a year being allocated to the area—but for significant policy changes by both African countries and donor organizations. First and foremost, African governments will be expected to undertake policy reforms designed to provide a firmer foundation for economic growth, particularly to encourage the growth of agricultural production, where most African countries have lagged badly. The bank, for its part, will be concentrating harder on making current projects productive, and be more amenable to providing loans to help governments carry out reforms that may be financially difficult and politically unpopular.

Some critics see the bank's new policies as entailing a shift in focus to short- and medium-term goals that will divert attention from efforts to deal with problems of the environment, education, population, and science and technology that are regarded as essential to long-term development strategy.

The bank's record in incorporating new technology into its projects is mixed. The bank is the largest multilateral source of funds for development and in

*The proposal is contained in a World Bank report, "Towards Sustained Development in Sub-Saharan Africa" (1984).

sectors such as agriculture, energy, industry, and public health, the successful transfer of Western technology is deemed crucial to the carrying out of bank projects. The bank staff, which totals about 7000, includes some 600 to 700 professionals with technical backgrounds and the bank uses many consultants with the expertise required for specific projects.† In general, the bank has been at least as successful as other major development assistance organizations in incorporating technology into its projects, but, in Africa, critics say that insufficient attention to local circumstances has led to a high rate of project failures.

Many academics knowledgeable about development say that the bank shares this shortcoming with most other aid organizations. David Cole of the Harvard Institute for International Development, who has a special interest in Africa, says, "The bank and other agencies have tried over the past decade to mount programs which would bring in new technology" in order to achieve major increases in agricultural production. These efforts generally have produced "poor results," says Cole. Often an attempt was made to impose policies that proved unsuitable and "to apply technology to areas where it didn't fit." In general, he says "the complexities of the African environment are so great and the differences so extreme," that projects fail when these factors are not taken sufficiently into account. Cole adds that "the scientific community has not served the program very well." In agriculture, for example, researchers say they have the technological answers and point to developments that prosper in research centers. The new technology often proves "difficult to transmit in Africa."

Victor Rabinowitch, executive officer of the National Research Council's office of international affairs says, "the bank has tried hard to develop a significant program" of utilizing science and technology and credits bank staff member Charles Weiss, who has headed the science and technology unit, with a strong effort to develop ties with the NRC and the community it represents. But of the link between the bank and NRC, Rabinowitch says that, "as a practical matter it is not a substantial relationship," and suggests that because the bank is an international organization "not many American scientists have become involved" in the bank's work.

†A description of the bank as a technological institution is found in "Technology, Finance, and Development," edited by Charles Weiss and Nicholas Jequier (Lexington Books, Lexington, Mass., 1984).

In the 1970's during the bank presidency of Robert McNamara, science and technology received more attention at the bank as McNamara moved the organization from an almost exclusive concentration on large, infrastructure projects, such as roads, power plants, and ports, to a concern with smaller, rural development projects aimed at helping the poorest people. McNamara appointed Weiss, who has a background as a biochemist, to be his science adviser and head of a science and technology unit. A main task was to scout for new science and technology useful to the bank and bring it to the attention of bank project staff. The unit, for example, was an advocate for the establishment of a remote sensing unit in the agriculture and rural development department that led to a significant use of that technology in bank operations and the unit played an important role in stimulating bank interest in low cost technology.

Interpretations vary on the reasons for the merger of the science and technology unit into a combined office in the central projects office headed by James Lee. Some insiders ascribe it to a personality clash. Others see the change simply as the result of a reorganization aimed at making the department more manageable. Among upper level managers in the banks, however, there currently appears to be a measure of real uncertainty over what to do organizationally about science and technology.

"The average African is worse off today than he was 10 years ago."

Some close observers of the bank say that its operating rules and practices make it difficult for it to deal broadly with science and technology issues. The bank is just that and not an R&D agency. It has no grant program to fund research although some research is sponsored if it can be justified as directly useful to a particular development project. And, typically, the bank must persuade borrowing nations to find non-bank funds for pilot programs to test new technology.

Bank president A. W. Clausen is depicted as anything but hostile to science and technology. The bank is a cosponsor of the Consultative Group on International Agricultural Research (CGIAR), which operates a system of agricultural research centers around the world. Under Clausen, the bank share has risen from 10 percent to 15 percent of the CGIAR budget.

The bank's organization on decentralized, regional lines is said to make it difficult for a science and technology unit to be effective across the organization. In the case of agricultural technology, there is a sympathetic attitude throughout the bank, because each regional office has agricultural specialists assigned to it. For other types of technology, there is no similar constituency.

During the recent meeting, the bank's vice president for financial policy, planning, and budgeting, D. Joseph Wood, said the the issue of technology was regarded as an important one and was being considered by one of the dozen task forces engaged in the future-of-the-bank exercise, but the subject did not surface on the meeting agenda.

In the perspective of the bank, this is hardly surprising. The bank hierarchy is concerned with a major effort to expand its capital base at the same time that it carries on a dialogue with a U.S. administration which is both the bank's major source of funding and an apparently unsympathetic partner. The bottom line for the bank is the productivity of its loans. And the debt crisis that shook up the international financial system has meant that the bank is paying even closer attention to performance. The bank's policy rethink is attributed in part to criticism that it responded inadequately to the emergency arising from the recession. Clausen and other top bank officials were said to be stung by the complaints. The new African action program is viewed as having been influenced by their response.

The bank makes clear that in Africa it is taking on a formidable task. The report notes that a deterioration of social and economic conditions began in the Sub-Saharan countries in the 1970's and bank vice president for operations Ernest Stern noted in a press conference that "the average African is worse off today than he was 10 years ago." The main remedy proposed is policy reform coupled with assistance, in other words, the carrot combined with the stick.

