

Brazil's Pollution Regulatory Structure and Background

David Shaman

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Brazil's Regulatory Background

Brazil's first efforts to regulate pollution started with the enactment of the **Water Code of 1934**. The Water Code regulated norms, rights and limits of water use. Prior to this precedent setting legislation, competing demands for water use had been administered by the National Department of Water and Energy, an agency within the Ministry of Energy. Power generation and electricity were the key water use issues in the early part of the century. Prior to the code, hydroelectricity producers had had unusual leverage on issues affecting their industry. Individual concessions on water use were granted by the agency.

After 1934, domestic consumption and community use were given priority. For the first time, polluters directly or indirectly responsible for reducing water quality had to provide compensation to those affected. The 1934 Water Code has since been considered the benchmark for subsequent legislation regarding water use.

Prior to the first World War, foreign companies had built Brazil's original sanitation systems. After the war, foreign capital dried up and the federal government stepped in provide support to state and municipal governments in need of sanitation systems and services. But those fiscal burdens became too demanding on the central government, and as funding receded, eventually only the most robust local economies could adequately provide services. Finally, in 1942, the **Special Service of Public Health** was established to provide financial and technical assistance to local governments for expansion or modernization of sanitation services.

The years following the second World War was one of dramatic urbanization for Brazil and was also a period where the federal government increasingly ceded power to the states and municipalities to address sanitation issues. The authority to do more, however, did not alleviate many of fiscal constraints states and localities faced. What resulted was haphazard coverage of water services where only the wealthiest of communities adequately supplying and servicing its residents.

Management of water and sanitation services underwent several reorganizations during the 1960's and 1970's. **The Sanitary Financing System** was established in 1968, followed by the **National Water Supply and Sanitation Plan (PLANASA)** in 1971. Under PLANASA, investment in infrastructure increased significantly as the percentage of water service coverage for urban dwellers grew from 45% in 1970 to 85% in 1990. The percentage of citizens with access to sewerage service increased as well from 24% to 42% during the same period.^[1] Despite this improvement, sewerage services are still considered woefully inadequate. From 1977 through 1985, PLANASA accounted for \$9 billion worth of investment in Brazil's water supply and sewerage services. An additional \$2 billion came from the National Housing Bank. Seventy percent of these funds went into connecting the public to adequate water services.

Continued financial difficulties at the national level precipitated additional reorganizations of authority over water issues during the 1980's. Today, the **Sanitation Secretariat (SNS)** under the **Ministry of Social Welfare (MAS)**, administers water issues.

The dawn of environmental awareness in Brazil started as early as 1964 when Sao Paulo began its first efforts toward pollution control. The city established its first air and water regulations and started monitoring efforts. From this period, up until 1973, environmental laws and their enforcement came from a variety of federal and state agencies and usually designed to address specific issues of local conflict.

Still, it was apparent that the prevailing attitude of regulators toward environmental problems was not one of urgency. During the 1972 Stockholm Conference on the Human Environment, the Brazilian delegation's agenda was to push social policies before environmental ones. They declared that "the worst form of pollution is poverty".^[2]

However, Stockholm turned out to be a watershed moment for Brazil, as with many other countries. At the conference, delegates passed **Resolution 44/228**, which stated that "poverty and environmental degradation are intimately related". This notion of how to view poverty became a growing influence on the Brazilian's way of governance. The next year, the federal government started a series of dramatic shifts in the how environmental matters were administered. It compartmentalized all environmental administrative and regulatory issues into a formal ministry called the **Special Secretariat of the Environment (SEMA)**. Under **Decree 73030**, SEMA, housed under the auspices of the **Ministry of Interior**, coordinated all federal pollution control activities, developed pollution standards and provided education and assistance to the state agencies (**SEPA's**). Prior to the creation of SEMA, state and municipal governments had relied on a series of laws not specifically written to address environmental concerns, including the **National Health Code**, federal **Law 2.132**, or **Decree 49.974**.^[3]

SEMA's original framework was designed after the U.S. EPA's. In 1974, the **Industrial Pollution Control and Prevention Law** identified seven of the country's nine metropolitan regions as critical and made SEMA responsible for basic zoning guidelines. In 1975, additional measures continued to define the state's role in the environmental behavior of the manufacturing sector. **Law 1413** allowed state and municipal governments to regulate industrial operations. **Decree 76.389** provided the federal government with the authority to shut down an industrial facility because of pollution problems. National air standards were defined in 1976 under **Regulation 13** for particulate matter, sulfur dioxide, carbon monoxide and photochemical oxides. Water bodies and river basins were also classified. In 1978, **Resolution 14** was passed by the federal legislature to influence where industries locate. The resolution did allow for some exceptions, such as new projects in Sao Paulo, and **Decree 81.107**, passed the year before, allowed the federal government to retain authority in preventing facilities from being closed because of environmental reasons if they were in the interest of national security. In 1980, federal legislation allowed states and municipalities to zone land uses on pollution grounds.

In 1981, the federal legislature initiated a second major restructuring of its administration of environmental policy. Passage of **Law 6938** created both the **National Environmental System (SISNAMA)**. SISNAMA was the government's top environmental council with representatives from all the ministries. Its mandate was to implement a **National Environmental Policy (PNMA)**, also created by Law 6938. The PNMA's main goals were to identify priority areas for government action, develop pollution standards and promote sustainable development. SEMA remained the administrative authority of SISNAMA and retained its responsibilities to assist the SEPA's.

