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2000 M Street, NW, Suite 200, Washington, DC 20036
Telephone: (202) 331-1860 · Fax: (202) 331-1871

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Mobilizing Morocco's Private Sector for Environmental Management

By:
Morton Gorden
Michael Crossetti
Tibor Krantz

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EXECUTIVE SUMMARY

Morocco's environmental problems are best described as natural resource shortages greatly aggravated by pollution. The most significant shortage is of water. There would not be sufficient quantities of water to dilute discharges into rivers even if dilution were an acceptable strategy. Forty percent of the country's drinking water comes from groundwater, a source that is being polluted. Expensive treatment is required before polluted water can be reused. The high cost and impracticality of treating water exacerbates the problem. Morocco's growing resource shortages are casting doubts on the strategy of allowing pollution for the present so as to attract investment and postponing clean up until later.

An alternative strategy—involving environmental private sector companies in prevention and clean up—also creates jobs but avoids later problems. Morocco has a private sector that can provide environmental solutions and pollution prevention services. Over 100 companies are already involved in the environmental business. The environmental management functions needed to help prevent further damage are being established, although incentives are needed to expand their availability.

Environmental norms that set targets for industry and environmental management roles need to be established, according to managers interviewed in a survey of Morocco's environmental private sector conducted for this report. These measures will help create a market within which the private sector can work to solve environmental problems. This report suggests a number of environmental management strategies that can make sustainable economic growth possible.

The report also describes several demonstration projects to show how private sector capabilities can be employed in environmental management. To demonstrate how to harmonize regional economic development with a sustainable national economy, the report introduces a waste management plan for Safi. The plan calls for industrial audits to minimize waste and prevent pollution. In addition, it outlines how to combine industrial wastes of high heat content with municipal wastes that are too moist in a cogeneration plant that provides steam and electricity. The revenue from such a plant could be used to safely dispose of wastes that cannot be eliminated from the industrial processes in the region.

The report outlines another demonstration project that would collect revenue from eco-tourists visiting the National Park of Souss-Massa in order to help preserve the park and provide employment for its nearby residents. Finally, the report provides a design for an environmental loan fund to leverage donor and World Bank funds as a means of enlisting the private sector in environmental management. The fund would use private loans for public purposes. These projects demonstrate how to overcome the alleged conflict between sustainable economic growth and environmental management.

SECTION I

MOROCCO'S ENVIRONMENTAL PROBLEMS AND THE PRIVATE SECTOR RESPONSE

A. Introduction

There are many ways to classify environmental problems. Some Moroccans describe rats and pests as serious environmental problems. Indeed they are, but for purposes of setting national priorities for problem solving, environmental problems are classified as natural resource shortages aggravated by pollution. For example, water is a critically scarce natural resource, and manmade water pollution is damaging health and economic productivity. The relationship between the quantity and the quality of water is important. The shortage of water from rainfall is compounded by water pollution. Polluted water cannot be diluted due to water scarcity. The concentrations of pollutants persist and create substantial costs because drinking water must be treated. During the agricultural processing season in the Sebou, water treatment costs in some cases have been increased by a factor of 14 times normal. This has led to closure of water treatment plants. The damage to health and natural resources have made remedial actions a priority. With the economic goal of sustainable development in mind, it is counterproductive to destroy economically valuable resources. The goals of preventing their destruction and controlling ongoing damage set the framework for environmental managers to pick the targets for action.

The most serious natural resource problem for Morocco is probably the shortage of drinking water. While water availability is primarily a resource shortage problem, it is magnified by pollution. Pollution from fertilizer application, for example, damages water quality, reducing the quantity available for human consumption. Since 40 percent of Moroccan drinking water comes from underground aquifers, some of which already exceed internationally accepted standards for nitrates (e.g., Tadla), prevention of fertilizer contamination in other aquifers makes good environmental management sense. Cleaning up a contaminated aquifer is slow, expensive, and perhaps impossible, especially for the purpose of obtaining drinking water. Problems thus defined call for a prevention strategy involving farmer education and better pricing of agricultural inputs.

For years, environmental managers in developing countries believed that sacrificing resources to attract employment would produce enough wealth to pay for later environmental cleanup. As Europe attempts to shift its polluting industries to Morocco, that strategy remains tempting. The extent of pollution will be unprecedented.

Past experience demonstrates that destruction of natural resources undermines national wealth. The Mediterranean fish population is believed to be threatened by river outfalls. Pollutant accumulations will grow as modern economic activity increases. Of Morocco's 54 provinces, 22 have heavy metal accumulations in the environment. Nine provinces have hazardous waste accumulations. The majority of provinces have biological or chemical

oxygen demand that, if untreated, will harm additional square kilometers of surface and underground waters, requiring costly treatment of industrial water and drinking water. Costs are displaced to the ecosystem and transferred to downstream users. Remedial and preventive measures, however, would make the strategy of sacrificing now for a better life later an unnecessary choice. The private sector, both polluters and the pollution prevention companies, can avoid making this choice by selecting appropriate technology and by adapting industrial processes. Prevention of further damage is by far the best environmental management strategy (Scandiconsult report: Chapter 4 and Annex 6).

With that policy framework in mind, the major Moroccan environmental problem can be characterized as deterioration of surface and underground water as a result of short-sighted irrigation techniques, fertilizer and pesticide application, and industrial and municipal discharges into surface and ground water. These and other environmental problems listed below are further discussed in Appendix A of this report and in more depth in a companion piece written for the World Bank Environmental Management Program (EMP) by a group of Swedish consultants, SWEEP/Scandiaconsult. As European industry extends southward and Morocco looks to the Common Market, it is time to substitute pollution prevention for toleration of resource degradation.

It might be added that the U.S./Mexican industrial relations, Russian/Eastern Europe relations, and other commercial partnerships have been based on similar trade-offs. Morocco still has time to determine its own trade-offs.

The targets for action listed on the next page are manmade pollution problems selected because corrective action is possible. Morocco cannot change its climate and limited rainfall which exacerbate pollution problems, but it can act on the resource damaging pollution that interferes with sustainable development. However, certain problems that might appear to have only natural causes because they affect natural resources, actually have human causes as well. Erosion, for example, is frequently caused by overgrazing by herds of animals purchased with remittances that foreign workers send to families. Resource management will show that human actions and natural resource shortages interact, leading to a downward spiral that works against sustainable yield economics.

Based on those reports and investigation of natural resource and river basin data, some of the most resource-degrading pollutants released in Morocco are cited below:

<u>Pollutant</u>	<u>Source of pollution</u>
Pollution of surface waters nitrates and pesticides biomass and lack of oxygen	fertilizer and pesticide run-offs, sugar refineries, oil mills, canneries, textile mills, tanneries and municipal effluent
toxic organics heavy metals organic toxins	pulp & paper plants, textile plants tanneries, textile plants pulp & paper mills, tanneries
Pollution of ground water nitrates	excess fertilizer
Pollution of coastal water phosphates cinder toxic organics	ore handling, acid plant electric generating stations oil refineries
Pollution of air NO CO lead dust odors	motor vehicles motor vehicles motor vehicles cement plants canneries, tanneries
Solid waste Hazardous waste Deforestation Desertification Silting of dams	municipalities, industries pesticides overexploitation of forests overgrazing land erosion caused by overgrazing and deforestation

The main purpose of this report is not to review Moroccan environmental problems, but to indicate the role of the private sector in dealing with them. The private sector is a source of pollution through its discharges into the environment, but it is also a source of solutions through its technical competence and ability to sustain the costs of pollution prevention.

B. Environmental Management Potential of the Private Sector

To better assess the private sector's environmental management capabilities and needs, a survey of 43 Moroccan companies was conducted. The survey did not aim to generate statistically valid quantitative results on the firms that could do environmental work or the amount of environmental work already underway, but rather to impart a qualitative

understanding of the existing capabilities, interests, and concerns among companies which appear to have the potential to provide environmental goods and services. Specifically, the objectives of the survey were to identify the following:

- Existing and potential environmental capabilities of Moroccan companies;
- Environmental areas in which these companies would like to expand their operations or capabilities;
- Impediments to developing markets for environmental goods and services; and
- Means of overcoming these impediments.

Identification of the first two items above will facilitate contacts between national and international suppliers and users of environmental goods and services. Identification of the last two, on the other hand, will facilitate the design of a private sector component to the World Bank's Environmental Management Program.

Firms that were interviewed were selected from *Kompass*, an annual directory that lists Moroccan companies by principal business area. Firms were selected from areas directly or indirectly related to environmental management. All were wholly private sector companies. This sampling method yielded a broad cross section of Moroccan companies. Company size ranged from a small firm with few employees to an engineering company with a staff of 2,000. The types of companies included equipment vendors, petroleum product distributors, architectural firms, testing laboratories, facility maintenance companies, consulting firms, water system engineering companies, and textile waste treatment companies. While firms were chosen to represent a broad spectrum of environmental skills, clusters of skills occurred among engineering, construction, project management, financial services, support and maintenance, and various economic studies groups.

B1. Observations

- More than 80 percent of respondents said that environmental business is growing in Morocco. This optimism is generating plans for investment and expansion into new fields. Industrial wastewater provides the largest target for business plans.
- Most firms viewed themselves as operating within the environmental sector. Indeed, most conveyed a sophisticated understanding of environmental issues, and two-thirds classified themselves as holding an important ranking among environmentally capable firms. The areas of water treatment for drinking and other uses, and environmental consulting provided the largest number of examples.
- In response to questions on what are the most pressing environmental problems in Morocco, opinions were fairly evenly divided among air pollution, groundwater pollution, surface water pollution, and coastal pollution. However, three of these

areas are linked to water pollution, which makes it the single greatest environmental concern.

B2. Expectations

- The private sector views the absence of environmental standards as the primary impediment to the development of the environmental market. Virtually all companies interviewed looked to the government to take the lead in setting regulations soon. The consensus is that once the government takes this step, the market will evolve quickly and spontaneously.
- The environmental business area of greatest interest to these firms was water treatment, recycling, and conservation. About one-third of the respondents indicated an interest in an area which is not currently their principal business area. Two-thirds of the respondents could specify the next area in which they planned to act. Indeed, even when asked to limit their choices to five areas each, the companies named 100 areas of business they expected to enter. Drinking water, industrial water, and liquid waste were the most attractive areas for future business included in the plans of 75 percent of the firms. An expected increase in water prices has already prompted requests for conservation services and equipment.
- As for timing, virtually all the firms expect the government to introduce environmental regulations in the next few years.
- A secondary issue is the perceived need to bring environmental concerns to the forefront of consciousness in the business community and the public in general. The press, radio, and television should all devote additional coverage to environmental issues. Further, the business community should be informed about the economic consequences of environmental degradation, and the availability and costs of strategies to respond.
- Another issue is enforcement. Many respondents pointed out that without enforcement the regulations will be ineffective. Although the historical pattern of strong government may support the belief that regulations will lead to more business, respondents were also wary of the government's ability to enforce environmental regulations comprehensively and impartially. Many said that the contracting of compliance monitoring to private firms will be more effective and consistent with government trends to privatize.

B3. Clients

The interviewed firms are doing business with a varied clientele, but government ministries and municipalities provide over half of them with revenue. Other major client groups include processing industries, refineries, hotels, training groups, agriculture and agro-industries, and minerals and mines, each providing revenue for over one-quarter of the firms. Assorted schools, tanneries, and restaurants were mentioned as well.

Most firms indicated that a regular environmental bulletin describing technological advances, pending regulations, and business opportunities would be valuable, as they wish to expand their clientele.

The implementation of regulations was viewed as the principal prerequisite for development of the environmental market, but many firms also identified financial assistance as a means to further develop the market. Few firms felt that lack of technology access or training would impede the development of environmental business. In fact, the personnel interviewed were generally very knowledgeable about environmental technologies and regulatory trends outside Morocco. Most had extensive business contacts outside Morocco. The firms had eleven joint ventures, six suppliers, six representatives, three distributorships, three subsidiaries, and one subcontracting relationship with French environmental firms alone. While French relationships dominated numerically, firms had many other ties, including European, Japanese, and American. There are 50 firms of all kinds and a chamber of commerce in Casablanca. Many of them want to expand their ties in the environmental sector where the United States is believed to be a technological leader.

Few firms were aware of the potential benefits for environmental projects under the investment code, e.g., the rebate of import duties on environmental protection equipment.

Many of the survey results are consistent with those of other projects in Morocco. For example, the GEM Project (Gestion d'Energie dans les entreprises Marocaines), which is sponsored by USAID and the Ministry of Energy and Mines, found that the lack of information dissemination was a major impediment to industry's adoption of energy-efficient practices. GEM also found that few companies took advantage of benefits under the investment code, which are available for both environmental and energy efficiency investments.

Subsequent sections of this report build upon these findings and identify policy and program options that will help mobilize private sector participation in environmental management. The profile indicates the private sector is a willing ally in the effort to solve the problems of resource damage from pollution. There is a broad array of capability domestically and through foreign contacts. With the possible exception of agricultural practices that lead to natural resource problems, such as erosion and application of excessive nutrients, the private sector businesses are well placed to assist in all areas. Even when farmer education, rather than the sale of products and industrial services, is the main intervention strategy, consulting firms are available to provide analysis and private services for the implementation of solutions in the agricultural sector. In the case of pesticides, the need for export product quality has already created private business for labs, although there is much competition from government labs. Environmental firms believe they need government cooperation only to set norms and targets so polluters, their engineers, and equipment suppliers can choose fair and appropriate solutions.

C. Competition Between Government and Private Environmental Businesses

Private sector environmental businesses perceive themselves as key figures in environmental management who present solutions to private and public sector polluters. In terms of material volume and history, most of the large, old, polluting businesses in Morocco are in the government sector, e.g., mining, petroleum, power generation, and municipalities. The predilection is to call on government agencies to do their own cleanup. Many artisanal polluters are small and private, but they are concentrated in urban areas where their proximity to urban populations causes more harm than their material volume might suggest. The government is tempted to intervene in those solutions too.

With a conscious policy decision by donors and the government, the investment in solutions is likely to be led by privatization and recognition that the public can turn to the private sector for solutions. The effort will start with studies and continue with the development of prevention strategies provided by public policy incentives and private know-how. The private sector involvement should not interfere with the role of existing government technical services, laboratories, and ministerial technical competence. It recognizes, however, that it is not necessary to build more than a regulatory function in government. The capacity for solutions already exists in the domestic skill pool, augmented by technical services from abroad.

It is important for the private sector role in environmental management to be consciously and consistently supported. It would be inconsistent to build government laboratories and service groups when the economy is liberalizing and private skills are available. The government would do better to clarify its expectations of needs to be filled by the private sector and encourage an expansion of that capability. Donors would do better than to grant government recipients funds to compete with the private firms. A long-term private strategy can be more successful in attracting investors and vendors to fill market needs. In sum, a conscious policy to leverage public funds by encouraging private investment in the environmental management area is not an attempt to build government capability.

One statistical point clarifies the strategy of supporting private initiative. The Moroccan economy is growing at approximately 5 percent and higher in the industrial sector. If private investors are encouraged to employ clean technologies when they select or modify processes, much of the pollution load can be efficiently eliminated or avoided in the next decade. It is essential that the policy of pollution prevention be implemented in the private sector where the investment will originate. A proactive private sector will help abate the problem over time as environmentally aware thinking is adopted. If the Moroccan economy grows and modernizes, clean technology growth can reduce the problems of the past. The optimism expressed in responses to the private sector profile will then be justified.

SECTION II

ENVIRONMENTAL CAPABILITIES OF THE PRIVATE SECTOR

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ENVIRONMENTAL CAPABILITIES OF THE PRIVATE SECTOR

A. Functions of the Environmental Sector

To play a significant role in solving environmental problems, an environmental goods and services sector should be ready to provide a broad range of specific services and hardware. Each country has a unique private sector profile based on its priorities and legislative history. Over the last few decades, countries like Germany that have major river systems have focused on water. Their private sectors developed strong specializations in water. The United States had an early air pollution program and grew strong in that area. Both countries today have a major share of the international environmental export goods and services market.

Morocco will probably develop its strength in water pollution prevention and control, the area of its major problems. The cost of developing new water resources and the price of water are sure to increase. This means that water conservation devices for residences and industries will find an early market. By reviewing the history of developed countries, environmental market developments in Morocco could be anticipated more accurately than through gross statistical or anecdotal evidence.

Table II-1 on the next page provides an overview of major environmental behavior since the 1970s, before regulations were put in force in the larger Western countries. The table also illustrates differences between the first U.N. conference on the global environment in Stockholm in 1970 and the most recent conference in Rio de Janeiro in 1992. As consciousness was raised in the early regulatory era, the private sector polluters and problem solvers developed end-of-pipe treatment to remove nuisances and harmful pollutants from the waste stream. But with more time and an evolving environmental strategy, new options reflected sounder economic behavior by eliminating the pollution problem at its source. While Stockholm reported on end-of-pipe controls, Rio reported on clean technologies and the economics of sustainable development. Experience and consciousness of global environmental damage will enable developing countries to industrialize before their resource base is irretrievably damaged.

Some narrowly focused analysts will see environmental concerns as a constraint on growth and just another cost. But by prioritizing regulations, those economics are altered in favor of preserving the productive resource base and protecting human health. Management and workers will still feel threatened by alleged loss of employment, but the sectoral shifts of employment to cleaning up industry, whether it is export-oriented or not, promises more jobs for the developing world. Environmental business has already delivered on that promise in the developed world to the sum of \$200 billion (ref. 42). Pilot projects described in Section 4 illustrate how the private sector can help achieve that outcome.

TABLE II-1

GAINING DEVELOPING COUNTRY FORESIGHT
WITH DEVELOPED COUNTRY HINDSIGHT
1970-1992

PRE-REGULATORY EXPERIENCE	POST-REGULATORY EXPERIENCE
Consciousness of environmental damage to resource and health	Control systems in place for damaging pollutants
End-of-pipe control technology	Prevention based on source reduction; process changes; clean technology; in-plant waste recuperation; recycling; by-product marketing
As applicable, use of simple biological treatment methods such as holding tanks, lagoons, digesters, filtration systems.	Continued simple systems, but also space and time saving devices with high tech and energy use to accelerate reactions.
Use of interim, progressive regs and "grandfather" clauses to give time for more sophisticated methods to be developed.	Continually tightened standards. Search for new practical methods.
Production of wastes based on ignorance of potential savings and fear of consumer dissatisfaction with product changes.	Consumer agreement and responsive management for new products, packaging, and in-plant total quality control.
Fear of economic disruption and loss of jobs.	Environment is globally a \$200 billion business and a source of much employment. Local job dislocation remains, but at the national level, environmental leaders are developing a growing export business
Command and control management systems, adversarial relations with industry.	Emphasis on negotiated solutions that prevent pollution and encourage innovative solutions.

The environmental business sector has evolved on a reasonably logical path in the market-driven developed world. The government in each country set priorities for controls. The private sector, sometimes augmented by government sponsored research, developed technologies to comply with regulations. Command economies, most notably those in the former Soviet Union and Eastern Europe, took a very different path. Now past generations unwittingly and current generations consciously are paying the price for that choice. Since Morocco is in a liberalizing mode, this report will downplay the command model as well as the Asian experience in favor of the Western pattern. It is recognized, however, that the legacy of large government-owned polluting industries will make the need to develop a unique Moroccan strategy even more important.

B. Evolution of Environmental Business

The pattern presented has variants in Germany, France, Japan, the United States, and elsewhere. But as consumerism follows global patterns with national variations, so does the demand for a clean, healthy environment. And, as national policy encourages the development of the export sector, the pattern of trade surpluses also varies. Germany exports 40 percent of its environmental products to take the lead with a \$10 billion trade surplus, followed by the United States with \$4 billion and Japan with \$3 billion (ref. 42, pg 13).