The proposal is an extension of two earlier reports on Sub-Saharan Africa (*Science*, 4 May, p. 467) which also analyzed the problems of the region. The new action plan, however, provides much more specific suggestions on what both donor and recipient nations should do about those problems. Stern stated the bank view that the present "situation is not inevitable, it can be changed." He noted that several African governments

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have made policy changes that enabled them to make a better use of resources and are regarded as modest success stories. The bank "hopes to take these isolated examples and make them into a general system for development."

Much attention at the meeting was directed at the bank's intention to encourage policy change through the provision, in bank parlance, of structural adjustment loans. These funds are provided to help countries carry out reforms agreed to with the bank.

Does the push for policy reform indicate a fixation with short-term problems and results that make it likely that the bank will worry less about getting science and technology into its projects? Bank officials deny it, noting that the action plan report refers to the importance of long-term constraints as follows: "Improved policies and economic management will succeed only if, in addition to attending to short-term crises, they ease the longer term constraints on development. The growth of population is the single greatest long-term threat to Africa's economic development. Others include the widespread existence of disease; inadequately trained manpower; the slow development of new technologies, especially in agriculture; and erosion and deforestation of the land. Many of these basic issues have been neglected or, as in the case of education, programs to address them have often been poorly designed."

Bank staff readily acknowledge that these imposing long-term constraints can be overcome only by the effective deployment of new technologies. They concede failures in the past—the meaculpa count in the new report is remarkably high for an institution which is ordinarily as majestically confident in public as the bank. But they argue that the action program includes measures which will improve prospects for success. The bank is increasing the size of its field staff and creating a special office to monitor progress. Officials at the operating level insist that there is now wider acceptance in the bank of the necessity of acquiring a better understanding of local conditions, particularly human conditions, before designing projects.

Bank officials are obviously counting heavily on the policy dialogue with African countries to lead to a resumption of real growth and they seem optimistic that they are backing the right policies. Those familiar with Africa observe that it will be just as important and at least as difficult to get the right technologies adopted.—**JOHN WALSH**

OMB Move Threatens Landsat

After years of controversy, the Department of Commerce has finally reached agreement with a private company to take over the operation and development of the Landsat system, but the White House Office of Management and Budget (OMB) has suddenly refused to approve the money. The company is EOSAT, a partnership of RCA and Hughes. After OMB put a cap on Landsat subsidies last summer, cutting the previously agreed-upon $500 million to $250 million, the only other remaining competitor, Kodak, dropped out (*Science*, 21 September, p. 1373).

On 19 September, shortly after negotiations with EOSAT had been completed, Commerce Secretary Malcolm Baldrige asked OMB to request a supplemental $75 million appropriation from Congress as a down payment on the subsidy. Two days later, OMB director David Stockman replied "No."

The EOSAT contract, said Stockman, did not meet the conditions that he and Baldrige had agreed to during the confrontation over the subsidy cap. Specifically, the contract stipulated that the National Aeronautics and Space Administration (NASA) would continue development of an advanced sensor technology known as the Multilinear Array and that EOSAT would have the right to withdraw from the agreement after 3 years if the market for Landsat data failed to materialize. The government, said Stockman, wanted a guaranteed 6 years of service for its $250 million.

The howls of outrage were immediate. For one thing, EOSAT was still committed to the launch of at least one new satellite, the construction of one new data center, and an intense marketing effort. The government would have all that even if EOSAT later withdrew, says one observer, "*And* we would have tried the commercialization experiment."

Virtually all of the multitudinous Landsat study groups have agreed that a full-scale commercialization would require about twice as much subsidy as OMB was allowing. So why should EOSAT lock itself into a venture that might starve to death in its infancy?

As for the stipulation about the multilinear array, EOSAT has already agreed to drop it. (The point was moot anyway, since NASA, under budget pressure of its own, had canceled the program in August.) On the other hand, Landsat supporters point out that the Administration has consistently affirmed that basic research is the proper role of government. And every past study of Landsat has contended that advanced sensor research by the government is essential for a healthy and competitive industry.

But most disturbing, say observers, is the potential impact of the OMB's action on the whole commercialization effort. While there is money in the pipeline now for EOSAT to take over Landsat operations, the disputed $75 million is essential for a start on the next satellite in the series, Landsat 6. Landsat 6 is, in turn, essential to EOSAT's marketing effort.

The current satellite, Landsat 5, is expected to survive only until sometime in 1987. So potential customers had better see a follow-on satellite coming along pretty quickly. Under EOSAT's current schedule, the data gap between Landsat 5 and 6 is a tolerable 8 to 10 months, although that does depend on Landsat 6 being completed in only 3½ years, versus a more typical 6 years. However, if that gap widens to, say, 18 months, those potential Landsat cusomers may very well start buying their data from the French, who will be launching their SPOT remote sensing satellite in 1985. "[The OMB action] could not only mess up the marketing," says one observer, "it could mess up the market."

Congress could appropriate the $75 million on its own initiative, of course, but with elections coming up that seems unlikely before spring. It also seems unlikely that Stockman will have a change of heart anytime soon.

Thus, on 28 September, Baldrige wrote a letter to Stockman stating that in his opinion the EOSAT contract now met the conditions the two of them had worked out last summer, that he would appreciate it if Stockman sent the supplemental request to Congress, and that if Stockman did not, he would authorize the National Oceanic and Atmospheric Administration to dig the money out of its other programs and get the contract moving anyway, depending on Congress to replace the money next year.

—**M. MITCHELL WALDROP**