Other important developments followed. That same year, **Supplementary Law 40** made the **Ministry of Justice** responsible for criminal and civil lawsuits involving environmental protection. The Ministry set up **Environmental Boards of Curators** in the major cities where grievances could be brought. In 1983, a new federal law allowed no new industrial project to be built with first

having an Environmental Impact Assessment done.^[4] The Interior Ministry hailed its importance as proof of its commitment on the environment.

The first attempt to address river basin issues occurred in 1978 when the **Special Committee of Integrated Studies of River Basins** was created. The committee consisted of representatives from municipalities, SEPA's, electric and sanitation companies. Some studies were completed, but the effort lacked the political and fiscal autonomy necessary for a long lasting impact. By 1986, **Resolution 20** introduced five classes of water quality, defined by adequacy for human use, and required all national and state water bodies to be classified. The **Fresh Water Pollution Control Law of 1986** made states responsible for classification and monitoring of their water bodies.

In 1988, a new federal Constitution reorganized the country's environmental strategy yet again. The Constitution addressed a relatively new, but expanding notion of the community's collective right to a sound environment. The new Constitution stated that citizens had a legitimate right to a clean and healthy environment, and allowed the public to take an active role in protecting the environment by granting more autonomy to states and localities. A **Secretary for the Environment (SENAM)** was created to serve as a central agency. It administers the National Environmental Fund and allocates resources for the PNMA. **CONAMA** was created to serve SENAM as an advisory council and to both help set standards and institute licensing requirements for polluting activities. CONAMA's membership consists of representatives from the state agencies, unions, non-governmental organizations and environmental experts.

Law 7804 replaced SEMA with the **Institute of the Environment and Natural Renewable Resources (IBAMA)** and placed it under the SENAM's authority. IBAMA's responsibilities are monitoring and enforcement and to provide technical assistance to the state agencies. Importantly, the Interior Ministry did not retain control over IBAMA as it did SEMA. IBAMA was combined with a number of other agencies, including the **Rubber Superintendency**, the **Fisheries Development Superintendency**, the **Brazilian Forest Development Institute** and the **Special Environment Bureau**. IBAMA maintains a Superintendency in each state to help it implement SISNAMA's mandates. A national environmental fund was established to finance PNMA and is administered by SENAM as well. In addition, the Constitution required environmental master plans for all municipalities over 20,000, but to date this has not been consistently carried out.

While IBAMA's regulations and standards are as strict as those in the developed world, enforcement has been lax due to shortfalls in funding, personnel and political backing. As a result, the agency has historically devoted most of its staff and budget on natural resource protection. IBAMA established four divisions in 1991. They are Control and Supervision, Natural Renewable Resources, Eco-Systems, and Fisheries Incentives. IBAMA also administers three boards, the National Wildlife Protection Council, the National Conservation Units Council, and the Technical and Scientific Committee.

The new Constitution promulgated more authority to the states and municipalities when addressing pollution issues. While the federal government controlled the regulatory process, standard setting and budgetary allocations, the states were responsible for water pollution control and the municipalities were authorized to administer solid waste management. The Constitution allowed localities the flexibility to tailor enforcement of environmental policy to suit particular concerns and needs. As a result, some cities had more highly development environmental agencies or enforcement mechanisms than others. Where a SEPA was not able to provide adequate licensing, monitoring and enforcement, the Constitution required IBAMA to provide assistance.

Article 23 states the federal Congress is responsible for environmental laws, but state can pass supplementary laws on industrial pollution control, soil and natural resource protection, forestry,

hunting, fishing, fauna and conservation. Municipalities have further leeway still. **Article 170** mandates private activity cannot compromise environmental quality and **Article 225** requires environmental impact assessments (**RIMA**) for any projects potentially affecting the environment.

The resulting decentralization has provided state government's the autonomy to tailor standards or economic instruments beyond federal mandates. This allows environmental standards and policy instruments to vary across regions according to social and economic preferences. In reality, the federal government defines **minimum** water quality standards. In reality, however, state's have other objectives competing with federal mandates, such as creating jobs and cultivating a tax revenue base. As noted in one Bank report, the prevailing wisdom among state government's is that they "face a tradeoff between revenue and environmental quality ... the better a state's enforcement of federal requirements, the less polluted the state is but the lower is the state net revenue. Net revenue is lower because output is cut, at least in the short run as capital has to be diverted from production to pollution control. But net revenue is also lower because monitoring is costly and currently only yields trivial penalty returns. This sort of reasoning may explain why the degree of enforcement of pollution laws is often negotiated between polluter and state ..."[\[5\]](#)

The federal government did retain authority on some water issues. Federal law handles fresh, salt and brackish waters, defines nine classes of water according to their use, and federal standards address what types of emissions are prohibited as well as emission levels. Any discharge that would cause a change in a water body's classification is prohibited. Again, states and municipalities have the option of making federal regulations and standards more stringent, but what is mandated at the federal level must serve as a minimum level of compliance. In most cases, standards adopted at the state level have mimicked the national standards. Only in Sao Paulo and Rio de Janeiro have there been efforts to have standards reflect the actual costs of pollution.

The Constitution also provided a legal framework for environmental public interest lawsuits, allowing individual citizens or NGO's to pursue in court litigation involving environmental damage. However, a precedent for considering the public's role in protecting the environment had already been set in 1985 with **Law 7.347**, commonly referred to as the **Civil Public Action**. The law, for the first time, recognized the legitimacy of NGO's to pursue civil action in defense of the community's right to a sound environment. One well documented case of its use came in 1986 when several NGO's and the **Ministerio Publico** brought a civil suit against 24 polluting firms for damage done to the Serra do Mar in Cubatao. In 1990, **Law 8.078** also had language defending the community's rights with regard to the environment, but 7.347 was the original legislation to codify the rights of the community to take action against companies, individuals, even the state itself.