The GOM, even in a liberal economy, has an opportunity to shape this future by encouraging the domestic market and finding its national comparative advantage in trade. While it is too early to verify this judgment, Morocco should have an ultimate advantage in water-short countries, especially in the Maghreb, if it brings its human planning and engineering skills to bear in such market areas as clean technologies and the removal of organics in food processing. The technology for this is well known, requiring residual time in tanks or ponds with pumps and controls as a start. In sum, the pattern has been a domestic market driven by public concern and regulation, leading to the development of domestic capability, further leading to significant international demand for goods and services. While this model is too simple for Morocco, variations on the theme may well be monitored and exploited.

C. A Regulation-driven Environmental Market

Once again, the strategy outlined here is driven by regulation as it developed in Europe and the United States and as anticipated by the private sector survey in Morocco where business nearly unanimously chose regulation and enforcement as the most important incentives for successful environmental business. It should be noted that other observers of Morocco and the region do not believe such a regulation-driven assumption is realistic. The authors of this report choose to follow the advice of the Moroccan private sector. No strategy, whether of prevention, clean up, or time-phased reduction can succeed without industry knowing the limits within which it must operate. The authors do not therefore share the private sector faith in a command and control system with enforcement of norms, but motivated by practical considerations of choosing industrial processes, technologies, and economically justifiable behavior for exporting industries. Government environmental

managers in Morocco should set a level playing field with clear targets. Flexibilities called for to execute these regulations depend on geographic location, timing, prevention strategy and policy, but the need for regulation as a form of target setting is unquestioned.

Assuming the environmental business will be regulation-driven and the government will set up the necessary laws and apparatus, then the first business to grow will be the measurement business. Measurement is done to see how far out of compliance with norms the behavior of polluters might be.

In the Western economies, growth of the measurement business has meant the growth of engineering, planning, and laboratory functions in the private sector. To monitor private business behavior, a much smaller parallel structure was built in the government to verify the results. For example, private laboratories which do most national measurement work are certified by the USEPA government laboratory which sends unidentified samples for identification and quality control. In the U.S. these private laboratories numbered 1,000 in 1991 estimated to exceed \$1 billion in the measurement business. Small laboratories are the rule in the United States where the top seven national labs still account for less than 25 percent of the business and most labs have revenues of approximately \$1 million. (Source: information in private offering.)

In addition to the laboratories, a series of measurement methodologies have been established by practice and more or less formalized. These include the environmental audit for industries; the public liability report for industry; the environmental impact analysis for major construction project design and development; the environmental assessment report rendering judgment on the impact; and other analytical frameworks designed to call attention to damage minimization in project design. Because the local population is affected by change, they are often invited to participate in measuring the suitability of proposed remedial measures. While this public participation process may limit options for the developer of unpopular facilities, such as disposal sites, it often leads to design measures that limit the effect on the most impacted population.

A consulting industry and a public relations industry have grown up around this impact measurement business. Often these skills are added to an existing consulting engineering company rather than a specialist company that would have to carry too many diverse skills in one market area. These environmental professionals also help focus debate on scientific matters rather than more general political opposition.

After these measurement, impact, and assessment steps are taken, business opportunities open in remedial action. An economy grows sector by sector and firm by firm. Environmental business does not follow a logical linear development. The next step, remedial action, therefore, may occur early in different sectors, often depending on international competitiveness, amortization of existing equipment, plans for expansion, and other case-specific economic factors that facilitate or retard change.

Within a firm seeking remediation, the interest in environmental business usually begins when a consulting firm or in-house engineer recommends an improvement in "good

housekeeping" practices. That means tuning a boiler, stopping leaks, production planning to minimize wastes, and other maintenance efficiency practices associated with good management. This step usually does not require capital costs, and is always worth the effort.

When the simple housekeeping tasks are accomplished, the services of an engineering firm are then needed, especially since remedial measures by now are driven by regulatory pressure. The talents needed at this point are quite diverse. They include end-of-pipe treatments, as simple as a retention pond for biodegradable wastes to be released slowly into the environment only after treatment. Other alternatives, not necessarily more expensive, will be sought, such as replacing environmentally harmful petroleum-based solvents with water-based solvents in manufacturing processes. Sometimes raw material inputs need to be changed, using materials that are biodegradable instead of those that are not, for example. Sometimes, as in the case in chlorine production, there is little choice beyond process change and the phase out of old methods. The remedial action step requires process engineers who know an industry well.

Most remedial plans include solutions requiring hardware procurement, where global contacts are important for installation, service, and updating, especially when advanced and less familiar solutions are being implemented. Finally, there is a finance business to pay for the solution over time while the savings are accumulating or the costs must be paid to stay in business without consuming the resource base. Hopefully, norms and regulations have set a proper balance among the many trade-offs of social objectives so that financing will not be impossible when it should be practical.

Often, in relatively simple industrial economies, such diverse and specialized expertise is not available locally, so access to international expertise is essential. This access can be gained through joint ventures, subsidiary relations, partnerships, and many other cooperative devices that facilitate the transfer of skills. Libraries are useful, but site-specific problems usually require hands-on experience of both local and international technicians to determine the optimal solution. Foreign experts often need to know local practices and economics before devising a solution. Affiliations of some kind, joint ventures or otherwise, make sense.

As the matrix below indicates, most environmental functions can be performed by Moroccan firms. Some of the missing skills and experience are not available in the area of clean technologies to prevent future damage, but associations with developed country firms can fill this gap.

These judgments are rendered at the most general level. Sector by sector specialization and experience vary greatly.

The matrix below summarizes the functional capabilities needed to develop and execute an environmental program. The letter X at the intersection of the function line and the skill column indicates a firm availability among 43 firms interviewed. No quality judgments could be made in the survey.

	Lab	Engineer	Plan	Eqpmnt	Instll	Maint.	Legal	Finance
MEASURE e.g. Audit Impact Assessment	X	X	X	X	X	X	X	X
PREVENT	X	X		X	X			
REMEDiate	X	X	X	X	X	X	X	X
REDESIGN	X	X	X	X	X	X	X	X

The terms and criteria in the matrix require some discussion. *Measure* indicates that most environmental programs need all the capabilities associated with laboratories, engineering services, planning, and measurement equipment and its installation, including maintenance and a knowledge of the legal and financial implications of environmental management. No specialty companies were found in the legal and financial areas, but the services were available either in house or in general services firms. The survey found all these capabilities but little actual experience, except in the export industry quality control functions. For complicated and essential measurement functions, experienced foreigners are invited to participate. Gaining access to this help is not difficult; with time, local experience will develop.

The survey found less capability in the function called *Prevent*, or the ability to select and design clean technologies to clean up or replace polluting processes or materials in new or existing industries. Nonetheless, any new plant designer is likely to find local skills in this area. Prevention is seldom discussed as a main environmental strategy. Most discussion focuses on cleaning up present problems and assumes regulation will force new plants to choose clean technologies.

Remediate, or the ability to detox, isolate, treat, and handle wastes is available among the firms interviewed, but current practices are well below Western standards. Businesses know there are better remedial technologies, they also know their clients will not pay for them. The problem of operating costs gets in the way of treatment that cannot compete economically with free disposal dumps.

Redesign, or the ability to accomplish a function in a different, no-polluting way by redesigning the packaging or processing, or by educating consumers certainly has representation in the survey. Nonetheless, public awareness has been raised by defining the problem as pollution control. The green movement, with its message of prevention through better use of resources and limiting damage by consumerism, is a new movement. Moroccan consciousness has been raised through recognizing the problems. Prevention and redesign are forward-looking approaches that do not yet dominate the thinking. For many people, awareness has not passed beyond the initial stage of "stop polluting." Lifestyle changes, consumerism, and an environmental movement as it exists in the West awaits more

consciousness raising. The capabilities to redesign exist among locals or foreign partners, but the clients may not know enough or be motivated enough to ask for them.

D. Existing Functions Versus Future Needs

In the private sector survey of about one-half of the companies providing environmental goods and services, 43 firms listed their capabilities. The survey team did not try to assess the quality of services, as that was beyond their scope. The market will assess their services; in fact, reputations already exist based on early experience. Without making a judgment based on quality, it is fair to say that all the listed functions are represented in Morocco by either domestic companies or their international affiliates. Thus, a matrix of needs and firms that can fill those needs would show very few gaps in the private sector.

Nonetheless, it is fair to say that experience is limited in the current market in Morocco; companies who feel they are qualified could still benefit from outside contact. Ideally, a private sector competing globally would act to fill any gaps themselves. In less than ideal circumstances where experience and communication are limited, an engineer cannot be expected to know the extent of his ignorance, or the appropriate questions to ask.

It is enlightening to speculate on the environmental market challenge ahead in gross dollar terms. Assume that Morocco undertakes pollution prevention and clean up of municipal and industrial water efforts that resemble programs taken by OECD states over the last decade. Then, correcting for its population size and GNP, the country might spend from \$40 to \$90 million in the environmental, industrial, and municipal sectors annually for a decade. While this extrapolation of numbers assuming proportionality with estimates for OECD (ref. 43) could be wide of the mark, the capability existing in Morocco's private sector today would have to expand to handle that level of business.

To accelerate that environmental experience, a series of workshops, seminars, and hands-on training to stimulate discussion would be helpful to the private sector. Whether such activities should be part of an environmental equipment trade show in Casablanca; published in multimedia electronic equipment catalogues; or take some other format will be left to program designers. Based on limited conversations in the environmental industry and the absence of certain apparent solutions, certain topics could be addressed. Even before regulations are established to lead the market, sharing potential solutions would be helpful. Such information could lead the markets because there are enough "victims" of pollution to force the issue and more than a few provincial governors who are already involved in settling disputes among constituents. Ignorance of solutions protects the polluter, and raises the costs from those associated with prevention to those associated with end-of-pipe clean-up.

E. Immediate Needs for Capabilities

While many environmental firms are active in the business today, they may not know about certain high priority potential actions described here to alert investors and donors to the opportunity to be of particular assistance. The companies have not yet penetrated the markets as much as they might. Some examples follow.

E1. The demand for scientific landfills that control the placement of materials and collect leachate is unmet. In part this is because of the lack of an aggressive, informed industry that could work to persuade authorities of ways to meet the need. This is not to say there are no capable civil engineering firms, but rather, that consciousness raising is not aggressively sought.

E2. Techniques for industrial pollution prevention are improving all the time in cost and effectiveness. An industrial exchange visit to or from countries that have solved problems the Moroccans believe to be inevitable or too costly could be helpful. Agro-industries such as dairies and fruit canners and their environmental service companies should see the potential of by-product creation from diluted waste streams. Bus and truck companies should observe a fleet maintenance program that pays for itself. Once again, the industrial familiarization program design is left to outside donors, but the Moroccan private sector needs to demonstrate to its clients evidence of success and confidence to act.

E3. Industry associations, led by an association of associations, the Patronat, have just begun to expose their members to cost effective and readily financeable practices that can be taken before regulation forces the issue. Technical assistance from the outside could greatly accelerate this interest and provide additional stimulus and information for the private sector polluters and problem solvers.

E4. The Moroccan economy continues to grow but approximately 5 percent per year. From both environmental and economic points of view it is often cheaper to work with the incremental growth than to solve all but the most persistent and damaging problems of the past. Therefore, exposure to "clean technologies" such as tanneries without chromate discharges, and energy production without SO₂ discharges, low water consumption methods and other environmentally sensitive process designs should be encouraged. Exposing industrial planners to clean technologies will help to avoid regulatory and price pressures. Interviews with managers of new European-sourced industrial capacity in Casablanca indicated this trend is already underway. The industrialization process needs to be rethought before more environmentally and economically expensive commitments are made.

It is fair to say that progress in establishing and enforcing environmental regulations in Morocco will not suffer from mere ignorance of how to implement them. Morocco has a well-developed private sector and international access to skills to solve environmental problems. Political awareness of how industries are negatively impacting on each other is sufficient. It is only a matter of time, and not much time, before action will be required and accepted. We therefore turn now to the incentives necessary to involve the private sector in the clean-up effort.

SECTION III

INCENTIVES FOR DEVELOPING THE PRIVATE SECTOR

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The first two sections of this report reviewed environmental problems defined as the loss of the productive capacity of natural resources, especially water. The opinions of management and the span of private sector services were discussed. This chapter addresses the private sector's relation to government policy incentives. The environmental response of the private sector, especially in pollution prevention, will remain limited until incentives are established. These incentives are set in the larger context of environmental management by command-and-control mechanisms, market mechanisms for allocating clean-up priorities, pollution prevention by source reduction, and application of environmental management techniques. A number of program options are reviewed to illustrate specific steps that might be taken to prevent and control pollution with private sector support.

A. Introduction

As the 43 environmental companies stated, the major constraint on their growth is the lack of pollution norms and enforcement.

From their point of view, the firms will find the talent and the ability to solve environmental problems once polluters are forced to comply with specific performance standards. This optimistic viewpoint overlooks the need for financing, since some environmental projects do not provide returns on investment at rates acceptable to private borrowers.

Morocco's pollution control experience is too limited for the optimistic outlook to be readily accepted. Efforts must be made to overcome constraints on private sector development, especially to strengthen institutions that promulgate standards. Firms are ignorant of the highly developed technical field with its many options for preventing future problems. There is a concern for evenhanded regulation and a level playing field. The private sector sees the government contributing significantly to pollution and asks why it should go first. Its view is that there should be a joint effort to solve the problem.

The first step toward better environmental management in Morocco is to develop a sound institutional foundation which recognizes the private sector as the force that can execute regulations. Clean-up efforts can be conducted in parallel to demonstrate the feasibility and technical principles of environmental management. There are government as well as private sector polluters, many of them in the same industry. A two-pronged approach can accelerate the dissemination of improved environmental management practices.

B. Design Considerations for Private Sector Participation in Environmental Management in Developing Countries

Several considerations relating to the private sector role should be taken into account when formulating an institutional framework for environmental management. These considerations recognize the private sector's dual potential role as polluter and solver of environmental problems.

B1. Improved Public Health and Economic Well-being: the Ultimate Objectives of Environmental Management

Environmental management has at times been mistakenly considered a luxury obtained at the price of reduced economic growth and household welfare. On the contrary, environmental management is a prerequisite for economic and physical well-being. A population that is sick from dirty air or water cannot be productive; a region that is polluted will not attract tourists. It is not surprising that environmental management programs have emerged spontaneously at the municipal level in Morocco, since that is where the economic impacts of environmental degradation are first manifested.

Protection of public health is a *sine qua non* of environmental management. Market-based instruments cannot guarantee this benefit because of their voluntary nature. The government can use command-and-control instruments, on the other hand, to provide at least minimum health protection. The command-and-control and the market instruments can work in combination. To the extent that the police function is required to protect human health, these command-and-control instruments should be applied uniformly for the entire country in a set of at least minimum standards.

The command-and-control approach stipulates pollution standards and regulations which may include these options, either singly or in combination:

- Ambient standards that specify the pollutant concentrations in a particular medium such as surface water, groundwater, or air over a given period of time and at particular monitoring points;
- Performance standards that define the environmental effects of a particular pollution control or production process measured at a given point source;
- Technology standards that specify the types of equipment to be used in a given process;
- Bans or prohibitions on particular processes or inputs;
- Quantity limits or quotas on inputs or outputs for particular activities;
- Land and water use controls which define allowable uses in spatial terms and segregate conflicting uses;

- Requirements for environmental impact assessments in the approval of new projects; and
- Permits and licenses to engage in specific activities or to discharge wastes.

Command-and-control instruments may also include measures to enhance public accountability, such as publication of the pollution levels of particular plants. The command-and-control approach encourages compliance through the imposition of fines, imprisonment, and/or business interruption.

Conversely, standards or regulations cannot be so stringent that they strangle economic growth. The exact level of environmental protection must balance the risks which are acceptable to Moroccan society and the net economic costs of the environmental management strategy. Direction Générale de l'Urbanisme, de l'Amenagement du Territoire et de l'Environnement (DGUATE) is considered a candidate to take the lead in establishing these standards. Local and provincial pilot projects have been designed to help with this process as well.

It is also essential that the application of command-and-control measures does not lead to wasteful control measures such as end-of-pipe treatment when better alternatives for source reduction exist. Often, the further up the pipe into the process one looks, the more likely it is that less expensive and more cost-effective measures can be applied. In the haste and under technological limits of the early years of cleanup in Western countries, too much money was spent on treatment and removal. Now, engineers are more sensitive to ways in which clean technologies can create solutions addressing a broader range of economic and social values.

Standards can be set creatively so as not to bias the technological choice of source reduction. Standards of some kind are needed, nonetheless, if only to set targets for addressing the problem at the source, rather than at the end of the pipe.

B2. Incentives to Involve the Private Sector in Solutions and Increase the Economic Efficiency of Environmental Management

Although command-and-control standards can help ensure a minimum level of environmental protection, they are not the most economically efficient means of reducing pollution. The national economic efficiency of environmental management increases when those polluters facing the lowest pollution abatement costs per unit of pollution are encouraged to clean up the most. Market-based instruments are the most effective tools for encouraging this response.

The market-based approach seeks to compensate for market failures by capturing the costs of environmental externalities that would not otherwise be considered in business or purchase decision making. It explicitly links environmental management to economic decision making by creating economic advantages to voluntarily preventing pollution at its source or recovering material from waste streams. In effect, the market-based approach

seeks compliance by creating business opportunities to limit pollution; it makes what is good for the environment good for business. Examples of market-based mechanisms which can also be used singly or in combination according to the context of risk and economic impact include:

- **Pollution charges, e.g., a tax per unit of pollutant produced;**
- **User charges, e.g., a charge for all those connected to a public service such as a municipal wastewater treatment system;**
- **Product charges, e.g., taxes on material inputs which subsequently result in pollution, such as pesticides;**
- **Emissions trading, e.g., allocating tradeable permits to polluters;**
- **Deposit-refund systems, e.g., a deposit on bottles or cans which is refunded when the materials are returned after use; and**
- **Investment taxes and subsidies, e.g., duty-free importation of pollution-reducing technologies.**

All these mechanisms can be used to combat water pollution, although pollution and user charges are most common in other countries. Pollution charges can be levied on effluents such as oxidizable matter, phosphate, nitrogen nutrients, salt, organic chlorine compounds, and metal such as chromium, all of which are relatively straightforward to detect and measure. User charges can be assessed as a part of the consumer's water bill to cover the cost of municipal wastewater treatment. Product charges can be assessed on inputs such as fertilizers, detergents, plastic bags and bottles, and pesticides. Deposit-refund systems can be used on items such as pesticide containers. In any case, invoicing for these charges must make clear that payers perceive them as the cost of environmental management.

A market-based approach offers several benefits in addition to encouraging the most cost-effective environmental management from society's point of view:

- **Market-based instruments encourage continuous innovation, since they pay polluters to clean up as much as the currently available technology allows from an economic standpoint.**
- **A market-based approach allows polluters the flexibility to respond to incentives as they see fit. This may result in more compliance than mandated strategies.**
- **Market-based approaches can raise revenue for specific environmental projects (e.g., water user fees to cover the cost of municipal wastewater treatment), general environmental management support (e.g., compliance monitoring), or general budgetary support.**

Command-and-control and market-based approaches are not incompatible. In fact, the two approaches are commonly used in tandem. A review of 14 countries conducted by the Organization for Economic Cooperation and Development (OECD) in 1987 revealed over 150 instances of the application of economic instruments for environmental management. Most of these countries also use command-and-control approaches to environmental management.

B3. Environmental Management Can be Self-financing

Successful environmental management requires sufficient funding for strategy formulation, the construction and operation of treatment facilities, program administration, compliance monitoring, and enforcement. As noted above, market-based instruments can raise revenue for environmental management. In the case of municipal wastewater treatment, user charges assessed on water bills are often a critical source of funds for treatment facilities. A revenue-requirements evaluation of an environmental management program can help determine the levels of user fees, pollution charges, etc. Certain municipalities in Morocco have imposed user charges that have often been insufficient to cover the costs of environmental treatment facilities, or have been used to fund the general municipal budget.