Unfortunately, Law 7.347 had two significant problems. First, the language was so vague and general, it was being used to interpret issues other than the environment. Second, the Brazilian legal system makes the defeated party liable for legal fees from attorneys representing both sides. This has had the effect of reducing the NGO's ability to pursue cases for purely financial reasons. In the end, many cases have had to be taken up by the Ministerio Publico, which serves as state's attorney general office.[\[6\]](#)

The trend of holding polluters accountable continued in 1989 when the National Environmental Policy Act was revised. A category for ecological crime was created so polluters could now be imprisoned for activities deemed dangerous to plant, animal or human life.

Following its creation, CONAMA was active in expanding Brazil's environmental regulatory framework. In 1989, it passed **Resolution 05/89**, which created the **National Programme for Air Quality Control (PRONAR)**. PRONAR established a sampling network and marked the country's first serious attempt at monitoring pollution. As with most environmental policies, implementation

of the resolution was left to individual states, and as a result there is no uniformity of methodology or resources. Not all states moved forward to put a network in place. Often data collection in some states with monitoring has been spotty or unavailable to the public. Additional goals of PRONAR included creating a national inventory of emissions and licensing of pollution sources.

In 1990, CONAMA passed **Resolution 03/90** which set ambient air quality standards for various pollutants, and **Resolution 08/90** which set emission standards for particulate and sulfur dioxide from stationary sources.

The Constitution, and the reforms passed in the years following it, solidified four key principles of Brazil's environmental policy. First, it set minimum air and water standards at the federal level, with the state's given the option of strengthening them to fit their particular environmental concerns. Second, flexibility was again built into zoning laws to influence the location of polluting industries. In practice, the federal government has used its zoning authority to create ecological reserves, while state governments have used it to influence industrial location. To date, only Sao Paulo, Rio de Janeiro and Santa Catarina have actively applied zoning authority.^[7] Third, licensing permits and RIMA's became key policy components at the state level. Finally, fines became another integral component of regulation, and importantly, flexibility was designed to allow regulators and polluters the opportunity to negotiate the size and timing of penalties.

Competing interests in allocation of environmental resources have led to turmoil within government circles. In the months leading up to the 1992 Earth Summit in Rio, President Fernando Collor de Mello fired his Minister of Environment, Jose Lutzenberger for publicly accusing the government, and in particular IBAMA, of corruption. Lutzenberger, an ardent environmentalist and a cabinet choice which surprised political insider, criticized the Collor Administration's policies of sustainable development and charged his ministry with being too closely tied to the timber industry.

A Bank report at the time of the Summit summarized the deficiencies of Brazil's environmental framework. The report noted government had limited capacity for enforcement, uneven application of the law in the private and public sectors, high costs and expenditures were needed for monitoring and compliance, and poor coordination of responsibility and administration across the three levels of government.^[8]

In 1994, the environmental bureaucracy was redesigned with the new title of Ministry of Environment, Water Resources and Legal Amazon. Like its regulatory predecessors, it was focused mostly on green issues.

Deregulation and privatization of key public sector industries has had some important consequences for Brazil's environmental management. Former government-owned companies such as PETROBRAS, CVRD, and CSN, which is the largest steel mill in South America, were amongst the worst polluters. SEPA's had limited or no enforcement authority over them. But privatization has led, in some cases, to improved environmental performance due to more effective enforcement and mobilization of private capital for abatement and prevention improvements.

By the 1990's, environmental policy makers and the financial community began to jointly address clean-up issues by launching a series of projects. \$800 million was targeted for Guanabara Bay. Another \$4 billion effort was focused on the Rio Tiete and other rivers near Sao Paulo. Hundreds of millions of dollars were provided to assist states in need of sewerage treatment plants and water supply and sanitation. During the last decade, **BNDES**, the Brazilian national development bank has extended about \$1 billion in loans to industries to install or implement environmental technologies.^[9]

BNDES has been one of main channels for the government's promotion of cleaner technology, offering lines of credit for industrial pollution control since 1986. Lending from BNDES has increased substantially in recent years, increasing from \$202 million in 1990 to \$304 million in 1994. The financing from BNDES has been funneled into end of pipe controls, process changes, and recycling and waste recovery projects. Financing of investments is complemented by financing of RIMA's and staff training. Six percent of the bank's lending went for environmental projects in 1993, and the expectation is that figure will reach 20% within the next ten years.

FINEP is a government finance agency which assists companies in setting up environmental quality management programs. Financing from FINEP in this area has risen significantly as well, starting with \$6 million in 1992 and increasing to \$62 million by 1994. FINEP has recently taken steps to create new financing lines to support environmental audits, management systems, certifications and performance evaluations of performance.

In the near future, UNEP, UNIDO and the state industry federation will establish a **National Center for Clean Technologies in Latin America** in Porto Alegre. The center will promote technology transfers through pilot and demonstration projects, environmental audits and information dissemination. A major focus will be on assisting companies in receiving ISO 14000 certification.[\[10\]](#)

To date, problems continue. To alleviate the increasing burdens on the Amazon, the federal legislature has required the pulp and wood-processing industries to obtain raw materials from planted forests. With less than 400 federal inspectors, however, violations are frequent and usually go unpunished. The steel industry has been continually cited as a culprit in using virgin forests illegally for its furnaces. The alcohol and sugar industries have also been recognized as sectors that tax the nation's environmental resources.[\[11\]](#)

Brazil's SEPA's

The 70,000 industrial sites between Sao Paulo and Rio de Janeiro make this corridor the most concentrated in all of Latin America and Brazil one of the most industrialized countries in the developing world. The most dominant industrial sectors are petrochemicals, steel and mining.