B4. Regulatory Bodies Can Be Organized on a Scale Appropriate to the Environmental Issues

The jurisdiction of any regulatory body should be commensurate with the environmental problem it is meant to address. For example, a regulatory body charged with surface water management should have jurisdiction over an entire water basin. Otherwise, the jurisdiction cannot be held accountable for downstream impacts of its management practices, just as upstream users outside the jurisdiction could discharge effluents which reduce the effectiveness of water management efforts within the jurisdiction.

A corollary of this need for geographically appropriate boundaries for water management suggests that different regulatory bodies will be developed for different environmental problems. An air quality board, therefore, may have a different jurisdiction from either river basin commissions or solid waste management bodies.

Regulatory bodies should also be designed so as to balance local needs and monitoring capability with equitable and consistent application of standards. Too large a jurisdiction may leave a regulatory body out of touch with the diverse environmental problems faced by its constituents, while too small a jurisdiction may mean the authorities lack the resources for effective management. They are then more susceptible to the impacts of management practices of adjacent jurisdictions which dominate by their size.

There is one more criterion for regional regulatory bodies. Their standards should be consistent with the minimum national standards. Without minimum national standards applied to all regulatory jurisdictions, some regulatory bodies may adopt lax standards to attract polluting industries from other regions. These polluting industries may be perceived as offering certain economic benefits to the region, though at the expense of long-term well-

being. Beyond that, individual bodies will have to balance the local ambient, geographical, and economic concerns in developing an environmental program.

B5. Regulatory Compliance Should Be Feasible

Strict regulations may be counterproductive. For example, Moroccan environmental laws passed earlier this century are so strict they are unfeasible; few industries anywhere could comply with them. Regulations should be prepared in consultation with industry groups. If compliance is infeasible, the regulations will be ineffective.

Industry groups may claim that any regulation will be economically harmful and technically unachievable. Pilot programs play a critical role here by demonstrating the economic and technical feasibility of environmental management strategies. Even if consultation with industry results in some compromises, compliance will be greater than if industry were excluded from the regulatory design process.

The temporal dimension of regulation must also be considered. Regulations can be introduced in well-publicized phases to allow industry and others time to respond. They may be introduced on different timetables in different regions to take into account local conditions. "Grandfather" clauses are typically used to allow existing facilities sufficient time to adapt their technologies and minimize the near-term economic hardships that may result from compliance.

In addition, the feasibility of compliance is enhanced by providing access to environmental technology, training, and finance. Programs can be established to facilitate compliance, as well as to enforce it.

B6. Regulations Should Be Transparent and Enforceable

Just because companies *can* comply with regulations does not mean they *will*. Firms must be made to understand regulations, and regulations must be enforced.

Industry groups, the media, and government-sponsored conferences for the private sector can be important mechanisms for the dissemination of regulations. Furthermore, regulations can be presented in such a way that potential polluters understand the rationale behind them as well as what is required to comply or respond. Industry in particular needs to know with certainty the motivation and potential impacts of regulations so that it can plan investment accordingly.

It may be worthwhile to base enforcement on unequivocal scientific monitoring of pollutants, despite the cost of doing so. Laws, perhaps as part of the investment code, can spell out financial responsibilities for pollution following the "polluter pays" principle. Private contractors may be appropriate to monitor pollutants, especially if incentives are introduced in the contract to identify additional polluters. Compliance bonding is another enforcement mechanism to ensure that companies are aware of the risks of non-compliance and that the regulatory bodies can easily implement penalties. Requirements for

environmental impact assessments prior to investment are a common form of "preventive enforcement." Finally, equitable enforcement across companies helps to build confidence in the regulatory system.

B7. The Regulatory Framework Should Be Resilient

The composition of pollution, abatement technologies, and environmental risks will change. The regulatory framework should be designed to respond to these changes. Provisions should be made to allow for the expansion or revision of environmental regulations. Responsibilities, procedures, and authority must be clearly spelled out from the start.

In addition, the regulatory framework must include provisions for dispute resolution. In the United States, environmental disputes are generally handled through litigation but less costly alternatives are available such as arbitration.

C. Incentives for Enhancing the Private Sector Role

Many of the companies that were interviewed raised the above issues, particularly items B5, B6, and B7. Based on those survey findings and a review of the experience in other countries, the following options are available to enhance the private sector's role in environmental management. The phrase *program option* applied after each discussion of incentives is meant to suggest there are different ways to create incentives. The suggested mechanisms are only optional.

C1. Establish Clear Environmental Standards and Incentives

Many of the businesses surveyed shared the view that the lack of clear standards is the principal impediment to the development of a market for environmental goods and services. Give them the regulations, they claim, and they are ready with the capability and financing to implement environmental improvement projects. Improved environmental management will not become widespread until environmental regulations are put in place.

Establishing appropriate national minimum standards is an important task of the UNDP-funded National Environmental Strategy. Once the desired levels of environmental protection have been identified, they could be implemented through national-level command-and-control mechanisms, such as ambient standards or performance standards.

The creation of market-based instruments which could be implemented regionally or nationally would also draw heavily upon the results of the National Environmental Strategy. In particular, estimates of the amount of pollution and its economic impacts can be used along with estimates of environmental management revenue requirements to establish user fee or pollution charge levels. In addition to this revenue-raising function, it is critical to ensure that fees are set high enough to encourage polluters to seek ways to reduce pollution.

Program Option: GOM could proceed as quickly as possible with the studies that would help establish health-based minimum pollution standards and incentives to reduce pollution beyond those minimum standards.

C2. Establish an Institutional Framework for Environmental Management which Harnesses Private Sector Capabilities

Program Option: A water pollution management program could be developed in Morocco following these steps:

- Establish at a national level the maximum ambient concentrations of various pollutants using health-based criteria, as well as penalties for exceeding those standards.
- Establish national laws or mechanisms for public accountability.
- Establish regional river basin authorities which would be responsible for (i) setting fees (e.g., pollution charges) for effluents in addition to the national maximum ambient standards; (ii) compliance monitoring; (iii) enforcement of regulations within each of Morocco's principal water basins. Fees would be charged to municipalities to cover municipal wastewater introduced to the river system, as well as to industries which may bypass the municipal wastewater system.
- Municipalities would, in turn, charge user fees to water users to cover the costs of municipal wastewater treatment.
- River basin authorities would oversee compliance monitoring. The most expedient way of doing so would be to contract out monitoring to private companies. This is discussed further below.
- Ensure that water and water-polluting inputs are priced properly. This too is discussed further below.

Other projects in Morocco have successfully harnessed private sector capabilities in other areas, such as energy efficiency. Project GEM, for example, has developed a sustainable, commercially viable approach for identifying and implementing efficiency improvements in Moroccan industry.

C3. Demonstrate That What is Good for the Environment is Good for Business

While many businesses mentioned the need to increase media coverage of environmental issues (particularly to gain political support for regulations), many also emphasized the need to ensure that industry understands the economic motivation for environmental protection, the scope of the measures required, and the methods of compliance. By making business an informed partner in environmental management, negative economic impacts can be minimized, and compliance enhanced.

Program Option: Trade associations could organize a series of regional seminars oriented toward specific industrial sectors, perhaps under contract to GOM. The World Bank's EMP could allocate funds for this purpose. These seminars would sensitize businesses to the need for environmental control, impending regulations, potential compliance strategies, and service firms that can help them comply. These seminars would also provide a conduit for private sector input to the formulation of regulations. One could start with information on clean technologies and pollution prevention strategies that are economically attractive and less threatening than regulations.

Program Option: In addition, a regular environmental newsletter could be published. Although most firms indicated a willingness to pay for such a publication, government support in addition to subscription and advertising revenues would accelerate its launching. Since trade associations have the most credibility in industry, the government could contract with a trade association to edit a newsletter that would:

- Notify businesses of impending environmental regulations.
- Describe environmental management trends in other countries, especially clean technologies and recycling alternatives.
- Describe specific environmental management strategies and technologies, especially those that increase economic efficiency and productivity.
- Provide a forum to advertise services and tender offers.

The trade associations that publish these newsletters could serve as the industry representatives to the government regarding future environmental management. Similar newsletters have been successfully launched in Morocco. The most notable example is the GEM-O-GRAMME on energy efficiency for industry published by Project GEM.

C4. Develop Effective Enforcement Mechanisms

Regulations must be accompanied by effective enforcement mechanisms. Many businesses pointed out that the government is ill-equipped to undertake compliance monitoring.

Program Option: Instead, the government can harness the private sector's capabilities by contracting with them to undertake compliance monitoring. The government would naturally retain a role in compliance verification, e.g., by spot checking facilities. In addition, actual enforcement would still remain in the hands of the government. Contracts could be issued for individual river basins, and bonuses could be paid to contractors based on the number of polluters cited or fees obtained over a certain amount. The contracts could be administered by the proposed river basin authorities or whatever control institution is finally accepted.

Government contracting for compliance monitoring has been frequently used worldwide. One well-publicized example is the contract between the Swiss firm, Société Générale de Surveillance (SGS), and the Government of Indonesia for customs inspection. Ninety percent of Indonesian importers surveyed said that clearing customs was cheaper and quicker under SGS. The government estimates that the SGS contract has saved the government \$4.5 billion over the 1985-90 period by reassessing imports at their true market value. The inspection contract is between the government and a government-owned company in which SGS has a share.

Such an approach would be consistent with the GOM's privatization policies. It would also help ensure impartial enforcement (particularly if bonuses and contract renewal conditions are taken into account), and accelerate implementation of an environmental management program. Further, allowing local companies to team with foreign firms would enhance technology transfer to Morocco. The EMP could allocate funds to facilitate the preparation of terms of reference and evaluation of proposals to undertake compliance monitoring.

C5. Develop Government's Ability to Use Private Sector Capabilities

Program Option: To further harness the private sector's expertise and capabilities, the World Bank's Environmental Management Program (EMP), could allocate funds for technical assistance to municipalities to develop financing schemes (e.g., user charges), terms of reference, requests for proposals, and other bid documents, as well as to assist with bid evaluation for environmental management projects that would be contracted to the private sector. Examples include municipal wastewater treatment facilities and solid waste disposal services and site development. Pilot projects for individual municipalities could be carried out, as suggested in Section 4.

C6. Address Environmental Liabilities in State Companies to be Privatized

Although some companies to be privatized, such as the Compagnie Arabe des Machines Outils a Métaux (C3M), may ultimately contribute to private sector environmental capabilities, others will likely result in the transfer of environmental liabilities to the private sector. Many of the most polluting activities are concentrated in state-owned heavy industries which are to be privatized. Because GOM has yet to introduce environmental standards, environmental liabilities have not been considered in the course of valuing assets to be privatized. However, privatizations are scheduled over the period in which standards are expected. Given that polluting industries such as cement plants, pulp and paper mills, canneries, textile factories, mines, sugar mills, and tanneries are to be privatized, environmental liabilities will need to be addressed.

Treuhand, the German agency responsible for privatizing 11,000 companies in eastern Germany (two-thirds of these privatizations have been completed), has perhaps the most extensive experience in addressing environmental liabilities (IHT, 1992). First, all owners of commercial and industrial property in eastern Germany are exempt from all environmental liability claims arising from events prior to German unification. (This is an example of a

grandfather clause, as described above). Second, clean-up costs are taken into account. If a clean-up is impending and represents less than 10 percent of the purchase price of the company, Treuhand factors the estimated clean-up cost into the price. When clean-up costs are unknown, Treuhand employs a "base-ceiling" approach. The "base" is the amount to be borne solely by the new investors, equivalent to 10 percent of the purchase price. The "ceiling" is the maximum amount for which the investors can be held liable. Beyond the ceiling, Treuhand alone is liable. Costs falling between the base and the ceiling are shared by Treuhand and the investors.

Program Option: A similar model to address environmental liabilities associated with privatization may be appropriate for Morocco; the EMP could include a component to facilitate the design of such a program, and/or conduct environmental audits of selected firms to be privatized. In some cases pollution control investments might bring in new business as in a regional treatment facility or show savings of raw materials as in a clean technologies approach. In some cases value would be added, not subtracted.

C7. Provide Assistance to Promote Compliance

Although access to technology, training, and finance appears to be adequate in Morocco, the creation of a national environmental fund could help reduce the perceived risks of investment in environmental infrastructure which will no doubt exist at least initially. Such a fund could also help share the costs of feasibility studies for environmental projects, and could serve as a conduit for providing technical assistance to firms seeking environmental management assistance to comply with new regulations.

Program Option: Using funds under the EMP for administrative and initial working capital costs, GOM could establish a national environmental development fund to help finance private sector environmental projects and feasibility studies, and to provide technical assistance regarding compliance.

C8. Bring Costs of Water and Other Inputs in Line with Their Full Economic Value

An alternative to taxing effluents is to tax, or at least price at full economic value, inputs that can pollute or resources that can be polluted. Proper water pricing encourages efficient use and recycling. Industrial or agricultural inputs that can have harmful environmental impacts, such as fertilizers and pesticides, can be taxed to minimize their use. In Morocco, prices of these inputs have been rising but are still below their full economic cost. The rationale for raising these prices has been primarily economic and financial; until now, the environmental benefits of increasing these prices have not been considered.

Program Option: Increases in the prices of fertilizers, pesticides, and water could be accelerated to train farmers in their application and explain the additional environmental benefits of doing so.

When might these many suggestions be implemented? There is no reason to delay some of the more benign suggestions which do not need a major infrastructure of regulations and institutions. Information about clean technologies and source reduction can be disseminated immediately. It would multiply the effort to start with the private sector environmental firms already in contact with clients who know they will soon be held accountable or who can save money.

Discussions with government program designers who work with relatively limited options would be immediately helpful. Many people in government regulation and industry believe that end-of-pipe technologies are necessary. The options are too narrowly conceived and the knowledge shared about positive options would accelerate movement toward prevention and clean-up solutions.

SECTION IV

DEMONSTRATION OF PRIVATE SECTOR CAPABILITIES

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DEMONSTRATION OF PRIVATE SECTOR CAPABILITIES

Environmental management is a complex activity, requiring balance among numerous social and economic values. It is best learned through experience that gives environmental managers an opportunity to integrate the various factors. This section provides an outline of three pilot activities to illustrate major principles of environmental management, while demonstrating private sector capability to solve environmental problems. All the projects show how to use the private sector to carry out the public interest. The pilots provide a chance for all participants to learn by doing.

As indicated at the outset, the World Bank and USAID are cooperating to establish the Environmental Management Program (EMP) in Morocco. USAID has provided the services of the PRIDE program design team. The bank is responsible for a broad commitment to the EMP and is seeking donors to support the projects below and additional projects designed by the Swedish team. A number of donors are interested in funding the projects listed below. The summaries provided here are the first draft of the project designs prior to feasibility analysis; changes can be anticipated in the final versions. The focus for World Bank donors is on (1) a waste management plan for Safi leading to privatizing of collection and disposal; (2) an eco-tourism project in Souss-Massa designed to involve the private sector in the management and development of the national park; and (3) an environmental loan fund to facilitate the public/private institutional nature of the program. While in some cases the recipient of direct funds will be the Government of Morocco or one of its designees, contracting will be done with private sector firms to execute the environmental management demonstration program.

A. A Waste Management Plan for Safi: Privatizing Collection and Disposal

A1. Background

The problem addressed by this project is the management of 300 tons per day of municipal and a broad range of solid wastes from a variety of industries which are poorly disposed of in an open dump. While this problem is ubiquitous in Morocco, Safi is farther ahead in developing solutions than many municipalities in Morocco. It shares the same problems, but is more conscious of them than many cities and is willing to privatize collection and disposal. The governor of the province has created a regional environmental committee of public and private organizations to determine and evaluate solutions to environmental problems. A private company, Techno-Ecosystème, has reportedly been granted the local rights to collect and dispose of solid wastes in Safi, and a regional plan may be implemented in the near future. It is therefore a fertile place to demonstrate techniques that can be applied elsewhere.

A2. Objectives

This project has three major integrated objectives:

- Create an institutional framework at the local level to help higher levels of government plan priorities and solutions to waste management problems.
- Create a waste management plan based on closed cycle objectives which focus on reducing waste at the source by reusing waste materials within the factory, within the city, and within the region.
- Privatize collection and disposal, integrated into the region wide waste management plan.

These objectives will be met by a sequence of activities explained in the Project Description, with the following outputs.

A3. Outputs

- A Region wide Waste Management Plan for Safi based on the principles of waste reduction and safe disposal.
- A public participation-based local environmental agency and a national pilot for the concept.
- A group of trained Moroccans who can implement the ideas elsewhere. (Casablanca and Meknès are likely sites where composting is not competitive.)
- The use of a cogeneration plant to provide steam and electricity from waste fuels.
- Techniques to dry waste fuels and combine industrial and municipal wastes to improve the calorific value of municipal wastes that are otherwise too humid for burning.
- Clean air, water, and land.

A4. Project Description

The project anticipates the creation of a local agency with a mandate to develop a region wide plan to improve Safi's environmental and economic future. The local agency will initially derive its legitimacy from the governor of the province and the emerging consensus in Safi to both clean up environmental pollution and protect natural resources for future use.

If the pilot institution succeeds, formal authority will be sought through association with the governor's office and the national environmental institution. Initially the governor

will appoint the local agency executive and its board, and foreign experts and private sector Moroccan consulting firms will assist the staff.

The local agency will create a data bank of local pollution problems in the environment. Polluters will not be required to disclose their data, but a technical assistance team will be offered to the polluter to determine if there are in-plant or regional solutions to his problem. If such preliminary examination warrants further investigation, the polluter will be able to request an environmental audit and financing from the Environmental Development Fund discussed below.

Two major studies already exist on the collection of solid wastes of Safi. One of them, *Etude de la Collecte des Déchets Solides de Safi*, illustrates amortization of borrowings. Another study, performed by L3CD International for the Canadian Agency for International Development (*Schéma Directeur d'Assainissement de la Ville de Safi*), indicates an energy value of 500 KW per tonne and 300 tonnes per day of waste production. Based on these studies done at the end of the last decade, it would appear that a tipping fee of 500 dirham per tonne would make the collection and cogeneration system feasible for private and public financing. If 500 dirham (in December 1992 at 8.6 to a dollar or \$58) were realized per tonne in tipping fee, and 300 tonnes per day were converted to electricity or steam to supplement the fee, and the plant operated 325 days per year, the project would generate \$5.7 million per year to collect waste and operate the cogeneration facility. Pending verification of the existing studies, the project appears capable of repaying a loan of more than \$10 million and supporting safe final disposal of Safi's unavoidable waste.

The process of creating a waste management plan will uncover a materials flow pattern in Safi which results in a regional "waste accounting system." This system will provide the basis for a region wide waste management plan which will 1) seek to prevent wastes from being produced, 2) treat wastes which are inevitable, and 3) dispose safely of wastes that remain.

The boundaries of the plan are tentatively defined as the 20-kilometer band around Safi, and for selected wastes, Marrakech; however, the solutions may extend far outside the region (for example, a Canadian company's offer to buy recycled aluminum and steel cans). Too, pollution control levels will be set by national authority, sometimes even on the basis of international agreements. While the waste management plan will be based on wastes originating in Safi, the local plan will be integrated into a much larger geographic framework determined by national legal authority and by a global market.

The waste management plan includes safe disposal. The likely major solution will be the privatization of collection and incineration of all municipal and industrial waste that is not recycled. The calorific value of the waste in Safi, including fish oils, canned sardines, and packing materials from industry, is likely to include enough heat to reduce the cost of producing steam. Depending on the final location of the incinerator, the steam can be sold to other industries (OCP has expressed interest) or, economics permitting, converted to electricity.