A 1987 survey found the SEPA's nationwide to be both understaffed and underfunded. Between 1983 and 1987, SEPA staff levels increased only 7.3%. Two SEPA's, CETESB with 28%, and FEEMA with 20%, accounted for nearly half the amount of total staff. Four states had no more than ten staff members. Ten states did not have boats, three states did not have cars, and six states did not have labs. Only three states have the capability to provide air quality analysis.[\[12\]](#) The **Brazilian Association of Environmental Agencies (ABEMA)**, noted that as late as 1987, there were still three states without a SEPA.[\[13\]](#)

In 1992, the Bank assessed the overall situation and performance of the SEPA's. The Bank stated that "limited resources impede the effectiveness of SEPA's which, for the most part, are understaffed, lack adequate laboratory facilities, and cannot pay competitive salaries for professional personnel. In addition, some of the SEPA's are completely dependent on the state budget for their funding, while others can raise a certain percentage of their funds through service fees, although this latter source is small ... all the SEPA's must have alternative funding to substantially increase their budget and to gradually limit their reliance on state funds. The SEPA's should be allowed to supplement their budgets by charging fees for their services which reflect their real cost. In addition, increasing costs of licensing and fines would be consistent with the "polluter pays" principle, which should make the policy politically appealing. States should consider introducing pollution taxes and charges for the use of environmental resources, the proceeds of which would be earmarked for SEPA's."[\[14\]](#)

Interestingly, the federal government has based much of its legislation on laws set by state agencies in Sao Paulo and Rio, who in turn took their regulations and standards from existing models in United States.[\[15\]](#)

In recent years, the states of Sao Paulo, Rio de Janeiro, Minas Gerais and Parana have been or will be applying effluent charges as industrial sewage tariffs based on pollution content or load. In Sao Paulo, where such a tariff has been sporadically in effect since 1983, there have been marked reductions in BOD and suspended particulate emissions in a number of sectors.

Without doubt, the emergence of a strong agency in **Sao Paulo** has been a necessity. The city became the main industrial center of Brazil by the 1930's, and by 1970 almost half the country's industrial production and workforce came from there. It is the largest industrialized area in Latin America, and third most populated city in the world.[\[16\]](#)

The city has serious pollution problems from both automotive and industrial sources, compounded by a topography conducive to temperature inversions which hold polluted air close to ground level. In 1978, an estimated 8,000 tons of air pollutants were discharged daily. That year, standards for carbon monoxide were exceeded 299 times, and for particulate matter 121 times. While transportation accounted for the largest source of pollution in Sao Paulo, the city's 30,000 plants accounted for 88% of its sulfur dioxides, 65% of its particulate, 44% of its BOD, 24% of its nitrogen oxides, and 18% of its hydrocarbons.[\[17\]](#)

One note of interest, however, is the concentration of pollution sources. Sixty-five percent of emissions came from just a few key sectors: metals, non-metals and chemicals. Some estimates believed the vast majority of pollutants, as much as 90% of particulate matter and 74% of sulfur dioxide came from between five and ten percent of the city's industrial base.[\[18\]](#) In 1977, CETESB estimated that 53 plants accounted for 90% of particulate emissions, and 85% abatement could be achieved for approximately \$30 million, or about \$225 per ton.[\[19\]](#) A review of Medio Paraiba, another heavily industrialized city in the state of Sao Paulo, reveals striking similarities in industrial pollution characteristics during the same period. Four industrial sites accounted for 71% of particulate emissions. Analysts estimated almost complete abatement would cost \$16.6 million or about \$550 per ton.[\[20\]](#)

By the early 1980's, 80% of city residents who were polled, considered the environment as serious a hazard for them as crime.[\[21\]](#) But the decade saw little in the way of relief for residents. In 1989, health warnings for air pollution were issued on 250 days, of which 108 days were for excessive ozone levels and 54 days were for high particulate levels. On average, 6.2 tons of industrial solid waste are produced daily. Twenty percent of the city's estimated waste, industrial or otherwise, goes untreated through the official sanitation system.[\[22\]](#)

CETESB, the state SEPA, came into existence the same year as the federal ministry in 1973. In 1975, it was strengthened considerably when it was given the authority to sanction polluters under state **Law 997**. The law also provided CETESB with the authority and mandate to register and license all enterprises. Sao Paulo's legislature remained active in providing CETESB with legal framework to address growing industrial pollution problems. State **Law 1.817**, passed in 1978, required any industry seeking a new location or expansion of activities must first obtain a license from the Secretary of Metropolitan Affairs. Each license issued set limits on what type and to what level of pollution was allowable.

The state legislature set air and water standards. Water effluent from industry had pre-treatment, as well as discharge requirements. For air, CETESB defined eleven quality control areas and used zoning and licensing requirements to relocate industries away from highly populated areas. Before a plant wishing to do business in Sao Paulo can begin operations, they must provide the agency with details on what pollution control equipment will be installed, treatment procedures

and expected emission levels. CETESB then sends inspectors to monitor a new start-up before a final operating license is granted. The Ministry adopted CETESB's model of regulation and enforcement as its own standard in 1982.

In 1977, the state spent \$37 million on pollution control, or about \$1.68 per person.^[23] By 1990, CETESB's budget was \$250 million, with 96% of its funds coming from the state. By 1992, the agency was armed with some 2,350 researchers and technicians and dozens of monitoring stations throughout the city. Since the early 1980's, the city's 11.4 million residents have been provided daily information on pollution and health.