A new company, Techno-Ecosystème, has a charter to accomplish these objectives and has begun negotiating the purchase of equipment from the Municipality of Safi to collect municipal waste. The company has also begun negotiations to dispose of industrial wastes.

The private company needs financial and technical assistance to determine the specifications of the cogeneration unit it intends to buy. Moreover, it must examine the waste management plan to determine the economic limits of its ability to satisfy requirements of the plan. In addition to its handling of municipal wastes, the company has offered to assist with those wastes that cannot be safely discarded, such as infectious waste from the local hospital, which will have to be disinfected before it can be sent to an ordinary incinerator.

Also, another company is willing to experiment with slaughterhouse wastes as food for an aquaculture farm.

A number of investments by or with the private sector are possible once waste opportunities are determined by the regional waste management plan, including controlled landfill of wastes which cannot be safely incinerated, burning oils and lubricants, and stabilizing wastes from fertilizer production. An initial setaside of less than \$1 million for Safi waste control will be created in the Environmental Development Fund (EDF) for investments to control or prevent those wastes which will not be incinerated. Within the limits set by the EDF, the local institutions will sign off on whether the investment conforms to the waste management plan.

A5. Inputs

Cost Analysis of Safi Integrated Project Phase 1: Industrial Audits and Waste Minimization

Technical Assistance to local agency to conduct audits.

Consulting Services in Pollution Prevention and Natural Resources Management. 5.5 person years, of which 4.5 will be Moroccan.

\$400,000 for plant visits and review of existing studies

\$ 50,000 travel and per diem costs

\$ 10,000 monitoring equipment

Phase 1. Sub-total \$460,000

Phase 2: Initial Waste Management Investment

Assistance to investors to make applications and review of applications, cost included above.

Likely investments chosen include aquaculture waste recycling of slaughterhouse waste, hospital waste disinfection, refrigerant gas (CFC) recycling or replacement in a

fishing port requiring much refrigeration, and privatization of the collection system. Audits for clean technology candidates and pollution prevention strategies are also candidates for funding based on Phase 1 analysis.

Phase 2. Approximately \$1 million depending on final selection of investments.

Phase 3: Cogeneration Equipment Purchase and Installation

Phase 3. Approximately \$20 million based on early bid from incinerator vendor. Approximately one-half of investment is allegedly secured, foreign loan would be about \$10 million. Revenue streams for recycled waste and destruction of off-spec industrial and fish waste are still in negotiation. The primary sources of revenues will be a municipal tipping fee and the sale of steam and/or electricity to Maroc Chimie. Two sites are under consideration.

Total of Three Phases: Approximately \$11.5 million to be obligated pending final negotiations for the sale of steam or electricity.

Private Sector Justification: SAFI Integrated Waste Management Plan

- Moroccan liberalization makes projects private as a matter of preference, thereby removing some pressure on public funds and improving efficiency. Policy already encourages privatizing waste collection and disposal.
- Both national and local policy favor privatizing waste management. Current costs of operations encourage this private management policy.
- Safe destruction of waste has become a highly technological field with major capital investment and maintenance requirements.
- This project provides a case study of how to formulate public policy. The resulting policy is entirely the province of government. This is not, therefore, a private sector project per se, but it helps the private sector more than any other project by converting talk into measurable goals. The case will result in creating a level playing field and known targets so that polluters, whether they be public or private, can support the new economic sector of environmental preservation. The experience should not only give confidence to act nationally, but also demonstrate how to solve the organizational issue of local initiative versus central monitoring.

B. Eco-tourism in Souss-Massa National Park

B1. Background

A new national park has recently been created in the Souss-Massa river basins which contain unique flora and fauna, especially rare birds. The site has major attractions for eco-tourists, a growing category of tourists interested in natural environments. However, the

park is being overgrazed by herds of livestock which threaten the ecosystem. It is costly to maintain the park and to provide a livelihood for villagers living in the buffer zone around it. The solution is to give the local population an incentive to maintain the park and alternative employment that supports the park rather than destroys it.

B2. Objectives

- Protect natural attractions of the park.
- Create an economic base for the local population to avoid the social disruption arising from prohibition on grazing.
- Provide an economic return to managers of the park that will cover expenditures for improving access and enjoyment of eco-tourism.
- Design and build tourist infrastructure that will protect natural habitat.
- Use the pilot to demonstrate how to manage other such areas in Morocco.

B3. Outputs

- Employment for hundreds of local residents as guides, guards, and drivers through development of tourist facilities and park services.
- Substitution of an economic activity less harmful than grazing, which will be prohibited.
- Restoration of wild areas which have supported animal herds and rare migratory birds from Europe.
- An eco-tourism attraction which will also improve the occupancy of an existing tourist center in nearby Agadir.
- A source of income by collecting user fees from park visitors and creating private management to promote and attract eco-tourists who will pay for preservation of the natural ecosystem.

B4. Project Description

The pilot project would involve the creation of an eco-tourism infrastructure for the Souss-Massa National Park in the Agadir region in order to promote visits by tourist groups with minimum adverse impact on the protected environment of the park. Eco-tourism would provide local employment, stimulate environmental awareness in the region, provide income to help the park carry out environmentally significant projects, and promote the tourist industry in Agadir. It could also serve as a pilot for preserving other parks and ecological areas without budgeting state funds.

The project calls for the engagement of a private company with experience in eco-tourism. This company, in cooperation with the Direction des Eaux et Forêts, would draw up plans for creating physical and human infrastructures necessary to develop tourism in the park without negatively affecting its environment. The company would also prepare plans for park management and publicity campaigns.

The infrastructure required for eco-tourism would include tourist information centers, access roads, nature trails, observation platforms, and rest facilities built within the park. Setting up of animal transport stations (horse, camel, donkey) would also be part of the park infrastructure.

The human component would comprise the hiring and training of specialized park personnel including tourist guides, biologists, park guards, and maintenance and supervising personnel. Hiring should be from communities adjacent to the park.

Tourists who will visit the park are expected to come from two major groups: eco-tourists, drawn from a relatively limited but rapidly increasing pool of travelers with keen and sometimes specific interest in the environment (such as bird watchers), and other tourists visiting Agadir.

Accommodation and transportation (both vehicle and animal) would be provided by established tourist agencies. The eco-tourist groups would be accommodated in existing hotel facilities, limited facilities to be built adjacent to the park, or existing private enclaves within the park.

B4a. Environmental Justification

The coastal Souss-Massa National Park was recently created to provide a unique habitat for threatened and endangered wildlife species (e.g., Moroccan bald ibis) and protect the unique argan (*Argania spinosa*) forests and euphorb flora.

The area of the park is about 76,000 ha, of which 33,800 ha is the national park proper. The rest is buffer zone.

Overall, about 275 species of birds, 35 species of mammals, 31 species of reptiles and amphibians, and 9 species of fish have been documented in the area. The reintroduction of gazelles to the park is already in progress.

Soil conservation programs and long-term study of semi-arid and coastal environments are other objectives of the park program.

The human population of the park and of the adjacent areas, with their traditional agricultural, animal husbandry and fishing activities, pose an acute problem to park development. Employment opportunities offered by eco-tourism would provide an economic alternative as well as environmental sensitization to a critical number of people.

Eco-tourism is a rapidly developing branch of the tourist industry which is characterized by low capital investment requirements and a high service personnel/tourist ratio. It provides a very progressive environmental image to the host country (e.g., Costa Rica).

B4b. Economic Justification for the Project

International tourism forms a very important part of the economy of Agadir and the surrounding region. This economic sector has suffered a decline. The average number of charter tourists arriving in Agadir at the top of the high season (January-March) of 1992 was 14,000 per month, considerably lower (27-40 percent) than the comparable figures for 1990 and 1989. (The 1991 figure was atypical because of the disastrous effect of the Gulf war on international tourism.) The average room occupancy rate for Agadir hotels was 43 percent in the high season (November-April) of 1992.

The Souss-Massa National Park could draw an estimated 1,000 new eco-tourists (e.g., bird watchers) to the area in the nesting season. These tourists are expected to pay repeated visits to the park during their stay while other tourists would be likely to make single visits.

The following seven major attraction sites of the park could serve as core itinerary for the initial eco-tourist program:

Souss River estuary: Major nesting area of flamingos, cormorants, spoonbills etc.

Argan groves: Unique olivaceous ecosystem in northern region of park

Tifnit: Picturesque fishing village, beach

Sidi R'Bat: Scenic coast line, cliff dwellings, beach

Massa River estuary: Major nesting area of migratory birds

Sidi Bou El Fedail: Picturesque agro/animal raising community, bald ibis habitat

Europhorb stands: Unique desert cactaceous ecosystem in southern areas of park

Important eco-themes would also be demonstrations of desertification due to overgrazing and sand dune migration; dune stabilization through eucalyptus plantation and branch coverage; habitat change due to reversing sea water/fresh water inversion etc.

Eco-tourism would operate throughout the year. Incidentally, the peak tourist season, December-March, coincides with the winter nesting season in the park.

B5. Inputs

Cost Estimate

Expenses

Planning	\$ 50,000	
Infrastructure (2 platforms)	\$ 50,000	
2 reception centers	\$200,000	
5 washroom facilities	\$ 25,000	
trail improvement (25 km)	\$215,000	
fencing (5 km)	\$ 10,000	
Subtotal		\$550,000
Overseas Training (3 persons, 1 month in the U.S., Costa Rica)		
fare	\$ 12,000	
expense	\$ 13,000	
local guides (10) training	\$ 25,000	
Subtotal		\$ 50,000
TOTAL		\$600,000

Revenue to the Park

The park's potential attendance in the high season is estimated as follows:

Average number of tourist parties visiting the park per day	10
Number of tourists per party	15
Total average number of organized tourists per day	150
Total number of organized visitors per month (30 days)	4,500
Individual tourists arriving in their vehicles/month	1,000
Assumed entrance fee to the park	\$ 10

Eco-tourism income for the Park entrance per year \$390,000

(assuming 5,500 visitors per month in the high season, and 2,500 visitors per month in the low season [(5,500 x 3 + 2,500 x 9) visitors x \$10])

An alternative approach to estimating the number of park visitors is as follows (high season):

Number of visits by eco-tourists to the park (1,000 eco-tourists/month - 3 visits/stay)	3,000
Number of regular organized tourists (14,000 visitors to Agadir per month, of which 10 percent visit the park)	1,400
Number of individual tourists (Moroccan) arriving in their own vehicles per month	1,000
TOTAL	5,400

B6. Private Sector Justification: Eco-tourism at Souss-Massa

The eco-tourism niche is composed of market segments in several countries. A special network of communications capability is needed to reach eco-tourists. Advertising has been increasing the size of this niche.

Agadir already has a highly developed private tourist industry, so capital facilities will be minimal if these sources are tapped.

User fees can be charged, making loans possible to the private sector. The charges also make money available for Eaux et Forêts to play an appropriate supervisory role in the protection of wildlife. Income from the park's attractions will justify private investment in the area. A \$600,000 training and infrastructure package by a donor or lender will be returned by collecting an annual admission fee of close to \$400,000, less minor operating costs. This catalytic investment will encourage the private sector to protect and develop the area.

C. An Environmental Loan Fund

C1. Background

At least two financing options for implementing pilot projects use funds available under the EMP: local agency contracting and a national environmental development fund. Local agency contracting is a conventional means of project implementation in which funds pass from the World Bank to the Ministry of Finance and on to local agencies, under the supervision and coordination of DGUATE (or its future equivalent). Local agencies, which have the power to levy user fees and taxes, would be responsible for raising the money to repay at least part of these loans. Local agencies would issue RFPs for these projects using World Bank guidelines, and would contract with private companies to carry out the projects.

The second option, creation of a national environmental development fund (NEDF), would be modeled on private sector energy development funds which have been implemented in various countries. Funds would pass from the World Bank to a Moroccan development finance institution (DFI) such as the BMDE, under the supervision and coordination of DGUATE (or its future equivalent). These funds would then be available for on-lending to private sector companies that wish to implement qualified environmental projects. The NEDF could also include a provision for cost-sharing of feasibility studies up to a certain amount.

Advantages of local agency contracting include familiarity and relative ease of implementation. Advantages of NEDF, on the other hand, include:

- Flexibility in the scope of projects it would support, e.g., projects could be generated by local agencies, the national government, or the private sector;

- Flexibility in its ability to continue in an expanded role for environmental project finance after the government has adopted environmental standards; and
- NEDF requirements for developers to carry equity in the projects would create additional incentives for successful project completion and operation.

NEDF could accommodate many project finance variants associated with private power projects, such as build-own-operate (BOO), or build-own-transfer (BOT). For example, a private project developer could approach a local agency (either solicited or unsolicited) and offer to build a wastewater treatment plant. The local agency could pay for this through user fees such as for sewage connection. The developer and the local agency would agree on a price for a given quantity of water treated. This agreement could include elements such as take-or-pay elements to protect the developer, and penalty clauses which would be invoked if the developer failed to provide the agreed level of treatment. Under a BOT arrangement, the ownership of the treatment plant would revert to the local agency after an agreed period of time.

On the basis of this contract, the developer could approach NEDF for debt financing. Under guidelines to be formulated by NEDF, the developer would be expected to carry a certain amount of equity finance to give a developer an at-risk stake in the completion and successful operation of the project.

The NEDF appears to be a useful idea and its formation will be the third pilot project for which the World Bank will seek donor support. Based on interviews with 43 environmental private sector firms, over one-half cited financing as a barrier to their plans for environmental business expansion. In interviews with polluters and engineers who could help them, the issue of financing investments in pollution control arose repeatedly. Moroccan banks are not familiar with loans that bring benefits to the public, but not revenue benefits to the borrower. When the firms surveyed were asked what would most help their businesses, again about one-half answered "financing."

C2. Objectives

- Provide loans to encourage investment for corrective and protective environmental measures, which cannot be found in the commercial lending sector but have major public benefits.
- Assure the donor that funds are efficiently managed according to good banking practices and the money is reimbursed for replenishing a revolving fund.
- Assure that the donor funds earmarked for specific projects are applied to those projects.
- Attract applications for loans at concessionary rates which reflect public benefits, even if there is no revenue produced or saved for the applicant.

- Use private capital to create a multiplier on donor money, thus leveraging public money rather than making additional demands on the public debt.

C3. Project Description

C3a. Sources of Funds (Official)

Donors will establish a revolving fund to support the pilot projects that illustrate the principles of environmental management and solve immediate problems.

The donors will be invited to place money in this fund, either with commitments to specific projects or to environmental loans that meet established criteria.

As loans are repaid, they shall be returned to the general fund for future use.

Additional sources of funds will be accepted as long as objectives and lending policies satisfy the board of directors. For example, if a consortium of commercial banks or their foundations wished to lend or pay into the fund on attractive terms, the board would be authorized to accept such contributions.

It is also possible that various national environmental fees, such as user charges for discharges to the environment, pollution taxes, fines, and other revenues, could be directed to this fund. At the outset, however, the fund will be donor serviced.

C3b. Lending Policies (Parallel Financing)

The policies will be guided by bank rules for co-financing, applying parallel financing principles in which the bank may administer all or part of the co-financing, but the donors and the bank retain flexibility (see Operational Manual Statement No. 1.24 August 1977).

There will be a hierarchy of charges for loans, depending on the beneficiary. In cases where the applicant achieves offsetting savings through pollution control investments or process changes, the charges will be equal to commercial rates and the applicant will be sent to commercial sources for a loan. In cases where the borrower receives no benefits, but public economic, social and environmental reasons exist to support a loan, donor funds will be used to reduce the risk to the NEDF. In the case of severe economic disruption caused by requirements for complying with control standards—that is, genuine hardship cases with negative public impacts—the NEDF will consider longer payment terms and may loan for the purposes of technical assistance. If a business is marginal and cannot exist without subsidy for pollution control, the NEDF may deny the application. The NEDF may be concessionary with reference to rates and time, but it will not sustain marginal businesses whose fiscal health is precarious.

The source of the funds may be a donor grant administered by the NEDF, but the "polluter pays" principle applies. Under this principle, reimbursement is required. The revolving feature and public benefits derived justify the use of grant funds as a source of

loans to be repaid. The NEDF does not reward polluters. They must repay loans. The fund is designed to achieve public environmental benefits, taking into account the realities of each situation.

For example, public benefits that will account for concessionary rates include achieving the benefits implied in satisfying regulations, as well as explicit values such as protecting public health, making sustainable development possible, reducing natural resource risks, and other building blocks shown in Figure 4.1. To the extent that no benefits accrue to the private company other than staying in business (indeed there are negative costs that are difficult to pass on to the consumer), public benefits can offset the cost of the loan to the polluting party. For example, the nominal interest rate for commercial loans is 14 percent. Where there is no revenue gain to the company, and the public benefits are very high, the interest rate might decrease as illustrated in Figure 4.1. The fund can also give a grace period until the first payment based on cash flow projections is economically reasonable. In sum, for a non-productive loan with no revenue value to the company, interest charges are offset by public benefits. In the figure, the polluter pay scale is set by varying interest charges and a grace period. The greater the public benefits, the lower the base rate and the higher the reduction of the rate.

Figure 4.1
Defining Fairness in Environmental Lending Policy

Credit Points Based on Public Interest Benefits	Commercial Rates Based on Credit and Project Risk
Reduced health risk to local population	14% - 1%
Less cost for water treatment by down stream users	13% - 1%
Avoidance of unemployment	12% - 2%
Natural resource protection	10% - 3%
	net 7% if no other payback

Such lending policies and "offsetting point systems" will be reviewed annually by the directors of the bank, including the senior operating officer of Morocco's highest level environmental management institution as chairman of the board; two commercial bankers from major lending institutions in Morocco; two industrial representatives; two representatives from two technical ministries; and the donors who have contributed initially to the NEDF. The board shall have the right to expand its membership or limit the tenure of any member at an annual meeting. The minister of finance shall review the composition of the board every three years and propose changes at the next official board meeting.

The recipient of a loan shall come from the private or public sectors, although the ratio of private/public borrowings shall favor the private sector.

The NEDF shall require collateral; its quality will also influence the borrowing charges.

The NEDF shall not have a bad loan rate greater than the national banking average for three successive years. If this standard is not met, the board will take necessary actions to improve lending policies and augment revolving funds.

C3c. Procedures

The NEDF shall include technical staff or consultants who are aware of the state-of-the-art of process equipment and pollution control devices. Their signature is necessary on a loan if the loan applicant has not already retained certified and qualified engineering services. Where the technical group requests an environmental audit as a condition of a loan, the applicant will be required to comply, but the cost of the audit can be included in the loan.

The NEDF shall also certify to local tax authorities that it is granting a loan to an applicant who may request abatement of water and sewer taxes during the planning and construction period, if municipal services are not being supplied.

The NEDF shall charge administrative fees, to be paid from donor funds, to cover the expenses of its operations after the initial year of organization. Administrative charges shall be limited to the mean administrative costs of five commercial banks of similar size.

The NEDF shall hire executives with experience in the private banking community and hold them to professional standards.

An annual report shall be published concerning the NEDF's financial status and its loans. The report will also address the issues raised by operations as they apply to evaluating the lending policies and procedures governing the fund.

After 10 years of activities, or sooner if commercial lenders change their policies in favor of environmental loans, the minister of finance will have the right to sell the NEDF to commercial banks, should there be a satisfactory buyer.

C3d. Legal Status

In cooperation with the minister of finance, the legal status of the NEDF will be defined to receive and dispense funds with the controls appropriate to the objectives of the NEDF.

C3e. Bibliography

International Herald Tribune, "An Important Sideline to Privatization in Eastern Germany: Environmental Cleanup," July 7, 1992.

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Schmidheiny, S., *Changing Course: A Global Perspective on Development and the Environment*, MIT Press, Cambridge, Massachusetts, 1992.

La Vie Economique, "GEM: Il est possible d'économiser 2,5 million de dollars par an!", May 22, 1992, Rabat, Morocco.

C3e(1). Private Sector Justification—The NEDF

Donors interested in encouraging the liberalization of the Moroccan economy need a mechanism to transfer funds to the private sector with both flexibility and control. The NEDF is designed to do that.

C3f. Inputs

An initial capital infusion of \$20 million is requested for the NEDF to fund the two pilots described in this report and other environmental projects worthy of review. The fund would be revolving so that it would have multiple impacts over time and also stimulate the formation of private capital.

This section has described three projects for donor funding that illustrate major principles of environmental management in waste avoidance, control, treatment, and financing. They recognize the value choices that are part of technology selection. These principles are highlighted with the hands-on experience of solving pollution problems selected from the initial list of national pollution problems. In each case the private sector discussed in this report is called upon to solve the problem, after the local, provincial, and national governments have indicated the direction to take.

A major feature of the approach to these pilot projects is the technical assistance provided to inform industry and government of the choices available. In each location, there is a local group of government and industry representatives (in Safi, the Governor's Committee; in Souss-Massa, an international design competition with the local population a target of the design effort; in the NEDF, a bank board of directors responsible for local input).

These local inputs are harmonized with national minimum standards and conditions to avoid competition among regions. The process of environmental management is obliged to deal with a broad range of acceptance to assure compliance with the goals of pollution prevention and the protection of natural resources.

SECTION V

**RECOMMENDATIONS FOR A PRIVATE SECTOR COMPONENT IN
THE ENVIRONMENTAL MANAGEMENT PLAN**

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IN THE ENVIRONMENTAL MANAGEMENT PLAN

Several actors in coordination with each other can implement the recommendations of this report. The bank will discuss the recommendations with the GOM, seeking funding from donors to implement them, and provide technical assistance to augment the skills needed. These steps will facilitate the enlisting of the private sector in its role in implementing resource preservation, pollution prevention, and environmental clean up.

A. The Donor Community in Coordination with the World Bank

A1. Provide assistance in setting norms for pollution control and natural resource preservation, without which the private sector will have no targets or timetables to accomplish the environmental objectives set by the GOM. The norms are quantitative expressions of value judgments about health, risk, aesthetics, and a range of human values. The values chosen are Moroccan; foreign norms do not necessarily apply. Using the pilot project in Safi, show how local norms and national norms complement each other while reflecting Moroccan cultural settings.

A2. Expand the initial list of Moroccan companies in the survey to include descriptions of the remaining companies in the sector. Keep the list in a location where potential clients can have easy access to it.

A3. When the Environmental Loan Fund is completed, probably in the summer of 1993, examine the projects then available and consider earmarking grants or loaning concessionary funds for use in pollution prevention, control, or natural resource preservation.

A4. Sponsor a tour for Moroccan businessmen in the environmental sector (or those planning to invest in the sector) to visit pollution control manufacturers in the donors' home countries. Or sponsor a trade fair in Casablanca to match companies and equipment with Moroccan environmental needs, with particular focus on clean technology solutions.

A5. Sponsor an international design competition for the development of eco-tourism in the Souss-Massa National Park.

B. The Private Sector

A few companies interviewed in Morocco expressed an interest in an American partner. Usually these firms employ English-speaking, American-educated engineers who are optimistic about their future. They have standards of performance which are difficult to meet in Morocco for lack of technical information and relationships. They need technical support

and some limited capital to position themselves now before the market expands and while market share can still be developed at a relatively low cost.

The costs of being first into the marketplace—that is, the investment needed to sustain the company and identify its potential clients—has been paid in most cases, especially in services, but to some extent in equipment. With expectations of some cash flow within a year, expansion of business volume in two to three years, and profitability very early in this process, Morocco makes an attractive center for the local and the Maghreb market. This is especially true in the municipal and industrial water pollution areas.

Therefore Casablanca and Rabat, Morocco, and the companies listed in the USAID/PRIDE databank should be visited relevant to a business relationship during spring 1993, before new environmental laws are passed, after which these companies will have already made commitments.

C. Government of Morocco

These recommendations are recapitulated from the early chapters of this report (the original statement can be found at the section and paragraph number in parentheses).

C1. Apply a mix of command and control (3.1), pollution prevention through clean technologies and market-based (3.2) control instruments and timing, to diminish the negative economic effects of pollution control and take advantage of positive economic opportunities.

C2. Develop financial instruments, such as an environmental fund (4.3) to facilitate paying for pollution control and its prevention.

C3. Define the boundaries of regulatory bodies to coincide with the environmental targets chosen (3.4).

C4. Develop feasible regulations which take into account levels of pollution, accessibility to preventive and control technologies, timing, and economic impact (3.5). Generally this means not copying international standards. Morocco defines its own future according to its own values and the process of selecting standards requires rethinking them from the start.

C5. Regulations, at whatever level they are set, should be both enforceable and enforced as well as flexible (3.6, 3.7).

C6. The private sector, whether polluter or source of solutions, can be enlisted for positive gains. The sector's ability to make a positive contribution will be enhanced by:

- Establishing clear environmental norms.

- **Calling on the the private sector for different functions of environmental management, both to help clean up and to help develop an export industry to work in developing countries.**
- **Supporting training seminars to discuss solutions that are common to plants in priority industries.**
- **Employing the private sector in enforcement and technical support to municipalities.**
- **Examining systematically the risks of pollution in evaluating the privatization of selected industries.**
- **Providing assistance to promote compliance with an environmental fund.**
- **Creating user fees that reflect the full economic value of the resource, e.g. water rates reflecting costs of replacement.**
- **Monitoring and participating in the three pilot projects that illustrate how the private sector can help with environmental management tasks.**

APPENDIX A

BACKGROUND, CURRENT SITUATION, AND FUTURE PROSPECTS

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BACKGROUND, CURRENT SITUATION, AND FUTURE PROSPECTS

The sustained growth of the Moroccan economy, especially its industry, and the rapid growth of its population, accompanied by accelerated urbanization, are straining the country's environment. Evidence of serious environmental problems is increasing. If not confronted now, these problems will soon have substantial impacts on public health and the economy.

The Swedish Group of SWEEP/Scandiconsult is responsible for an in-depth characterization of the environmental problems in Morocco. This appendix provides only enough detail to focus our attention on the major problem areas.

A. Depletion of Water Resources

Water resources are limited in Morocco. The average annual precipitation is 150 billion m³ varying from 50 to 400 m³, depending on the year. Most of this precipitation evapotranspires, evaporates, or flows into the sea. Only 30 billion m³ is considered a renewable water resource. Of this total, 22.5 billion m³ is surface water, while 7.5 billion m³ is groundwater.

To improve the utilization of these limited resources, there has been a steady construction of retention dams and reservoirs on the major rivers during the last 30 years. More than 60 dams allow the utilization of 7.5 billion m³ of surface water and 3 billion m³ of groundwater. Additional dams and reservoirs are in the planning stages.

The seven major river basins are Moulouya, Sebou, Bou-Regreg-Mellah, Oum Er Rbia, Tensift, Souss-Massa and Loukkos-Mart. The seasonal distribution of water flow in these rivers is very unfavorable. From 60 to 90 percent of the water runs off during the rainy season while during the dry season the flow in some of the rivers drops to almost nil.

Irrigation of agricultural lands is the major use of water resources, currently accounting for 90 percent of the total water demand. Further expansion of irrigated lands will be possible only by controlling new resources.

Industry uses only 8 percent of the water resources. However, this sector is expected to increase faster than other sectors of the economy and its demand on water resources will accelerate.

Urban consumption makes up 1.5 percent of the water demand. Urban demand is also expected to rise, due to the rapidly increasing urbanization and the expected improvements in sanitary conditions in the cities. Current forecasts point to several regions,

specifically Casablanca, Rabat, and the Oum-Er-Rbia basin, that will suffer from water deficits by the year 2010.

However, the current resources are threatened by the silting up of the reservoirs due to land erosion in the watershed area which reduces the water retention capacity of dams. The estimated loss of water storage capacity due to silting is 0.5 percent per year.

The long-range planners would alleviate the depletion of current water resources by developing new resources through the construction of additional dams, reservoirs, and water transfer installations. However, the enormous capital cost of such construction and the expected negative effects of additional reservoirs on other areas of the environment renders this solution less and less attractive.

A1. Degradation of Water Quality

The degradation of the quality of water in major river basins, especially the Sebou, Oum-Er-Rbia, and Moulouya basins, which are very industrialized and populated, is of increasing concern. The major cause of water pollution in most basins is pesticide and artificial fertilizer run-off, mainly from irrigated lands. In some areas (Tadla) the nitrate content of the groundwater is above the allowable maximum (50 mg/l) considered safe in other countries.

The discharge of untreated industrial wastes and raw municipal sewage into the rivers is another major source of water pollution. Exact data on the different industrial sources are not available at present. However, an earlier study on the Sebou watershed system indicated that most organic contaminants are released by the agro/food industry (sugar refineries, and oil and canning plants) while specific toxic pollutants originate from pulp/paper and tanning plants and road surfacing activities.

With the exception of Nador (population, 600,000) and parts of a few other cities, all municipal sewage is discharged untreated into the nearby waterways or the sea. An infrastructure of wastewater treatment plants is unfortunately lacking.

The pollution of coastal waters by polluted rivers and untreated sewage from coastal cities and industrial plants located in the coastal regions is a very serious problem, which is damaging the fishing and tourist industries.

A1a. Air Pollution

Air pollution is officially not considered a high-priority environmental problem in Morocco, except in the two largest cities, Casablanca and Rabat, where it has already reached dangerous levels. This is due mainly to exhaust from vehicles, electricity generation, and some industrial plants. Based on air quality standards established in many countries, the CO content of air exceeded the maximum permissible level (9 ppm/8 hrs) in more than 50 percent of the measured cases in Casablanca, while the NO content of the air was above the maximum permissible value 40 percent of the time.

There are also localized industrial sources of air pollution such as thermal electric generation stations in various areas of the country, while oil refineries and chemical industries, other significant sources of air pollution, are located mostly in the Casablanca-Mohammedia corridor.

With a total population in the Casablanca-Mohammedia-Rabat corridor of over 3 million, the problem of air pollution cannot be disregarded. Yet the magnitude of the problem relative to the resources available to solve it becomes a barrier to the conception of solutions.

A1b. Solid Waste Disposal

Striking evidence of haphazardly discarded solid waste is visible in most populated areas, city streets, roadsides, and beaches. The rapid urbanization of the population, the increasing consumption of prepackaged consumer items and the prevalence of non-biodegradable plastic wrappings has rendered traditional collection and disposal of household garbage impractical, unsightly, and potentially hazardous to health.

Traditionally, garbage from households and commercial establishments has been deposited in open reusable containers or disposable cardboard boxes on the sidewalks. A curbside preselection of reusable and/or recyclable items (i.e. the removal of glass and plastic bottles, metals, magazines, etc.) reduces the volume of garbage and also enriches its green organic content and consequently increases its water content. The collected garbage is then deposited without further treatment or recycling in poorly selected, unmanaged landfill sites, usually located within city perimeters near riverbanks. The landfills are not covered by earth; hence, uncontrolled fires, airborne pollution, and wash-offs during the rainy season are common.

The introduction of mechanized garbage collection techniques in some areas of Casablanca created problems also. The covered plastic containers were inadequate and the compaction of garbage of higher moisture content than that common in Western countries resulted in unsanitary, unsightly drippings from the compactor trucks.

Thermal electric generating stations located in the coastal regions dispose coal ash and cinder into the sea, which is very detrimental to fish in the region.

A1c. Hazardous Waste

The single largest problem is the accumulation of unused, dated, and highly toxic pesticides in certain areas of the country. The quantity is estimated at 5,000 t to 10,000 t, which is potentially a very serious issue requiring urgent solution.

Some industries (e.g., pulp and paper, oil refineries) generate toxic wastes on a limited but steady basis. These materials also require safe disposal.

With further industrialization, the problem of toxic wastes will become more acute; prevention strategies are needed now. In some cases, as with solvents from more modern paint manufacturers in Casablanca, the problem is addressed collectively by sharing a company incinerator. Also in the CASA region, waste oils are recycled. The industrial concentration in Casablanca makes these solutions possible, but safe destruction of hazardous wastes is not practiced nationwide.

In the future, cleanups of accidental spills and treatment of industrial wastewaters are expected to generate toxic residues (e.g., contaminated soil or tannery sludge) which have to be disposed of in an environmentally safe manner. Once regulatory control over such wastes is instituted, the problem of ultimate disposal of these newly collected and concentrated materials will become particularly acute. It will do little good to collect and treat wastes if the concentrated residues find their way back to the water table or rivers.

At this time, no landfill site in Morocco is dedicated to or suitable for toxic wastes.

A1d. Loss of Land Resources

In addition to the classic environmental problems of water, air and soil pollution, Morocco faces major land management problems resulting from its specific geographical location and climate. Overgrazing of pastoral lands and extensive deforestation lead to desertification and soil erosion in many parts of the country. These processes are not only reducing the land area available for agriculture, pasture, and forestry, and hence, seriously affecting the country's future economic growth, but also leading to sedimentation of dams which reduces precious water resources available for the rest of the national economy.

A1e. Summary of Environmental Problems

Table A1 provides a list of Morocco's industries with the highest pollution potential. The data were selected from numerous GOM sources, especially the "1988 Report of the High Council of Water." The number of plants involved, their locations, and their rates of production in 1989 are also given.

The major environmental problems facing the Moroccan economy are listed below, not necessarily in order of importance.

Pollutant

Source of pollution

Pollution of surface waters

nitrates
biomass

fertilizer run-offs
sugar refineries, oil mills,
canneries, textile mills, tanneries
and municipal effluent

toxic organics
heavy metals
organic toxins

pulp & paper plants, textile plants
tanneries, textile plants
pulp & paper mills, tanneries

Pollution of ground water
nitrates

excess fertilizer

Pollution of coastal water
phosphates
cinder
toxic organics

ore handling, acid plant
electric generating stations
oil refineries

Pollution of air
NO
CO
lead
dust
odors

motor vehicles
motor vehicles
motor vehicles
cement plants
canneries, tanneries

Solid waste
Hazardous waste
Deforestation
Desertification
Silting of dams

municipalities, industries
pesticides
overexploitation of forests
overgrazing
land erosion caused by overgrazing
and deforestation

A2. Remedial Actions Required

The primary principle of environmental control is source elimination or reduction, i.e. avoiding the generation of pollution at the points of origin. This can be achieved by improving process technologies, employing better materials (improved packaging), and reusing and recycling waste products. If for technological or economic reasons these measures do not apply, remedial actions are required to protect the environment.

The following table lists general remedial processes applicable to the environmental problems encountered in Morocco. The underlined "Possible Solutions" have significant potential for private sector business in the experience of the consulting team.

<u>Problem Area</u>	<u>Possible Solution</u>
Surface Water	<u>Water purification plants (intake)</u> <u>Water treatment facilities (industrial and municipal effluents)</u>
Ground Water	Controlled use of fertilizer, pesticides

Coastal Water	<u>Water treatment facilities (industrial and municipal outlets)</u> <u>Landfills for solids</u>
Air	<u>Vehicle emission control</u> <u>Unleaded gasoline</u> <u>Industrial emission control</u>
Soil	<u>Upgraded municipal garbage collection</u> <u>Controlled landfill sites</u> <u>Municipal incinerators</u>
Hazardous Waste	<u>Toxic material incinerators</u> <u>Toxic material landfill sites</u>
Deforestation	<u>Controlled logging</u> <u>Reforestation</u>
Desertification	<u>Controlled grazing</u> <u>Reforestation</u>
Silting of dams	<u>Terracing</u> <u>Reforestation</u> <u>Dredging</u>

Table A.1
Moroccan Industries With the Highest Pollution Potential

Industry	Plants	Location	Production (1989)
Thermal Power Generating Plants	7	Mohammedia Kenitra Jerada Casablanca Tanger Agadir Tetouan	3,147 GWhrs 1,712 751 521 102 99 84
Oil Refineries	2	Mohammedia Sidi Kacem	3,743,000 t/year 1,273,000
Phosphate Plants	4	Safi	741,000 t/year
Cement Plants	8	Oujda Casablanca Skhirate-Temara Meknes Marrakech Agadir Tanger Tetouan	1,400,000 t/year 1,200,000 625,000 620,000 450,000 450,000 220,000 220,000
Sugar Mills (beets)	9	Sidi Bennour Khemis Zemamra Oulad Ayad Ksar El Kebir Beni Mellal Mechra Bel Ksiri Sidi Allal Tazi Souk Es Sebt Sidi Slimane	60,000 t/year 60,000 48,000 39,000 39,000 36,000 32,000 29,000 31,000
(cane)	3	Mechra Bel Ksiri Dar Guedarri Larache	94,000 34,000 29,000
(beet/cane)	1	Zaio	6,000
Refineries	2	Casablanca Tetouan	364,000 21,000
Dairies	19	Casablanca (4) Marrakech Kenitra El Jadida Oujda Fquih B. Salah Fes Agadir Tetouan 6 others	572,000 l/day 140,000 140,000 110,000 70,000 60,000 60,000 50,000 45,000 400,000

Industry	Plants	Location	Production (1989)
Oil Mills	72	Fes Region	154,000 t/year
	29	Meknes Region	54,000
	25	Marrakesh Region	102,000
	8	Sidi Kacem	10,000
	7	Essaouira	12,000
	28	Others	63,000
Refineries	14	Casablanca(5)	196,000
		Meknes	33,000
		Kenitra	18,000
		Fes(2)	24,000
		Agadir	20,000
		Oujda	20,000
		Marrakach	6,000
		Beni Mellal	6,000
Tanneries	20	Fes	90,000,000 ft ² /y
	17	Casablanca	(53,000 t/y)
	4	Marrakech	in 59 plants
	4	Meknes	
	3	Tanger	
	2	Safi	
	2	Sidi Kacem	
	1	Beni Mellal	
	1	Kelaa Seraghue	
	1	Kenitra	
	1	Larache	
	1	Settat	
	1	Tetouan	
Canneries	25	Safi	90,000 t/year
	16	Agadir	in 67 plants
	7	Casablanca	
	5	Essaouira	
	4	Al Hoceima	
	3	Nador	
	2	Oujda	
	2	Tanger	
	2	Larache	
	1	El Jadida	
	1	Kenitra	
Pulp Mills	1	Kenitra	
Paper Mills	3	Casablanca	
	2	Fes	
	2	Meknes	
	1	Kenitra	
	1	Tanger	
	1	Tetouan	

Industry	Plants	Location	Production (1989)		
Mines	Phosphate	4	Youssoufia	12,126,000 t/y	
			Khouribga	3,126,000	
			Boucraa	1,864,000	
			Ben Guerir	1,591,000	
		Iron	1	Nador	126,000
	Copper	3	Ouarzazate	34,000	
			Taroudr	5,000	
	Lead	4	Marra	2,600	
			Oujda	73,000	
			Khenifra	13,000	
			Anti Atlas	1,000	
	Zinc	2	Tafilalt	3,000	
			Tafilalt	9,000	
			Khenifra	5,000	
Manganese	1	Ouarzazate	32,000		
Silver	2	Ouarzazate	119,000		
		Zellidja	32,000		
Fluorine	1	Khemisset	105,000		

A3. The Current Environmental Management Response

Environmental management activities are currently underway on three levels to address these problems and initiate remedial actions: the national government, local governments, and the private sector. At least two nongovernmental organizations operate in the environmental area, l'Association pour le Droit et l'Environnement and l'Association Marocaine pour la Protection de l'Environnement. They are relatively small organizations which have not yet made a significant impact, but plan to expand.