While command-and-control has been the prevailing method of pollution control for most SEPA's, CETESB has implemented market-based instruments. In 1983, a tariff based on the pollutant contents of industrial sewerage was introduced with some success, but could not be expanded due lack of fiscal resources to invest in treatment stations. Up until 1990, the state could negotiate with firms about the provision of treatment services in exchange for a service charge. After 1990, the legislation was changed to allow the state to recover the cost of monitoring, collecting and treating water discharges. A tax is assessed and is based on the average effluent by sector.

CETESB has tried a variety of other approaches to pollution control over the years. Aside from the traditional use of fines and penalties, the agency has tried to encourage industries to locate to certain areas through licensing and zoning procedures. Another project sought to regulate a small number of plants who accounted for high percentages of toxic emissions or effluents. Loans to those plants were designed to help them meet minimum state and federal regulations by stressing least-cost control strategies. One problem CETESB has faced over the years has been that the agency has had its incentives to raise fine and penalty fees neutralized by a state procedure which proportionately decreases the same amount in its funding to the agency.

Other regulatory responsibilities of importance include licensing of water users by the Departamento de Agua e Energia Electrica (**DAEE**), issuance's of pollution licenses and RIMA's approvals by the Secretaria do Meio Ambiente (**SMA**), and administration of soil management and use of agri-toxics by the Secretaria de Agricultura. The **Instituto de Pesquisas Tecnologicas (IPT)**, a research branch of Sao Paulo's state government, is developing improved pollution treatment methodologies, analyzing recycling projects, and is searching for more environmentally compatible production materials.

Rio de Janeiro is the second most industrialized state in Brazil and has severe problems. Refineries and plants from a variety of sectors, but with a concentration in food, leather, steel, pharmaceutical and pulp and paper have created serious pollution problems. A 1985 study found air pollution accounted for 18% of infant mortalities in the city of Rio. It was the second highest cause of infant mortality.^[24]

Water discharges have had important impact on Guanabara and Sepetiba Bays. Some 10,000 industrial operations surround Guanabara Bay. By the mid-1980's pollution levels there were already at uncomfortably high levels. Currently, an estimated 465 tons of organic matter is discharged daily, with only 68 tons per day receiving adequate treatment. A quarter of this raw material comes from industrial sources, which includes 9.5 tons per day of oil pollution.^[25] Algae levels are also accelerating, decreasing oxygen to critical levels in the bay. Sepetiba Bay, located about 60 kilometers south of the city, had been a prime commercial fishing site. Today, a heavy metallurgical industry presence has had a serious impact.

Two important rivers which drain Guanabara's watershed, the Iguacu and Estrela, also drain a sizable industrial estate. Both rivers emit a strong hydrogen sulfide odor. The Paraiba River, Rio

de Janeiro's main source of drinking water, is also the receiving body for many industrial discharges and has been found to have high levels of chlorinated pesticides.[\[26\]](#)

FEEMA and **CECA**, Rio's environmental council, started operations in 1975. By comparison, FEEMA was better funded and more pro-active in regulating pollution control issues than all its sister agencies with the exception of CETESB. In 1977, through **Decree 1.633**, the state began registering some 5,000 of the most environmentally harmful industrial sites for FEEMA to monitor through its Polluting Activities Licensing System. Other accomplishments in its first decade included shutting down some 10,000 incinerators. It set dust emission limits for city quarries and cement plants, which resulted in a drop of 70% in eight years.[\[27\]](#) A requirement for Environmental Impact Reports (RIMA's) was enacted. In 1983, **Decree 88.351** provided incentives for research into technologies for the protection of environmental resources.

By 1990, FEEMA had a \$100 million budget and 1,100 personnel. That year, ten percent of the agency's funding came from service fees, while the rest of the funding coming from the state. By early 1993, FEEMA was seeking to initiate market-based instruments as part of its overall strategy with a pollution charge aimed at cost recovery of ambient air and water monitoring. However, a Bank report noted a marked decline in the agency's ability to perform in recent years. Lack of political support, limited budgets, salary declines have all been contributing factors.[\[28\]](#)

Minas Gerais has approximately 13,000 industrial pollution sources. Belo Horizonte, its major city, has significant representations of the iron and steel, cement, textile and agro-industrial sectors, and as a result has sizable air and water problems. The food sector accounts for 63% of the city's BOD discharges. Other large cities, such as Calcaria Sete Lagoas, Siderugica, Espinhaco Meridional, Alto Medio Sao Francisco, Juiz de Fora, Uberaba and Mineradoras de Diamantina are also plagued by unacceptable industrial pollution levels.

FEAM is the technical agency in Minas Gerais responsible for water quality planning and control, while **COPAM** is responsible for implementation of the National Policy for the Environment. FEAM has identified 1500 industries that warrant priority controls.[\[29\]](#) However, with no laboratory and a staff of only 106 (as of 1992), the agency lacks the ability to effectively address most monitoring and licensing issues. Instead FEAM relies on technical assistance and laboratory facilities from public and private institutions, and has been unable to keep up with the large flow of license requests and renewals. By the early 1990's, the agency had completed a series of studies and classifications of local river basins. With 15 monitoring stations in the Belo Horizonte region, FEAM has been able to do ambient water quality indexing of the das Velhas and Paraopeba Rivers. The agency, however, still had no formal water quality management plan in effect.