A3a. National Government Activities

The importance of environmental preservation is not a new concept in Morocco. Several laws issued between 1914 and 1926 in effect stipulate a zero-discharge policy toward water effluents, primarily to protect fisheries and public health. However, little if any effort has been made to enforce these laws, or even to create the institutions that would be necessary to do so. A zero-discharge law, in any case, is unenforceable and undesirable from an economic point of view. Instead, the government recognizes that a new set of environmental standards or incentives is required at the national level.

There is consensus within both the government and private sector that the adoption of new environmental standards is imminent, probably within the next two years. To prepare a foundation for these standards, the following activities are underway:

- The creation of a national environmental laboratory and a national environmental documentation center at l'Ecole Mohammedia d'Ingénieurs in Agdal, financed by GTZ; and

- The formulation of a national environmental strategy financed by UNDP, which will compile the necessary data and establish national environmental objectives.

Despite the lack of standards, other recent efforts have been made to encourage environmental protection. For example, Law 17-82 of the Industrial Code (first passed in 1983 and subsequently modified in 1988 and 1989), provides for:

- Duty-free importation and tax-free sale of materials or equipment which save water or energy, or preserve the environment; and
- Subsidies for the use of such technologies.

These exonerations and subsidies are recovered through proposals submitted to the Ministry of Industry. Few companies, though, seem to be aware of the benefits available under the industrial code, nor is the government responding rapidly to requests for exonerations.

Although considerable technical capabilities related to specific sectors are found in the ministries responsible for those sectors, the Ministry of Interior, through its *Directorat Général Urbain des Aménagements des Territoires et l'Environnement* (DGUATE), has assumed sole control of environmental policy at the national level (although the *Directorat des Collectivités Locales* is active in the area of municipal solid waste management). However, the *Conseil National de l'Environnement* (CNE), chaired by DGUATE, has been established to facilitate the design and implementation of the World Bank's Environmental Management Program (EMP), as well as broader environmental coordination.

A3b. Local Government Activities

Many environmental problems in Morocco have relatively localized impacts (e.g., the lack of solid waste or sewage treatment facilities generally affects only a well-defined urban area or coastal zone). Consequently, local governments have taken the lead in combatting environmental problems, as in these local initiatives described below:

- The city of El Jadida and the municipal authorities of Sidi Belyout (Casablanca) have initiated municipal solid waste management programs with private sector participation. Private companies bid for refuse collection and disposal contracts, which are paid for from garbage collection fees collected by the local municipality.
- The city of Mohammedia, which is surrounded by industry but also depends on tourism, has issued a request for proposals for assistance in formulating a municipal environmental strategy.
- The local industrial development agency in Marrakesh, *Etablissement Regional des Aménagements et Construction* (ERAC), has established environmental protection requirements for firms wishing to locate in the new Sidi Ghanem industrial park. Companies cannot store wastes on the premises; industries which may have

environmental impacts may have to undergo environmental review, in effect an environmental impact assessment. Furthermore, atmospheric emissions must be treated with the best available treatment technologies.

- Municipal authorities in Marrakesh also required a new housing development in the area to provide its own wastewater treatment.
- The cities of Nador, Khouribga, Kenitra, and Ouaouizerth (Beni Mellal province) have constructed and now operate municipal wastewater treatment facilities.
- The city of Tétouan, with assistance from USAID, has initiated an urban planning project to assess pollution and improve water quality in the city. The project includes components for technology selection, facility siting (e.g., landfills), and a sister city program with Raleigh, North Carolina, to share information and environmental strategies.

A3. Private Sector Activities

The absence of national environmental standards has muted private sector environmental activities. Nonetheless, certain industries have developed and implemented environmental strategies to improve their ability to sell their products internationally. For instance, the city of Safi depends heavily on the fishing industry. The cannery there must guarantee that all fish processing is conducted under European Community health standards to ensure access to that export market. This "better housekeeping" has resulted in an overall improvement in even the local environmental impacts of the cannery operation. Fruit and vegetable exports are subject to similar restrictions.

The private sector has also assisted environmental activities carried out at the local level. In fact, interviews conducted with current and potential environmental companies in Morocco reveal that the Moroccan private sector is well aware of environmental problems and has the capability and desire to address many of these problems. The major impediment to expanding their role, as discussed further below, is the lack of government regulations stipulating environmental protection.

B. External Influence on Environmental Problems

Morocco is very sensitive to the world around it for many good reasons. It is motivated to be accepted by the outside world partially from commercial considerations in which the country's image can mean sales lost or gained. Since Morocco is an agricultural country and a food exporter, a clean image is important to commercial success.

Moroccans have also "internalized" international quality of life values. Problems that years ago were considered inevitable nuisances are today viewed as unacceptable. Morocco has a middle class which accepts values that were once "foreign," including a desire for a pollution-free environment.

Morocco is also a player on the international scene. The Rio Conference results are very much in evidence in various forms: a written report; officials' references to conference discussions; a call to end ocean dumping by the foreign ministry; renewed efforts to pass environmental legislation stalled for the last five years; and concerns expressed over meeting standards for pollution control in trade with Europe.

In addition, the current project with USAID and the World Bank is not a small influence. Fruitful discussions have been held about options for managing the environment. Resistance to action at meetings was low. People were open to new ideas and the "how" questions predominated over "why" or "whether" questions.

The donor community is having a major impact by setting out the menu for choice. PNUD has a major technical presence, as do several other donors in the environmental area. The Belgians are doing environmental work in major ports, and will continue cooperating in a World Bank project reported later. The Germans have built a significant laboratory capability. The French have a variety of environmental programs, especially in the area of solid waste. The Spaniards are working on saving migratory bird sanctuaries.

Overseas companies in the modern private sector are sharing their toxic and hazardous waste incinerators with Moroccan companies.

Packaging standards in Germany have resulted in Morocco instituting a requirement to take back excess packaging shipped to Germany. Responses have included eliminating paper labels on sardine exports and using recyclable aluminum cans with painted labels. Another response has been planning for a new business to use the returned cardboard. Adoption of the principles of source reduction and recycling has been influenced by changes in European standards.

Even the CFC issue will soon be addressed. Morocco has a substantial cold chain for its agro-industry and the Montreal challenge is now being considered seriously.

Programs like METAP, which offer grants for Mediterranean pollution control, are being welcomed. The disappearance of fish and the threatened disappearance of tourists have caused people to realize that clean-up efforts are inevitable.

Generally, the overseas influence is pervasive and positive. One exception is the use of Morocco as the dumping ground for used tires from Europe, which have put local tire recappers out of business.

In sum, Morocco wants to neither escape this foreign influence, nor reject its message. The outside community has a willing audience which may drag its feet on timing issues or respond negatively to some ideas that on later reflection appear acceptable, but in normal Moroccan timeframes implement a series of environmental measures that will protect its natural resources from further degradation.

This message contains contradictions for the outsiders who are involved in a long-term strategy of looking at the developing world. Some foreign countries have preferred paying Morocco to accept the industries that are no longer allowed to pollute at home; other countries are willing to pay Morocco to clean up. Traditionally, it has been the less developed regions that accepted the polluting industries as their way of gaining goods until they could afford the quality of life that they sought. This kind of strategy drove private sector investment for years.

Today, this strategy for locating business has changed because many decision makers recognize the limits of the planet. If CFCs are used in Morocco, tourists will not only stop coming to Morocco to sunbathe, but wealthy Moroccans will develop skin cancers. As planetary limits become more evident in the form of greenhouse gases, destruction of protein sources from the sea, and degraded lands, the temptation to transfer pollution to the developing world is mitigated by the realization that the air and the oceans make us all neighbors.

Indeed, Moroccan efforts to clean up, especially if they focus on water problems in the domestic environment, will create an international skilled labor pool for future Third World markets. Moroccan comparative advantage will not be in sending manual laborers abroad as it is today, but in selling its engineering and water expertise developed by solving its domestic problems. The Maghreb will provide the next market for export of Moroccan expertise.

Morocco thus becomes an attractive joint venture partner for firms seeking to capture world environmental markets. Morocco can become a low-cost supplier of environmental goods and services if it takes the lead now to solve its domestic problems and build exportable solutions.

APPENDIX B

ORIGINAL REPORT ON THE SURVEY OF 43 COMPANIES

12

RAPPORT

L'enquête qui nous a été confiée portant sur "*l'évaluation de la capacité d'intervention du privé dans le secteur de l'environnement*", comporte deux phases chronologiques :

I- INVESTIGATIONS ET DETERMINATION DE LA CIBLE

Il s'agissait à ce niveau de procéder à la constitution de l'échantillon. A défaut d'une base de données sur le secteur, la recherche a été menée sur la base des activités identifiées dans le questionnaire, complétée grâce aux informations recueillies auprès des professionnels et experts.

Le présent Rapport porte sur quarante enquêtes :

II- EXECUTION DE L'ENQUETE ET RESULTATS

2.1- Exécution

L'exécution de l'enquête a été réalisée par des lauréats de l'I.S.C.A.E rodés à l'approche marketing et choisis en fonction de leurs performances confirmées.

Une supervision permanente est assurée par Monsieur M. EL BAZE, de manière à discuter de toutes sortes d'observations et régler tous problèmes liés à l'exécution du questionnaire et au déroulement des enquêtes.

2.2- Résultats

L'Exploitation s'est orientée sur les aspects suivants :

1- APPRECIATION GLOBALE DU SECTEUR

- Sa croissance (Q 28)
- Ses problèmes majeurs (Q 24)
- Possibilités de réglementation (Q 29)

2- APPRECIATION DES ENTRAVES

- Conditions de développement (Q 21)

3- APPRECIATION DE L'ENGAGEMENT DES OPERATEURS DANS LE SECTEUR

- Pour préciser si leur engagement est effectif (Q 25)
- Définir les domaines dans lesquels ils veulent investir (Q 20)

4- APPRECIATION DES BLOCAGES PROPRES AUX OPERATEURS

- (Q 22)

5- APPRECIATION DES MESURES D'IMPULSION PROPRE AUX OPERATEURS

- (Q 23)

6- APPRECIATION DE L'OPPORTUNITE D'UNE PUBLICATION

- Au niveau du contenu (Q 30)
- Au niveau du prix (Q 31)

L'analyse de la distribution des opérateurs économiques enquêtés par rapports à ces questions, permet de tirer les conclusions suivantes :

1- Appréciation du secteur

D'une manière générale, le secteur de l'environnement est considéré par la quasi totalité des opérateurs (32 opérateurs parmi les 39 qui se sont exprimés) comme un secteur en croissance au Maroc.

Dans ce secteur, on estime que les trois problèmes majeurs auxquels le Maroc aura à faire face concernent :

- La pollution atmosphérique (24 d)
- La pollution des eaux de surface (24 a)
- La pollution des eaux souterraines (24 b)
- Suivis de la pollution côtière (24 e)

L'appréciation faite de la croissance du secteur apparait directement liée à la réglementation escomptée du secteur. La quasi totalité (41 opérateurs sur 43 qui se sont exprimés) estiment en effet que dans les prochaines années, le gouvernement sera amené à prendre des mesures de réglementation destinées à protéger l'Environnement.

2- Appréciation des entraves (et des conditions de développement) du secteur

On estime que l'impulsion du secteur est conditionnée essentiellement par :

- L'absence de normes
- Le manque de mesures d'application
- Le manque de sensibilisation des clients potentiels
- Et également leur manque d'information quant aux possibilités d'interventions

Autrement dit, on observe un large consensus sur la nécessité de l'intervention de l'Etat pour réglementer de manière rigoureuse, la protection de l'environnement, associée à une sensibilisation à l'échelle du pays aux problèmes de l'environnement.

3- Appréciation de l'engagement des opérateurs dans le secteur

Trente Huit opérateurs considèrent effectivement qu'ils interviennent bel et bien dans le secteur. Peut on considérer que les cinq autres auraient dû être écartés de l'échantillon puisqu'ils sont supposés ne pas intervenir dans l'Environnement ?

Le réexamen des questionnaires correspondants nous confirment qu'aussi bien LABOMETAL. (n°5) PROTEC (n° 14), PROMOCONSULT (n° 19), ENERGIC SERVICES (n° 26) opèrent effectivement dans le secteur.

On observe également, que les opérateurs veulent développer leurs activités dans les différents domaines répertoriés sauf le traitement de déchets liquides et le système de combustion pour générer l'électricité et vapeur : le recyclage et le traitement de l'eau semblent plus visés.

Nous observons cependant que 12/40 ont cité de nouvelles activités non répertoriées dans le questionnaire comme étant leurs préoccupations centrales (voir annexe remarque Q.20).

4- Appréciation des blocages propres

Tel qu'il apparaît dans l'exploitation de l'échantillon, le développement du secteur privé dans les différents domaines liés à l'environnement est hypothéqué par :

- 1- L'étroitesse du marché au même titre que :
- 2- Les besoins de financement
- 3- Par le manque d'expertise

Certains opérateurs (Trois) ont cité, en dehors des raisons répertoriés, les problèmes administratifs.

L'étroitesse du marché doit être liée à l'absence de normes pour le secteur.

5- Les mesures d'impulsion

Cette question confirme la précédente puisque les opérateurs estiment que les mesures déterminantes pour promouvoir leurs activités sont liées à :

- L'établissement de normes claires relatives à la pollution
- Le financement (soutien à leurs projets)
- Le développement de la communication avec l'étranger.

6- La Publication

Toutes les informations présentées dans le questionnaire ont été citées comme informations importantes avec cependant la hiérarchie suivante :

- Opportunités immédiates
- Informations précoces
- Les technologies
- Les publicités et informations sur les fournisseurs. les équipements

Concernant le prix, aucun consensus ne se dégage, ceux qui se sont prononcés retiennent une fourchette de prix allant de la gratuité à 50 Dhs le spécimen.

Fait à Casablanca, le 19 Juillet 1992

NOTE STATISTIQUE

Remarques :

1- Les informations traitées proviennent de l'exploitation de quarante questionnaires : (classés de 1 à 43)

2- Dans chaque question, nous avons procédé à la classification des variables en fonction :

du nombre de fois citées en 1^o, en second et en 3^o rang
 du nombre de fois citées dans les trois premiers rangs

Données statistiques :

I- Appréciation globale du secteur

- Appréciation de la croissance du secteur : Q 28

Question : *Pensez-vous que le domaine dans de biens et services liés à l'environnement est un secteur en croissance au Maroc ?*

Opinion ----->	Oui	Non	Abstention
TOTAL EXPRIME	32	7	4

- Appréciation des problèmes majeurs du secteur : Q 24

Question : *Prière d'indiquer par ordre d'importance les trois problèmes majeurs d'environnement auxquels le Maroc doit faire face aujourd'hui ?*

Rang ----->	d : Pollution atmosphérique			a : Pollution des eaux de surface			b : Pollution des eaux souterraines			e : Pollution côtière		
	1	2	3	1	2	3	1	2	3	1	2	3
TOTAL EXPRIME	14	2	4	7	9	5	6	10	4	4	8	4
Nombre de fois citées parmi trois 1^o rangs	20			21			20			16		

• Appréciation de possibilités de réglementation : Q 29

Question : Estimez-vous que dans les prochaines années, le gouvernement introduira une réglementation concernant la protection de l'Environnement ?

Opinion ----->	Oui	Non	Abstention
TOTAL EXPRIME	41	2	0

II- Appréciation des entraves

• Appréciation des conditions de développement du secteur : Q 21

Question : D'après vous, quels seraient les obstacles majeurs au développement du marché des biens et services liés à l'Environnement ?

Rang ----->	a : absence normes			b : Manque mesures d'application			c : Sensibilisation clients		
	1	2	3	1	2	3	1	2	3
TOTAL EXPRIME	24	4	3	5	17	3	6	1	5
Nombre de fois citées parmi trois 1° rangs	31			25			12		

III- Appréciation de l'engagement des opérateurs dans le secteur

• Engagement effectif : Q 25

Question : Pensez-vous que votre firme est bien un opérateur dans le domaine de l'Environnement ?

Opinion ----->	Oui	Non	Abstention
TOTAL EXPRIME	38	5	0

IV- Appréciation des blocages propres aux opérateurs : Q 22

Question : Existe-t-il de barrières qui vous empêchent de développer vos activités dans les domaines choisis :

	a : Insuffisance du marché			d: Besoins financement			c : Manque expertise		
Rang ----->	1	2	3	1	2	3	1	2	3
TOTAL EXPRIME	15	3	3	14	11	2	4	8	0
Nombre de fois citées parmi trois 1° rangs	21			27			12		

V- Appréciation des mesures d'impulsion propres aux opérateurs : Q 23

Question : A votre avis, quels seraient les plus grand soutiens pour développer votre activité dans le domaine de l'Environnement ?

	a : Etablissement de normes			e : Besoins financement			b: Communication		
Rang ----->	1	2	3	1	2	3	1	2	3
TOTAL EXPRIME	21	4	4	11	8	2	3	4	0
Nombre de fois citées parmi trois 1° rangs	29			21			7		

VI- Appréciation de l'opportunité d'une publication

- Contenu : Q 30

Question : Quel type d'information doit contenir le bulletin mensuel ?

	a : Opportunités immédiates			b : Informations précoces			c : Rubrique Technologie		
Rang ----->	1	2	3	1	2	3	1	2	3
TOTAL EXPRIME	16	1	5	13	11	4	8	10	9
Nombre de fois citées parmi trois 1° rangs	22			28			27		

DOSSIER ENTREPRISES

ARCHITECTES :

- Mr SEKKAT
- Mes. VANDENDAELE & JOUNDY

LABORATOIRES D'ANALYSES :

- **AGRIPHARMA** : Fertilisation sur toute culture, analyse du sol, plantes et eau et oligo-éléments.
- **SMD UFINER** : Production et adduction d'eau potable, laboratoire de contrôle bactériologique et chimique (eaux, boissons, produits alimentaires).
- **LABOMETAL** : Laboratoire de contrôle et d'analyse des produits ferreux et non ferreux, sable de moulage.
- **L.P.E.E** : Laboratoire d'essai de bâtiment et de génie civil.
- **S.A.S.M.A** : Laboratoire agronomique, analyse de terres, de végétaux et d'eau d'irrigation pour cultures arboricoles et maraichères.

ENTRETIENS D'ESPACES VERTS :

- **ENERGIC SERVICES** : Entreprise de nettoyage industriel, désinsectisation, dératisation, assainissement nettoyage, gardiennage.
- **BLACK AND WHITE NETTOYAGE** : Entreprise de nettoyage et entretien.
- **NATIONAL F.A.C.S** : Service de nettoyage et entretien journalier.
Vente de produits industriels et traitement par voies aériennes.

SOCIETE DE FORAGES D'EAU :

- Société de forage des puits modernes .

BUREAUX D'ETUDES :

- **O.C.I.T** : Etudes, conseils, ingénierie, expertise et contrôle de travaux de bâtiments et génie civil, béton armé et expérimentation sur matériaux de construction.