Before it had a SEPA, Minas Gerais had an environmental council. The council was in operation from 1977 until 1985 when FEAM was created. By 1989, even though it was the third most heavily industrialized state in Brazil, FEAM's budget was merely \$4 million and its staff level was only 150 employees. In fact, throughout the 1980's, FEAM's budget was repeatedly reduced and at one point the agency closed all its monitoring stations. In 1992, a Bank assessment concluded FEAM did not have an effective policy in place for the state's chief polluter, the gold mining industry.

Espirito Santo started its first SEPA in 1979, but disbanded it the following year when environmental issues were placed within the jurisdiction of the Secretariat's of Health and Agriculture. In 1988, a second SEPA called **SEAMA** started operations. By the early 1990's, the most pressing problem was two federally owned steel facilities which had created high sulfur dioxide and particulate levels in the capitol city of Vitoria. Combined, the two plants account for almost 90% of the city's air pollution. SEAMA, with funding and technical assistance from CETESB, has been working to identify problems and abatement strategies. In 1990, the agency had a staff of only 106.

Curitiba, the capitol city of **Parana**, is one of the most heavily industrialized parts of Brazil. It has 31% of the state's population but half the state's industry and discharges 44% of the Iguazu River's pollution load.^[30] The diversity of its manufacturing sector, the associated pollution problems, and the lack of appropriate funding levels for **SUREHMA** provide the agency with a unique and difficult challenge. SUREHMA began in 1980. Prior to that, the Administration of Human Resources addressed environmental issues. While SUREHMA administers basic environmental activities such as monitoring water quality, supervising pollution control, approving RIMA's, and licensing industries and public water users, **COMEC** is the agency responsible for land use planning. In 1993, SUREHMA began experimenting with market-based instruments when it proposed implementing a pollution charge on COD and TSS emissions by key industries.

Bahia established its environmental council, **CEPRAM** in 1973, and its SEPA, **CRA**, in 1980. CRA, like many of its counterparts, been limited by low funding levels. In an effort to play a more activist role, the agency has experimented with instituting higher license fees than allowed by the state legislature. CRA's most pressing environmental concern to date are hazardous waste problems created by a major petrochemical complex near the capitol city of Salvador.

In **Rio Grande de Sul**, the capitol city of Porto Alegre is plagued by water problems from tanneries and shoe factories, as well as air discharges from steel, cement and petroleum refineries. **DMA**, established in 1980, must also address the pulp and paper, fertilizer and food processing sectors which large roles in the emission and effluent problems of the region.

FATMA, the environmental agency for **Santa Catarina**, started operations in 1981. One interesting and unique approach by this SEPA was a program to compel polluting companies to improve environmental performance by embarrassing them with public condemnations. Reportedly, this proved successful until funding shortfalls curtailed the program. With a 1990 budget of \$4.5 million and staff level at 335, FATMA is considered too weak to tackle the serious problems facing the state. Coal-fired power plants and coke ovens have created significant air problems in the southeast and mining activities have increased surface water acidity to unacceptable levels. Since the state's environmental regulations are lax by national standards, the agency has tried to be aggressive in its oversight efforts by requiring licensing renewals more frequent than mandated by local law.

World Bank Projects

The Bank has had a series of ongoing projects to assist Brazil in protecting its environment since 1971 when two water pollution control projects, **Loan 757** and **Loan 758**, were launched in Sao Paulo.

Loan 1822, in 1980, was the first project to focus specifically on industrial pollution control when it addressed air and water discharges in Sao Paulo. The project sought to meet existing discharge standards by focusing on a few large polluters. Another important component of the loan was to provide institutional strengthening for CETESB. The loan, however, was plagued by negotiation and project preparation delays, and after several years was substantially downsized. Though scaled back fiscally, a 1989 Performance Audit Report in 1989 found the project to have succeeded in reaching targeted emission reductions. In addition, the audit found the project had assisted CETESB to become the leading environmental agency in Brazil, and had help raise environmental consciousness throughout the country.

Loan 2831, a Second Industrial Pollution Control Project (PRONACOP), expanded on the foundation of **Loan 1822**. Institutional strengthening remained an important focus, with assistance to IBAMA and SEPA's other than CETESB. Technical assistance was provided to help identify problems in other states as well as Sao Paulo, and for the first time there was a component for hazardous waste disposal. But once again there were significant delays in the disbursement

schedule. A Brazilian Central Bank resolution in 1987 prohibited transfer of resources from the federal government to public entities. High interest rates, inflation and arrears problems for the state of Sao Paulo with the federal government caused further delays. In 1992, the Bank was compelled to extend the loan commitment for two and a half more years.[\[31\]](#)

In 1990, the National Environment Project was approved to help develop a framework for the federal and state governments to protect critical ecosystems. The Bank sought to promote sustainable rainforest develop, forestry and watershed management, agro-ecological zoning soil erosion assistance, continued institutional strengthening at IBAMA and the SEPA's, and further development of standards and regulations for pollution control. In addition, the project provides financing for an environmental study of the Sepetiba and Ilha Grande regions.

The same year, the Bank initiated a National Industrial Pollution Control Project to concentrate on problems outside Sao Paulo and the Cuabatao Valley. At the time, only about half the country's urban population was connected to sewerage systems, and only about 10% of total sewage was collected.[\[32\]](#) The project was designed to help SEPA's obtain adequate monitoring equipment, analytical aids and forecasting models and specialized training for detection and control of specific pollutants. Another component of the project provided financing for the cleanup along Rio's Volta Redonda.

By the early 1990's only CETESB and FEEMA had detailed data on water discharges. In fact, most industrial wastewater information collected by other SEPA's was collected as part of the PRONACOP project and only dated back to 1988.