- **S.G.S MAROC** : Contrôle qualité et quantité des produits industriels et miniers, pétroliers, agro-alimentaire et biens de consommation, stockage et magasinage libre.
- **BEPET MAROC** : Etudes techniques, bâtiments, béton armé, aménagement urbain, assainissement, alimentation en eau potable, hydro-agricole, études portuaires.
- **A.D.I** : Aménagements agricoles, béton armé, génie civil, viabilisation, assainissement et hydraulique urbaine.
- **INGEMA** : Ingénieurs conseils, bureau d'études dans le domaine des grands ouvrages de génie civil et des aménagements hydro-électriques et hydro-électriques et hydro-agricoles, ouvrages souterrains, informatique scientifique.
- **MAGHREBS PROJETS** : Ingénierie, bâtiments, génie civil, agriculture, hydraulique, etc.
- **PROMOCONSULT** : Engineering, bâtiments, travaux publics, hydraulique et industrie, étude de marché et factibilité, contrôle et suivi des travaux.
- **DAR AL HANDASSAH** : Adduction et distribution d'eau, aménagements hydrauliques, irrigation, assainissement et environnement.
- **APAVE INTERNATIONAL** : Contrôle réglementaire, vapeur, gaz, électricité, radiographie industrielle.
- **VERITAS** : Contrôle de matériaux navals, industriels et nucléaires, contrôle vapeur, gaz, électricité.
- **S.C.E.T** : Ingénierie, bureau d'études pluri-disciplinaires en hydraulique, ouvrages d'art, route, transports, assainissement, infrastructure, traitement des eaux, mise en valeur agricole.
- **SOLAR** : Analyse pédologique, fabrication de produits chimiques, vente de matériel scientifique.
- **SIGMA TECH** : Ingénierie industrielle: coordination de travaux, aménagement traitement des eaux, fabrication de capteurs solaires.
- **EQUITER** : Maîtrise et utilisation des ressources hydrauliques. ouvrages hydrauliques, barrages, réservoirs, aménagements hydro-électriques- etc
- **S.A.E.M** : Société africaine d'études au Maroc.
- **AGRO-MAROC** : Société marocaine de produits chimiques.
- **SOGEO MARODYN** : Mine, tirs spéciaux, démolition par explosifs, forage d'eau, sondage, étude géotechnique

- **G.E.T.B INGENIERIE** : Etudes techniques sous forme d'ingénierie, aménagement urbain, traitement des installations industrielles, etc.
- **S.E.T** : Entreprise d'irrigation et adduction d'eau, génie civil, terrassements, voirie, bâtiment, assainissement, routes.
- **C.I.D** : Bureau d'études techniques et économiques: infrastructure de transport, aménagement hydraulique, études portuaires, études générales sur l'eau et l'environnement.
- **HYDRO-SYSTEMES** : Etudes et réalisations d'unités de traitement des eaux potables et industrielles, filtration industrielle et pompage.

SOCIETE D'ENTRETIENS GLOBAL :

- **N.D.I** : Nettoyage de fin de chantier. Désinfection industrielle. Hygiène publique. Assainissement: vidange de fosses septiques, débouchage et curage d'égouts, détartrage de colonnes d'immeubles, collecte de déchets industriels dévasages de rivières, lacs et étangs, dépollution des eaux, traitements de rejets.
- **TERRAMINES** : Curage de canalisation, vidange égouts et fosses septiques, téléinspection.
- **GETRADIS** : Import-export d'équipements, énergie solaires et thermiques.

SOCIETE DIVERSES OPERANT DANS LE DOMAINE DE L'ENVIRONNEMENT:

SOCIETE DE PRODUITS PETROLIERS :

- **SOMEPI** : Commercialisation de produits pétroliers (essence, gaz, lubrifiants et produits spéciaux).
- **AFRIQUIA** : Importation, stockage et distribution de tous produits pétroliers (essence sans plomb), emplissage de bouteilles de gaz liquéfiés.

ENTRETIENS DE MACHINES :

- **BREYTON** : Mécanique générale, taillage d'engrenage, entretiens des silos, concasseurs, pompes, compresseurs, régulateurs de paliers.

TRAITEMENT DE CHIFFONS :

- **CHIFFONCOM** : Collecte et traitement des déchets textiles.

AUTRES

- **I.M.M** : Achat et vente de produits d'entretiens.
- **CASA-MAZOUT** : Importation de matériel thermique : chauffage, conditionnement d'air, régulation thermique, traitement des eaux.
- **CORSIN AGUATRA** : Etude, mise au point, construction, montage, vente d'appareils et d'installations destinés au traitement, à l'épuration, au conditionnement, au pompage et au transport de tous fluides, installations d'arrosage automatique.
- **PROTEC** : Protection incendie, traitement général des eaux, construction hydraulique, chauffage solaire.

QUESTION 20

Les observation additionnelles ont été regroupées dans la lettre r : Les observation formulées sont les suivantes :

OPERATEURS	OBSERVATIONS
2	Tous les domaines
4	Fertilisants et engrais
7	Forage
8	Génie civil, hygiène sous terrain (+ f)
9	Inspection de marchandises
12	Agriculture - Transport
15	Eclairage (+ a)
18	La société n'a pas pour le moment de politique à long terme
21	Vérification technique et sécurité dans tous les domaines
22	Traitement de chiffons et déchets plastiques
23	Mines
26	Hygiène industrielle

APPENDIX C

COMPANIES INVOLVED IN ENVIRONMENTAL PROTECTION

LEGEND

- | | |
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| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
| 2. Water treatment | 7. Solar, wind, other renewable energy |
| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports,
marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

N°	Code	Désignation	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Eq.
1	1	N.D.I	Dératisation dépollution des plans d'eau	Ismail CHAOUKI	Tours des HABOUS AV des F.A.R	31-41-51	SA 500 000	560
2	6	P.T.I	Formation de produits de traitement des espaces verts	Mr Ismail CHAOUKI	50, Avenue Armée Royale Casa	31.51.51	SA 1000.000	75
3	6	NETRADIS	Espaces verts	Ali EL MOUDNI	50, AV du SOUSS RABAT	75-38-14	SARL 1 000 000	
4	6	SETEL SIEMENS	Espaces verts	Mazou SOWAN	Km 1, Route de Rabat Ain Sebaa Casa	35.10.25	SA 10 000 000	125
5	6	ELECTRO-MOTOR	Espaces Verts	Mohamed AMAR	34, Rue Fermeidi Casa	25.99.56	SA 120 000	25
6	6	AGRO-MAROC	Espaces Verts	Ahmed RINGA	30, Av. de l'Armée Royale - Casa	31.40.04	SA 1 000 000	20
7	3	CHIFFONCOM	Traitement des déchets textiles	Labcen AMALAY	6, Rue des Pélicans Oasis - Casa	25.56.77	SA 10 000	17
8	3	C.M.E.F.I	Traitement des déchets textiles	Abdelghani LAMHABI	300, Bd Ambassadeur Ben Aïcha Casa	34.09.01	SARL 10 000	16
9	9	S.M.D UNIFER	Laboratoire d'analyses des produits alimentaires	Philippe HERVIEUX	20, Bd Rachidi CASA	22-41-07	SA 211 706 400	175
10	3	GARNITEX	Traitement des déchets textiles	Mohamed AID NOCTA	136, Av Hassan Seghir - Casa	31.48.68	SA 800 000	60
11	3	BOUDIH	Traitement de déchets textiles	Mohamed BOUDIH	28, Rue d'Alger - Casa	27.51.16	Affaire personnelle	5
12	3	UNIONATEX	Traitement de déchets textiles	Karl FREDRICH	4, Rue Abdelouahad Az- ragag Casablanca	30.18.82	SA 60 000	4-5
13	1	ASSIANA	Entretien D'usines	Mohamed MOUTAOUAKIL	Rue Ibn Khafaja Mohammedia	32.79.28 32.79.29	SA 100 000	100
14	1	BREYTON	Entretien D'usines	Mohamed BERRADA	15, Bd Fouarat - Casa	24.19.39	SA 324 000	25
15	1	FOUR LAGADEC MAROC	Entretien D'usines	Christian GODART	Route Zenatas Ain Sebaa KM 6,5 Casablanca	35.41.63	SA 1 000 000	65

COMPA _____ D IN
ENVIRONMENTAL _____ CTION IN MOROCCO

LEGEND

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| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
| 2. Water treatment | 7. Solar, wind, other renewable energy |
| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports,
marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique et capital	Rég.
16	9	S.G.S MAROC	Laboratoire d'analyses des produits alimentaires	Richard C.HINES	71, Avenue de l'Armée Royale Casablanca	31.67.89 30.74.91	SA 2 500 000	80
17	9	VERITAS	Laboratoire d'analyses, essais de matériaux	Jean Paul CHITRY	2 Bis, Rue Molière Casa	39.11.46	SA 400 000	9
18	9	LABOMETAL	Laboratoire d'analyses, essais de matériaux	Lahcen AFGIR	160, Route des Zenagas Ain sebaa Casablanca	35.92.62	SA 683 000	6
19	9	SOLAR	Laboratoire d'analyses, essais de matériaux	Othman ALAQUI	12, Rue de Angola Rabat	72.15.00	SA 600 000	35
20	10	APAVE	Contrôle Technique des constructions	Henri CASANOVA	3, Rue de Champigny	30.00.58 30.91.61	FILIERE	40
21	2	PROMOCONSULT	Bureau d'études, Assainissement	Omar BENNANI	174, Bd Med Zerkloumi Casablanca	22.12.31 22.11.01	SA 2 000 000	85
22	10	GETB Ingénierie	Bureau d'études, Hopitaux Cliniques, Hotels	Simon BORROS	127, Av Moulay Hassan Ier Casablanca	27.74.29 26.88.44	SARL 100 000	17
23	6	AGRO INGENEERING	Bureau d'études Agronomie, Elevage, Agriculture	Abdellatif BELMADANI	215, Avenue AMBASSADEUR BEN AICHA	24-44-14	SA 2 000 000	10
24	6	S.A.S.M.A	Bureau d'études Agronomie, Elevage, Agriculture	Mohamed LEXCHIRI	206, Allée des Jardins Ain sebaa - Casa	35.07.39	SA 100 000	96
25	6	SIGMA Tech	Bureau d'études Agronomie, Elevage, Agriculture	Abdelhanine BENALLOU	5, Rue de Mickel - Rabat	76.89.61 --- -->83	SA 350 000	40
26	11	INGEMA	Bureau d'études, Prospection du sol recherche pétrolière	Ahmed FOUAD CHRAIBI	40, Rue Oum Errabia RABAT	77.87.30	SA 4 000 000	40
27	11	BRPM	Bureau d'études, Prospection du sol	Assou LHATOUTE	5, Av Moulay Hassan RABAT	76.30.35	Autre personnelle	1430
28	11	MAGHREBS PROJETS	Bureau d'études recherches minières	Abderrahic KADIRI	7, Rue de Benghazi	76.52.31 76.58.10	SA 700 000	35

LEGEND

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| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
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| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports,
marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

C-3

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Eff.
29	11	C.C.L.T	Bureau d'études, Prospection du sol, recherche minière	Hassa HALIB	159, Bd Yacoub El Mansour CASA	25.99.18 23.66.86	SA 100 000	15
30	11	SAVERY Ingénierie	Bureau d'études, Prospection du sol, recherche minière	Marc SAVERY	1. Place de l'Istiqlal ex Mirabeau	30.00.25	SA 400 000	14
31	11	SEREC	Bureau d'études, Prospection du sol, recherche minière	Mehzmed DAHMAN	10, Place Mohamed V	20.33.05 27.10.16	SARL 50 000	40
32	11	AFRIQUIA	Bureau d'études, recherche minière	Aziz AHINNOLCH	Rue Ibnou Louannane	35.17.35	SA 20 000 000	571
33	11	SONEPI	Bureau d'études, recherche minière	Hadj Mohamed ANHAL	139, Bd My Smail CASA	40.12.89 40.19.52	SA 37 000 000	222
34	3	NORMDIC	Produits enzymatiques Produits chimiques pour industrie	Mr Alexandre AILLET	29, Rue Zaid Ibnou Rilaa A.S	25-03-34 25-09-16	SA 100 000	10
35	3	PROCHIMEDIC	Produits désinfectants désinsectisants Matériel de pulvérisation de protection	Mr Ahmed EL MAAYATI	90, Allée des Mimosas A.S	35-05-87 35-45-19	SA 250 000	8
36	3	SOBROMA	Application de bromure de méthyle pour désinfection des sols.	Mr Elkewy Mr Md El Alami	42, Av Armée royale	31 34 11	SA 400 000	13 - 10
37	2	Architecte		Mr Mounassir abichwahed		26 08 77 20 05 66		
38	2	Casa-mazout	Traitement des eaux	Chakib BERRADA	260, Bd Mohamed V	30 35 38 30 37 23	SA 2000 000	45
39	2	Oneli Maroc	Traitement des eaux par procédé C.F.E.C France	Mr Md BENNANI	87, Allée Orangers Lot le départ n° 9 bis A5	35 59 01 35 59 02	SA 600 000	50-100
40	3	SIRMEL SA	Matériel concassage de déchets industriels broyage	Mr Brahim SAAA	13, Rue Rocroy casa	40 08 83 4° B.84	SA 7500000	80-100
41	2	VENTEC MAROC	Conditionnement d'air - dépolluissage	Mr Abdelaziz TAZI	Route de Continental RP 96 Km 8,5 Casa	35.06.71/7 2	SA 15.300.000	70 - 90
42	7	CASA BLOC	Panneaux Solaires	Mr Yves DEJOIS	163, Rue Hadj Omar Rd Casa	31.81.40 30.39.97		40 - 50

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LEGEND

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|---|---|
| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
| 2. Water treatment | 7. Solar, wind, other renewable energy |
| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports, marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	EFF.
43	7	ISOLECTRA	Importation installation de panneaux solaires	Mr Ben Addou IDRISSI Mr Jawad	619, Bd Mohamed V	24 07.60	SA 100.000	10 - 12
44	7	ENERGETICA	Import Export de panneaux solaires : Photovoltaïques	Mr Rachid BENLEMLIH	20, Rue Ibn Hajar - Rabat	77.96/74	SARL 100.000	10 - 14
45	4	DRAPOR	Travaux de dragage (curer, nettoyer le fond d'une rivière.	Mr Mohamed SAJIB	18, Rue COLBERT	31 42 37	SA 3250000	100
46	2	BAHI S.A	Traitement des eaux, pompage, adduction d'eau	Mr Miloud BAH	88, Rue Mac Mahon	27.53.94 27.85.94	SA 250.000	20 - 30
47	3	CAGACI	Fabrication, transformation, recyclage de tout produit se rapportant à l'industrie	Mr Yves de Langre Mr Mohamed marrakchi	Douar Oulad Dakak, Ouled Saleh Nouasser Casa		SA 500.000	---
48	5	SODIPI	Produit prim gaz (1)	Yves de Langre (adm) Md Marrakchi (président)	246, Bd Emile zola	40 10 31 40 11 72	SA 25000000	350
49	3	Bouskoura plastique	Unité de transformation de matières plastiques	Azzouzi Ahmed El Alami Lahcen	PK 14 route secondaire 109 bouskoura casa		SA 200 000	---
50	6	Sté de travaux et management forestier	travaux forestiers de déliégage travaux de reboisement et création d'espaces verts	-----	11, Route de Midek AZROU		SA 10 000	
51	1	DISTRIBA	Désinfection Dératissage Désinsectation	Mme Chekroun Saadia	149, Rue Idriss Yacout			10 - 25
52	2	PROTEC	Traitement des eaux	Mr Robert GAIN	625, Bd Mohamed V	24.84.41	SA 4.550.000	80 - 90
53	7	ELECTRO-MOTOR		Mr Mohamed AMAR	34, Rue TERMIDI Casa	25-39-59	SA 120 000	25
54	2	SIDEN		Mme Mercedes LURBE	Km 17 route CASA BP 1373 Rabat	74-03-50	SA 1000000	50

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| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
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marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

C-5

N°	Cod	Dénomination	Objet	Responsable	Adresse	Téléphones	Forme juridique & capital	EFF.
55	7	SODEREL	Energies renouvelables Fabrication d'accessoires d'énergie solaire	Mr Mohamed BENHADDOU	22, Rue de Charleville	24.70.68	SA 20.000	10
56	7	SOCOCHARBO	Chauffage solaire	Mr Mounir Aoud	44, Rue l'écritain	24.97.20 24.04.62	SA 21.029.400	200
57	7	CDER	Promotion et développement des énergies renouvelables	Abdelhaq FAKIHANI	Rue Machaar El Haram bp 509 Marrakech	(04) 43.51.09 43.51.41	-----	5
58	6	SOTRAVAR	Reboisement mise en valeur agricole	Mr A. I. BENCHEROUN	190, Bd My Ismail		SA 100.000	10 - 15
59	2	Hydro systèmes	Etude et réalisation d'unités de traitement des eaux potables et industrielles	Mr A. I. Abdellaoui	36, Bd Anfa	20.24.28 22.05.40	SA 200.000	10 - 35
60	2	Atrial	Station de pompage et de traitement des eaux	Mr Abda	1, Chemin des glauculs		SA 4887.750	375
61	1	Pro-Entretien	Nettoyage désinfection industrielle	Mr Abdelmajid Bassou	142, Bd Emile Zola	24.25.52 24.27.31	SA 10.000.000	20
62	3	S.O.S.N.D.D	Désinfection dératization ramassage des ordures et déchets industriels évacuation à la décharge public des ordures	Mr Abdelkader SAID	296, Bd Mohamed V	30.35.26 30.39.43	SA 150.000	25 - 200
63	2	GETRATER	Terrassement assainissement	Mr Jacques SASSAF	46, Avenue de l'Armée Royale	35.39.51	SA 10000000	35 - 45
64	2	ZNATI	Assainissement	Mr A. CACELES	65, Rue Eugeaud - Casa	26.23.33	SA 800.000	50 - 200
65	2	SONER	Assainissement	Mr M'barek BOUIDRI	117, Bd Rahal El Meskina	31.23.91	SA 1.000.000	
66	2	E.C.G.M	Canaux assainissement	Mr Abderrachid HARKATI	4, Rue Capitaine Ben Elh		SA 10.000.000	20 - 120

COMPANIES INVOLVED IN ENVIRONMENTAL PROTECTION IN MOROCCO

LEGEND

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marine pollution | 9. Analytical laboratories |
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| | 11. Prospecting and petroleum research |

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Eff.
67	2	ECOMA	Entreprise privée	Mr JAMALI	16, Avenue El Maseira El Jadida	34.33.06 34.17.16	SA 400.000	70 - 100
68	3	DIVERSEY	Fabrication et commercialisation de produits chimiques, matériel pour traitement des surfaces solées	Mr Jacques VEDIER	Roule 110, Km 12,5 Ain Seba	35.27.75	SA 400.000	30 - 40
69	2	WATEC	Matériel et produits pour traitement des eaux à usage industriel, hôtelier, collectif	Mohamed AMINE	13, Bd Ibn Tachfin, n° 21	30.35.00 31.64.34	SARL 100.000	15
70	2	MACOBATE	Entreprise de traitement des eaux	Mr TOUNSI	Quartier Takadoun, lot 48 Rabat	75.96.46	SA 500.000	25 - 30
71	2	MOUKHA	Traitement des eaux usées chloration pompage	Mr Larbi TAZI	2, Rue Oqbah Rabat	77.29.50 77.09.51	SA 100.000	25 - 40
72	3	SARTOM	Importation matériel scientifiques de laboratoire et filtration industrielle	Mr Abderrahman LGNER	28, Rue de Provins		SA 100.000	5 - 8
73	4	MARPOL	Lutte contre la pollution marine	Mr Karim JAMAL	50, Avenue Armée Royale	sa 100.000		
74	2	GEISSMANN & FILS	Importation équipement pour traitement des eaux Economie d'énergie	Mr Patrick René GEISSMANN	Rue Charif Ichissi SKALLI	25.12.15 25.12.61	SA 2500.000	40
75	1	PROBI	Récupération thermique, importation matériel nettoyage et de désinfection	Mr Elie COHEN	11, Rue de Lille	33.01.03 30.01.05	SA 2500.000	45
76	2	S.M.E.G	Assainissement	Mr Rahal JBIL	19, Rue Brahim Nakhal	25.12.61 25.03.62	SA 2.000.000	250 - 400
77	2	P.T.I	Fabrication de produits anti-pollution	Ismail CHAOUKI	50, Av ARMEE ROYALE	31.1.51	SA 1.000.000	15
78	3	BA'JA	Traitement des eaux énergie solaire	Mr Roger OUARNIN	Rue Tarik Ibnou Ziad		SA 250.000	65 - 100