In 1992, the Bank launched the Minas Gerais Water Quality and Pollution Control Project. The \$307 million project, with \$145 million coming from the Bank, was for development of a strategy to reduce industrial water discharges. Institutional strengthening of FEAM was another important objective and financing was provided to help industries reach required treatment levels. Finally, the project supported development of a water basin agency system in Rio Paraiba do Sul.

In 1992, the Bank began implementation of a \$246 million loan to address water pollution control problems in the most congested areas in Brazil. By creating an authority to manage pollution control policies, the Bank hope to alleviate high pollution levels in targeted areas such as the Guarapiranga reservoir near Sao Paulo and the upper Iguazu river in Curitiba.

Another Bank project currently under preparation, The Rio de Janeiro State Reform Project, seeks to develop a State Environmental Action Plan, along with staff and budgetary reforms.

Since 1994, PRDEI has been providing technical assistance to FEEMA to help integrate their information systems. FEEMA has been able to modernize its computer network and information databases, and integrate its systems with other agencies. An ongoing database is being compiled on plant-level variables, self-reported emissions by industries, water quality data collected by FEEMA during the past 20 years, as well as data collected from the PRONACOP project. The process of modernizing and integrating equipment, and providing software and computer training, will allow FEEMA to perform sophisticated networking and communications among key decision makers in disparate parts of the agency.

GREEN ISSUES

Contrary to most expectations, environmental awareness in Brazil has a long history. Well before the protests of rock stars, NGO's and foreign political leaders regarding Brazilian environmental policy, the Brazilians themselves had put in place regulations designed to conserve precious resources. The first efforts at preservation were in 1797. Laws were enacted to limit logging along coastal forests and an enforcement agency named the Mounted Patrol was organized to

administer the new decree. By 1831, additional legislation mandated new landowners must conserve forests up to a distance of ten leagues from the coastline. This legislation was eventually amended in 1876 to only apply to public lands. In 1921, a national Forest Service was begun. The policy of sustainable development was first codified in the **Forestry Code of 1934**. Four years later, the first Brazilian national park was created.

If conservation in Brazil has a long history, then exploitation of its natural resources is equally as long. The extraction of rubber, cocoa and gold from the forests also dates back to colonial times. Deforestation of the Amazon, however, is a relatively new phenomena.

Following the second World War, the Brazilian population grew dramatically. Population figures increased by 80 million in the cities. Correspondingly, the burden's to the nation's environment increased as well. Roots in the country's efforts to develop the Amazon were first harvested during the military regime of President Medici during the 1960's. Medici initiated the Program of National Integration, which envisioned the construction of a Transamazon Highway as the cornerstone in a strategy to extract forest resources. Highway BR-364, the Cuiaba to Porto Velho road, ultimately linked northeastern Brazil with Peru. The cost was a staggering \$1.5 billion, of which, \$500 million came from a World Bank loan. The Medici regime enacted laws during construction of the highway which promised land grants to urban dwellers to entice relocation's. Private mining interests were able to set up large-scale operations.[\[33\]](#)

By the end of the 1970's, the effectiveness of the government's efforts was clearly evident when it estimated about 1.2 million Brazilians migrated to the region.[\[34\]](#) Lack of employment opportunities in the cities and governmental offers of land grants had fueled the population shift. But other events were also shaping the Amazon. The government provided fiscal incentives to the private sector to develop and harvest the forest's natural resources. Road building, agricultural development and mining operations intensified and expanded. The result was the creation of a new environmental issue: deforestation.

Foreign debt problems in the early 1980's plagued Brazil. In an effort to raise additional capital, the government launched two more projects in 1983, the Grand Carajas Program and the Program of Energy Mobilization. Again, each project was designed to exploit energy, mineral and forest resources, and special incentives were provided for private sector firms to participate. Throughout the decade, the government sought economic development opportunities at the expense of the environment. It proposed a multi-billion dollar hydro-electric dam on the Xingu River to reduce dependency on oil imports. Extensive road building continued to be a cornerstone of developmental policy. Highway 364 in Rondonia was started with the help of World Bank funds.[\[35\]](#) Efforts began to connect the highway system to Peru's through Acre in northwest in order to allow the transport of Brazilian products to the Pacific.[\[36\]](#) Government initiatives provided the business community with tax incentives for land development.

The 1980's was a decade when issues like global warming and ozone depletion drew increased attention from the international scientific community and such phenomena's were linked, in part, to the burning rainforests. Industrialized nations became alarmed by the rapid depletion. Estimates on deforestation rates varied, depending on satellite technology and cloud cover. Most indicated between 5% and 8% of the rainforest has been burned, though one World Bank estimate in 1988 said close to 600,000 square kilometers, or 12% of the forest, had been cleared.[\[37\]](#) One series of Landsat photographs showed deforestation the size of West Virginia from 1980 to 1987 in just one single Brazilian state, Rondonia.[\[38\]](#) Other studies estimated the deforestation of the Amazon was increasing carbon emissions worldwide by as much as 5%.[\[39\]](#)

By the late 1980's, the lines of debate were clearly visible. As the decade came to a close, Brazilian officials became increasingly inconvenienced, and in some cases, stymied by environmental activists. Effective grass roots organizing came from an unlikely savvy political force: the indigenous Amazonian Kayapo tribe. Alarmed by the prospect of large hydroelectric

facilities at Kararao and Babaquara on the Xingu, Kayapo leaders organized multi-tribal protests that caught the attention of the international environmental community. Tribal leaders organized the First Meeting of Indigenous Peoples of the Xingu in early 1989 and the protest drew a significant following among NGO's and media.[\[40\]](#) Threatened by exploitation of local resources, ravaged by diseases brought by outsiders, enraged by violence from parties interested in development, other Indian groups began to organize coalitions intent on protecting the rainforests. Other protest groups included the Federation of Indigenous Organizations of the Rio Negro (FOIRN), and Coordination of Indigenous Organizations of the Brazilian Amazon (COIAB). At times, Indian groups have turned to sabotage and vandalism among other aggressive acts.[\[41\]](#)

The official reaction of the government of the Kayapo tribal protests was expressed by Interior Minister Joao Alves Filho, who said "authentic ecologists and false ones, journalists, self-promoting rock stars, and many others who were interested only in personal advantages got together to explore the naive Indians that do not understand the needs of Brazil as a country and the necessities of the modern world."[\[42\]](#)

However, not all those concerned were from non-official circles. Noteworthy efforts were also made by high level state officials. In 1990, Helmut Kohl began an initiative at a Group of Seven summit in the United States to save the Amazon rainforest.[\[43\]](#) Environmentalism was in vogue.

Many Brazilians were angered by the international meddling. They complained that many of the countries pressing Brazil to reform its environmental policies were among the most polluting and wasteful of nations anywhere. Stopping Brazil from developing the rainforests, they argued, would stop the country from reaching its economic potential. Some have suggested that if the international community finds the Amazon such a vital resource, then Brazil should receive compensation to protect it.

In 1989, the Minister of the Interior, Joao Alves Filho, address the Brazilian legislature on development of the Amazon. He summed up the government's view on outside interference by saying "they say that at that time, they did not have an "ecological awareness". Truth be served, that this awareness only occurred after the destruction of the forests in the northern hemisphere, to fuel their agricultural frontiers, and, still today, let me mention it in passing, they continue to fell enormous Sequoias, those thousand-year old trees of California, that are as valuable as the rare varieties of the Amazon. When there were no more areas to be flooded for their hydroelectric plants, since all their potential had already been exhausted; when most of their Indians had simply disappeared or were isolated in "Ghettos" or "Reservations", created in a barren land, that no white man would wish to have; when they had already polluted their rivers; when factories, electric stoves, and an excessive number of vehicles threatened nature in an almost irreversible way; only then, they remembered the need to defend ecology."[\[44\]](#)

Filho criticized Western media for sensationalizing the murder of Chico Mendes, a rubber trapper who was assassinated after starting a movement to stop the rainforest destruction. He claimed the media was spreading myths about the forest's resource exploitation, and accused other governments of using satellites to "spy" on the Amazon to learn about its resources.[\[45\]](#)

The Sarney Administration was keen to mute the criticism and portray itself as a government, both aware of its environmental problems and active in addressing them. Filho noted the administration prohibited lumber exportation, placed a nation-wide ban on mercury use in mining sites, and eliminated agricultural and cattle raising subsidies inside the Amazon region. **Law 77.802** controlled pesticide use and ecological zoning, particularly in the rainforests. **Decree 96.994** tightened restrictions on clearing and logging.

The administration's insistence, however, on implementing agro-ecological zoning throughout the Amazon remained clear. "We will not need foreign interference or political conditions. They are

unthinkable for any sovereign nation ... financial aid is still restricted to unacceptable insinuations," Filho said.[\[46\]](#)

Seeking a way to escape the glare of the international spotlight, the government placed much of the blame for environmental calamity in the Amazon squarely on the shoulders of the mining community, citing it with "disorganized exploration". Officials claimed the industry had overtaken wood extraction as a threat to the forest.[\[47\]](#) During the 1970's and 1980's gold mining increased significantly. By 1986, there were 536 government-issued permits and another 1,700 under consideration.[\[48\]](#) One huge project in Carajas, reputedly covered 900,000 square kilometers, 10% of the forest in Brazil, an area twenty-five times the size of Holland.[\[49\]](#) But in return for the precious metal, poor mining techniques have had shattering consequences. There was a high prevalence of miners using mercury to amalgamate gold and causing toxic contamination of themselves and rivers throughout the Amazon. It is estimated one million miners today pan for gold. Many show signs of mercurialism. As alarming, many inhabitants downstream of mining activities show high Hg concentrations in their blood.[\[50\]](#)

In April, 1989, President Jose Sarney described the deforestation rate during his administration to be "infinitesimal", though the deforested acreage during the previous four years of his term accounted for almost 30% of total deforested jungle in the Amazon.[\[51\]](#) His administration continued to tout plans to increase economic development opportunities for the forest's 13 million inhabitants by increasing agricultural yield, natural resource and mineral extraction, and transportation links. In fact, it seems, an underlying political culture has been able to form with a platform of anti-environmentalism. One figure has emerged in 1991 as a leading force in the anti-environment movement was Amazonas state governor Gilberto Mestrinho, who led a coalition of pro-logging business interests, farmers and migrants who had come to depend on the forest's resources. His efforts centered on moving regulatory control of the forests from the federal government to the states.[\[52\]](#)

The cumulative effects of international and domestic criticism, however, had put the government on the defensive. By 1989, to rectify a tarnished image, the Interior Ministry asserted that the nation had forty two ecological stations, with nineteen in the Amazon, along with twenty nine national parks and fifteen biological reservations.

Recently, the government issued new reports about deforestation. The Brazilian National Space Research Institute (INPE), using LANDSAT images, said the deforestation rate had slowed from a peak of 0.54% during the 1980's to 0.30% in 1990. During 1991 and 1992, the rate was 0.37%, but figures for 1992 through 1994 showed increase to 0.40%. For all the hype caused by environmentalists, INPE claims an estimated 90% of the Amazon remains unaltered by deforestation.