LEGEND

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| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
| 2. Water treatment | 7. Solar wind, other renewable energy |
| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports,
marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	EG
79	2	ETAMETAL	Traitement des eaux potables et industrielles	Mr Azzedine BENCHEKROUN	61, Rue Karatchi	30.85.07	SA 500.000	20
80	2	HYDRO-CONSUL	Traitement des eaux	Mr Abdelmalek FARES	15, Rue Al Mouahidine	70-74-42	SNC 100 000	10
81	3	ADDICSA	Fabrication de produits chimiques et additifs de traitement des surfaces	Mr TALEB	67, Bd Amir Amr Ibnou Al Ass		SA 100 000	4
82	6	SASF MAROC	Fabrication de produits Phytosanitaires	Mr Guenter REIZIEN	7, Chemin des Orchides	35.57.68	SA 9.990.000	53
83	6	ALFACHIMIE	Importation de produits Phytosanitaires	Mr Mohamed ELCHAÏ	215, Bd Abdellah Ben Yacine	24.72.02	SA 300.000	14
84	7	Maroc Aero-Energie	Fabrication - installation d'aerogenerateurs	Mr MESSAOUDI Boujemaa	24, Bd El Fatouani	68.25.59	Aut. Peral	10 - 20
85	2	Inter industrie	Traitement des eaux	Mr Emilie Barrau	433, Bd Mohamed V	24.84.02	SA 700.000	30 - 150
86	2	B. E. P. G.	Bureau d'Etude : travaux irrigation - assainissement	Mr Mohamed EL YAZIDI	1 Allée Al Bahani - Rabat	77.03.53		8 - 12
87	2	Bersel Maroc	Bureau d'Etudes, assainissement	Mr Albert BOUSSIDAN	2, Rue Celi - Casa	31.17.28 31.16.73	SA 100.000	5 - 10
88	2	Guigues Maroc	Ingénieurs conseils en Traitement des eaux, protection de l'environnement	Mr Carbi CHRAÏB	2, Rue Tamassouht - Rabat	76.57.07	SA 871.600	15
89	2	Indesa S.A	Etudes techniques - Voirie Assainissement - station d'épuration	Mr Mohamed BOUATIA	Av. Hassan II - Cité Al Manar, Im. B n°1 - Rabat	73.37.15	SA 100.000	10-20
90	2	Sigmat	Etudes, installation de station de pompage, traitement des eaux	Mr Abdelwahab ALAMI	135, Bd Abdellah Ibn Yacine	30.30.04 30.01.81	SA 1.200.000	20
91	2	SOTERRAB	Voies - Assainissement	Mr Mohamed JAWHARI HASSANI	43, Bd de Jerrada - Casa	25.46.43 25.94.56	SA 2.000.000	350 - 400

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**COMPA
ENVIRONNEMENTAL**

IN MOROCCO

LEGEND

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|--|---|
| 1. Disinfection, pest control | 6. Reforestation, sanitation products |
| 2. Water treatment | 7. Solar, wind, other renewable energy |
| 3. Treatment of industrial wastes | 8. Heating, ventilation, air conditioning |
| 4. Cleaning of rivers and ports,
marine pollution | 9. Analytical laboratories |
| 5. Manufacture nonpolluting | 10. Construction supervision |
| | 11. Prospecting and petroleum research |

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	EFF.
92	5	MAGHREB OXYGENE	Fabrication et Epuration des gaz industriels et spéciaux	Mr Hamza Abdellah	52, Bd Grande Ceinture	35.03.61	SA 45.000.000	100
93	C	CLIMAIR SYSTEME	Climatisation, ventilation, dépoussiérage	Mr Abdelkrim ALHAKKAK	22, Rue de Bethane	31.41.51	SA 150.000	30-50
94	3	MERTZ (Délégation)	Import - Export matériels pour broyage de plastique	Mr Klaus MERTZ	10, Rue de Royen	39.39.71		1
95	3	SCIMA	Importation Equipements et matières premières pour transformation plastique Aluminium	Mme Naima ARAB	55, Rue Zineb Ishak An naghzia - Casa	24.86.08 24.79.22	SA 1.000.000	20
96	1	NEMTAV	Traitement anti-mouches, antimites, désinsectisation	Mr Ouahid SAHHAKI	52, Rue Socrate	25.60.78 25.36.51	SA 1000.000	1700
97	3	EASI MAG	Traitement des déchets textiles	Raïk DERROUGH	4, Rue Montaigne	25.98.81	SA 250.000	10
98	2	S. C. E. T Maroc	Bureau d'études en hydraulique	Abdelhalid BENJAMAA	30, Bd Al Alaouytine - Rabat	73.04.49 73.20.23	SA 8.300.000	120
99	2	PROTEC SA	Traitement Général des eaux, Constructions Hydrauliques	Abdessalam CHERIF	625, Bd Mohamed V	24.84.41	SA 4.550.000	90
100	11	PROMOCONSULT	Bureau d'études hydrauliques et industrielles	Omar BENNANI	174, Bd Mohamed ZERIKTOUNI	22-12-31	SA 2.000.000	85
101	6	AGRO INCENGINEERING	Bureau d'études, Agronomie, Elevage, Agriculture	Abdellatif BELMADANI	215, Av AMBASSADEUR BEN AICHA	24-44-14	SA 2.000.000	10

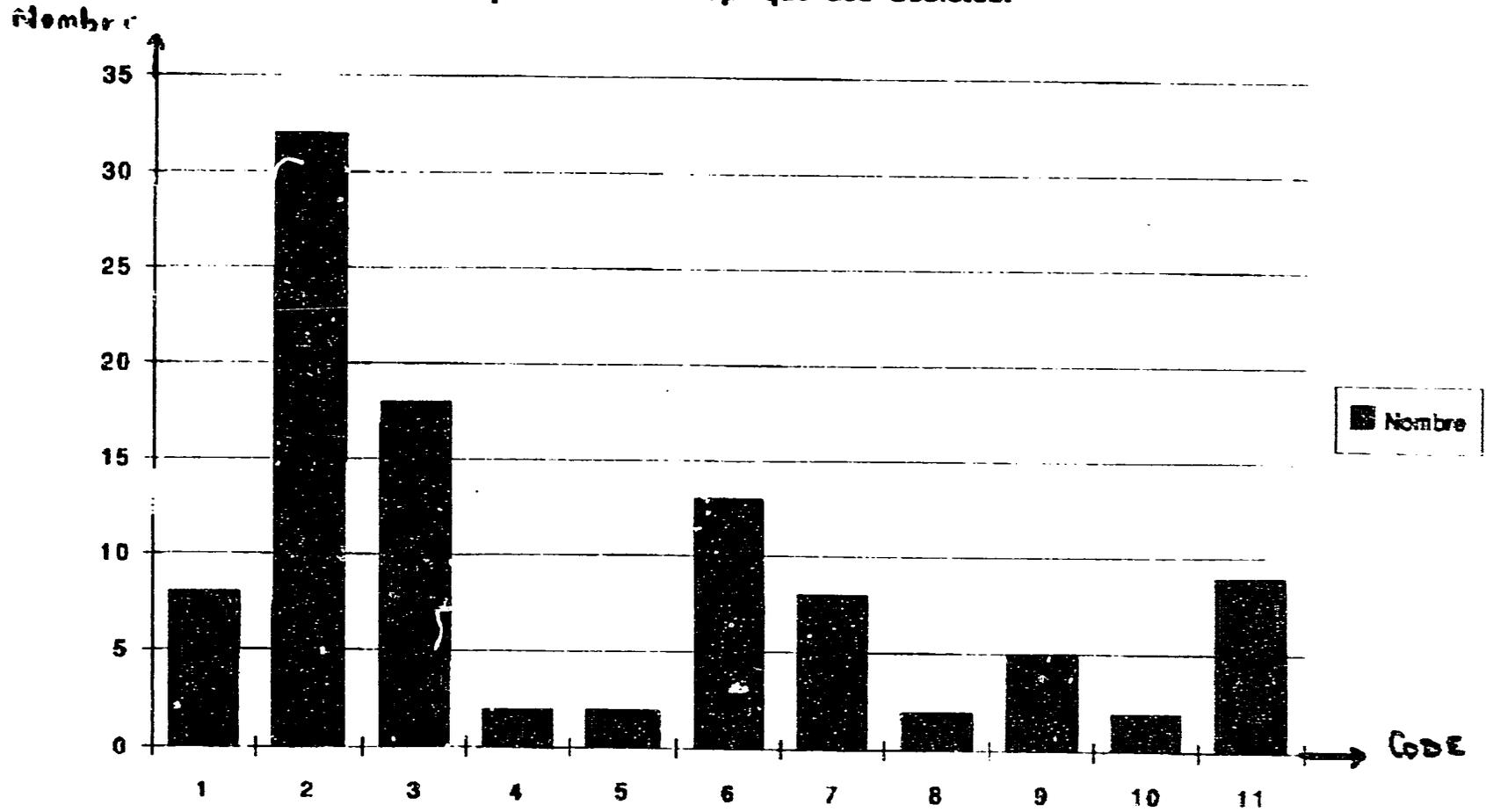
**LISTE DES SOCIÉTÉS PARTICIPANT À LA PROTECTION DE L'ENVIRONNEMENT
(CODES FOR CATEGORIES OF BUSINESS IN THE ENVIRONMENT)**

LEGENDE

Code	Domaine d'action	Nombre de Sociétés
1	Désinfection Dératissage Traitement Anti-mouches Anti-mites	8
2	Traitement des Eaux	32
3	Traitement des déchets industriels	18
4	Nettoyage des fonds de rivière. Ports, lutte contre la pollution marine	2
5	Fabrication de produits non polluants	2
6	Travaux de reboisement, produits phytosanitaires, espaces verts	13
7	Energie solaire, éolienne, énergies renouvelables	8
8	Climatisation, ventilation, dépoussiérage	2
9	Laboratoire d'analyse	5
10	Contrôle technique des constructions	2
11	Prospection du sol - recherche pétrolière	9

- 1 Désinfection, pest control
- 2 Water treatment
- 3 Treatment of industrial wastes
- 4 Cleaning of rivers and ports, marine pollution
- 5 Manufacture of non polluting products
- 6 Reforestation, sanitation products
- 7 Solar, wind, renewable energy
- 8 HVAC
- 9 Analytical laboratories
- 10 Construction supervision
- 11 Prospecting and petroleum research

Représentation Graphique des Sociétés.



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COMPANIES INVOLVED IN ENVIRONMENTAL PROTECTION IN MOROCCO

LEGEND

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| <ul style="list-style-type: none"> 1. Disinfection, pest control 2. Water treatment 3. Treatment of industrial wastes 4. Cleaning of rivers and ports,
marine pollution 5. Manufacture nonpolluting | <ul style="list-style-type: none"> 6. Reforestation, sanitation products 7. Solar, wind, other renewable energy 8. Heating, ventilation, air conditioning 9. Analytical laboratories 10. Construction supervision 11. Prospecting and petroleum research |
|--|--|

Code	Dénomination	Objet	Responsable	Adresse	Téléphones	Forme juridique & capital	Eff.
1	Tue-Rats	Dératisation Désinsectisation Désinfection Nettoyage	Mr Omar DAHA	14, Rue Galilée	20 67 33 27 36 82	SARL 10.000	20 - 30
1	CLEAN SERVICE	Nettoyage industriel, lutte anti pollution	Mr Christian BOUCHET	33, Cité des crêtes, Route Al Jadida		SA 100.000	60
1	ENERGIC SERVICES	Nettoyage industriel désinsectisation, désinfection	Mr Dominique VILLAIN	70, Rue Agadir	20.06.07	SA 1000.000	250 - 350
1	GENIE SERVICE MAROC	Dératisation, désinsectation désinfection	Mr Azzedine BERRADA	31, Rue du capitaine Puissesseau	30.29.72	SA 10.000	10 - 20
1	G.E.P.S	Assainissement	Mr Damilo MORROCCU	7, Rue Aquitaine	27.08.00 26.29.02	SARL 180.000	
1	JAMAIN BACO	Entreprise de nettoyage désinfection dératisation	Mr Abdelhak KABBAJ	60, Bd Grande Ceinture	24.75.42	SA 100.000	500 - 800

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APPENDIX D

REFERENCES

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**APPENDIX D
REFERENCES**

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Méthodologie détaillée de l'étude de Gestion de l'Environnement
Groupement SWEEP/Scandiaconsult
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2. Morocco: Environmental Management Project
Revised Initial Project Summary
3. Faxes (de Groupement SWEEP/Scandiaconsult à la Banque Mondiale)
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4. Royaume du Maroc
Mission de Reconnaissance de la Banque Mondiale pour la Gestion de
l'Environnement
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5. USAID/MOROCCO
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6. Royaume du Maroc
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7. Royaume du Maroc
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8. New Enterprise Development
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9. Morocco: Environmental Management Project
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10. Centre pour l'Environnement et le Développement pour la Région Arabe et l'Europe
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19. **Morocco**
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25. **Massa National Park Project**
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August 1986
26. **Audit Energétique de la Cimenterie ASMAR, Marrakech**
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Mars 1991
27. **La Privatisation de la Collecte et du Traitement des Ordures**
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Rabat, Maroc, les 13 et 14 février 1992
28. **Codes Marocains des Investissements**
Mohammed Lamzoudi
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USAID Project Paper, May 1992
30. **Annuaire Statistique du Maroc, 1990**
31. **Audit and Reduction Manual for Industrial Emissions and Wastes**
UNEP/UNIDO Report No 7, 1991
32. **Elimination de Produits Phytopharmaceutiques dans la Cimenterie ASMAR au Maroc**
R. Bolwerk
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32. **Etude du Schéma Directeur d'Assainissement Liquide de la Ville de Tétouan**
Etudes des Pollutions
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33. **Etude du Schéma Directeur d'Assainissement Liquide de la Ville de Tétouan
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Fevrier 1992**
34. **Etude du Schéma Directeur d'Assainissement Liquide de la Ville de Tétouan
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A Global Business Perspective on Development and the Environment
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44. **Schéma Directeur d'Assainissement de la Ville de Safi, LBCD International
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March 1991**

APPENDIX E

PERSONS CONTACTED

**APPENDIX E
PERSONS CONTACTED**

- | | | | |
|-----------|--|--|--------------------------------------|
| 1. | Banque Mondial
Sherif Arif
André Fargeix
Laura Raimondo | Chef de Mission
Financial Analyst
Economist | (202) 473-2565 |
| 2. | USAID Morocco
Denis Chandlar
Eric Loken
Rick Scott
Criss Juliard
Joe Kitts
Mark Kraczkiewitz
Joyce Holfeld
Michele Moloney
Harry Birnholz
Taha Burata
Grant Morill
Richard Burns
David Dreiman
Marty Dagada
M. Mulenax | Mission Director
Senior Environmental Officer
EDM Project Officer
Business Consultant
Locust Cont.
Economist
Health
Health
Urbanism, Tétouan
Urbanism
Tourism
Private Sector, Chief of Division
Project NED
Mission Director
Agriculture | 76.22.65 |
| 3. | RCG/Hagler, Bailly (GEM)
Niels de Terra
Yvan Gravel
Mustapha Benkhassi | Chief of Mission
Energy Expert
Energy Expert | 75.95.52 |
| 4. | SWEEP/Scandiaconsult
Eilert Sidestam
Peter Hormander
David Belin
Stig Morling
Bo Eriksson
Lennart Danielson | Vice President, Scandiaconsult | 46 8 703 20 00

46 8 799 15 40 |
| 5. | Ministère de l'Intérieur
Mme. Layachi
Mr. Alaoui
Dris Toulali | | 76.84.23 |

6.	Ministère du Commerce et de l'Industrie		
	Mr. Hassmani	Minister	
	Ahmed Jniyeh	Chief, Env. Division	70.46.29
	Mohammed Benayada	Environmental Engineer	70.46.29
7.	Ministère de l'Agriculture		
	Direction des Eaux et Forêts		
	Laallam Lahcen	Chef, Div. Prot. Nat.	76.25.55
	El Kabiri M Lahcen	Chef, Serv. Prot. Nat.	76.26.94
	Mohammed Ribí	Dir., Parc Nat. Souss-Massa	
8.	Ministère de Privatisation		
	Alfred Saulniers	Consultant	75.63.93
	M. Benijilali	Industries	
9.	Ministère des Travaux Publiques		
	Mohammed Jellali	Dir. de Res.	77.87.51
10.	Ministère de l'Energie et des Mines		
	Ahmed Bouhaouli	Dir., de l'Energie	77.52.97
	Abdelali Bencheqroun	Dir., Adj. de l'Energie	77.36.58
	Mr. Sadati		
	Mr. Beneli		
	Mr. Hatimi		
	Mohamed Bennani	Chef de Service	77.48.27
11.	Ministère des Pêches Maritimes		
	Khadija Kaouakib Kadiri	Rel. Internat.	77.11.86
12.	Industry Representatives		
	Husnu Atilla	Goodyear	35.08.31
	Abdelkerim El Kouch	Dir., Usine ASMAR	(4)43.42.63
	Ahmed Moutaqui	Prés. Tannerie Modern	43.58.24
	Leon Bettan	Dir., Tech. Coop. Mar. de la Conserve	46.20.81
	Youssef Alaoui	Secr. Gen. Les Conserv. Chérifiennes	46.32.26
	El Kaderi	Sudexport Huilerie	
	Brahim Yassin	Sogenco Farine de Pech	
	Gilles Castonguay	Dir. Tech. Thermaltech	(4)62.11.95
	Chami Hassan	V.P. Multitex	32.58.91
	Lazrak Aziz	Adm. Multitex	32.58.91
	Claude Avanzini	Dir. Gen. SADVEL	35.02.03
	J. Royer	Dir. Techn. SADVEL	35.56.66
	Bennani Smires	CIOR	76.02.83

	Abderrahmane Bennani-Smires	SIM	24.44.61
	Ismail Chaouki	PTI	31 51.51
13.	PNUD (U.N. Development Project)		
	Louis Philippe Mousseau	Chargé de Programmes	76.35.05
14.	Consultants		
	Mustapha El Baze	FOCS	23.00.22
	Pierre Astell	Bureau de la Coop. Cn. au Maroc	67-10-75
	Mohammed Daoudi	Agro-Exp.	31.49.74
			H 67.34.94
	Rachid Abdellauoui	Hydrosystems	20.24.27
	Ali Abdellaoui	Hydrosystems	20.24.28
	Jamai Hajhouj	Access	30.28.77
	Abdelhanine Benallou	Sigma Tech	76.89.61
	Boubker Bouchentouf	IMEG, Optimum	77.80.80
	Faycal Benchekroun	IMEG	
	Mustapha Ait Bassidi	Exper. Energy	75.56.47
	P. Defosse	Bureau Véritas	20.08.57
	Rachid Belkhadir	Ecole Mohammedia d'Ingénieur	77.26.47
	Adallah Adyel	Faculté de Droit	75.15.44
15.	Business		
	Brahim Benali	Techno-Ecosyst. Safi	62.35.31
	Mohammed Ettaib	Adm. Unique	62.35.31
	Abderrahmane Bennani	Pres. Soc. Ind. Mor.	24.44.61
	Mohamed Bedidi	Business Promotion	62.54.69
16.	FAO		
	Abderrahmane Hafraoui	Senior Officer, Rome	57974812
17.	ONEP		
	Abousaïd	Scientist	
18.	Parliament		
	Alou Hatidi	President of Parliamentary Group, Directorates Water and Sewer, Rural Affairs	
19.	Ministre "Qualité des Milieux Naturels"		
	Ali Agoumi	Conseil du Ministre	76.28.11