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Profile of the Environmental Business Sector in Morocco

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Profile of the Environmental Business Sector in Morocco

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Acronyms

BOD	Biochemical oxygen demand
CFCs	Chlorofluorocarbons
CNE	National Council on the Environment
EC	European Community
EMP	Environmental Management Program of the World Bank
ERAC	Regional Agency for Land Management and Construction
FOCS	A market research and consulting firm in Casablanca
GOM	Government of Morocco
ISCAE	A business school in Casablanca
LBCD	A Canadian consulting engineering company
METAP	Mediterranean Environmental Technical Assistance Programme
OECD	Organization for Economic Cooperation and Development
ONEP	National Office for Potable Water
SAMIR	The national oil refinery
SIC	Standard Industrial Code
UNDP	United Nations Development Programme

Executive Summary

Profile of the Environmental Business Sector in Morocco is intended for a private sector audience, both American and Moroccan, interested in the growing environmental business market in Morocco. It is sponsored by the Project in Development and the Environment (PRIDE)/U.S. Agency for International Development (USAID). USAID, the World Bank, and the Government of Morocco (GOM) have agreed to design a public environmental management program which includes a role for the private sector in solving environmental problems. This profile will facilitate implementation of that program by describing the market for American environmental goods and services.

The current environmental market in Morocco is estimated at $116 million annually. Due to increased environmental awareness, future national market assessments will reach a cumulative $5.2 billion, most of which will be spent on municipal wastewater collection and treatment by the year 2011.

In addition, Morocco is diversifying its product sources away from its traditional French suppliers. The country is also liberalizing important aspects of its economy, allowing more foreign ownership and expatriation of profits. Because it is preparing to supply a united Europe, Morocco is welcoming these changes for foreign investors. (Ref. 46)

Against this background of change, the profile focuses on environmental market developments of interest to American exporters and investors. Morocco has courted American investors in hopes that they will participate in the country's economic growth. Although the American Chamber of Commerce in Casablanca has 50 members, the growth of the American niche has been less than expected and certainly less than desired.

To explore the potential of the environmental sector, 43 environmental companies were interviewed. The survey summary shows that the respondents believe the regulations needed to drive the market will be forthcoming. Generally, they forecast much expansion of business and diversification of markets.

Although the municipal wastewater collection and treatment sector will lead the way in dollar volume, several other markets will grow as well. Industrial pretreatment is necessary for a municipal program, as are consulting services and monitoring systems.

Drinking water, a major resource requirement, is in short supply. Whenever the poor quality of water reduces the quantity available for use, there is a market. Water purification will be well funded.

Existing environmental businesses in Morocco often seek foreign partners as a means of introducing their capability to the market. Almost all Moroccan environmental businesses have some foreign connections. Some company principals speak English as a second or third language and have advanced U.S. schooling at the graduate engineering level.

A clean technology thrust that focuses on changes in process more than end-of-pipe treatment will be welcome because it saves resources and promotes efficiency. Moroccans consider the United States a leader in clean technology and they welcome American companies. The local USAID mission is working to create a demand for American environmental know-how and technology. The World Bank is working with the GOM to finance growth of the environmental private sector by helping to develop policies and providing loans. It is now up to American private sector companies to evaluate and take advantage of opportunities created by these policies.

The diagram on the following page summarizes the outlook for business in the environmental area and lists the types of environmental businesses discussed in the profile. Sources of further guidance are suggested in Appendix G, References.

Most Attractive Features of Environmental Business Segments

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Near-Term Market	Long-Term Market
Municipal water and wastewater	●	●	●	●	●
Waste recycling	○	○	●	○	◑
Industrial wastewater	●	●	●	●	●
Air pollution	○	◑	○	○	◑
Water purification	●	●	●	●	●
Municipal solid waste	◑	◑	◑	◑	◑
Renewable energy	●	●	●	◑	●
Mobile source air pollution	○	○	◑	○	◑
Air & water monitoring and testing	●	◑	●	●	●
Environmental consulting	●	◑	●	●	●

KEY
○ = Low
◑ = Medium
● = High

A National Market Projection

As a prelude to the market projections for environmental business subsectors, this section of the profile estimates the overall national market for Morocco's environmental business.

Several methodologies, the conclusions which fall within a reasonable range, are employed to make these estimates. The conclusions are based on a combination of top-down analysis of pollution-control costs in the non-OECD countries, bottom-up estimated biochemical oxygen demand (BOD) discharges, actual budgets in Moroccan municipalities, and official program plans.

Quantitative estimates of the potential environmental market in Morocco are difficult to make, given the lack of disaggregated primary sales data. Two indicators can be used, however, to develop "order of magnitude" estimates of the annual market size:

1)	**Gross sales volume of private sector environmental services and equipment:**	**$116 million**
2)	**Availability of funds:**	**$281 million**

The first indicator is based on the study team's interviews with approximately 100 of the largest private sector firms involved in the environmental market. The estimate includes only current expenditures and does not account for future implementation of pollution prevention regulations and strategies. Thus, it seriously underestimates the actual market potential. The embryonic environmental industries expect significant growth, especially after the new Secretariat for the Environment is fully in place.

The second indicator is an estimate of the funds available for environmental investment. It may provide a better (if somewhat optimistic) indicator, since no matter what people want, they can get only what they can afford. The estimate of $281 million has the following components:

Allocation of a cumulative $5.2 billion of funds for wastewater treatment to the year 2010, including expenditures for sewage treatment such as construction of collectors and treatment plants by municipalities. Source: Discussions of needs assessment with World Bank	$233 million
Annualized expenditures of government-owned industries Source: 16% of total economic activity estimate	$46.5 million
Annualized expenditures of private industries Source: 4% of total economic activity estimate	$1.6 million

estimates assume Moroccan borrowing power will improve with the proposed program of significant economic liberalization. Our discussions with senior economists and government planners indicate that while the funding levels will undoubtedly change by the year 2010, the program target of $5.2 billion is a realistic estimate of what will be available. For example, sewers for the major cities alone would cost $3.4 billion.

Assuming a positive economic performance and donor willingness to allocate funds for pollution prevention and control, the past patterns of spending will likely shift. One reason is the privatization of public sector industries, which will change the anticipated ratio of public/private expenditures. Another reason is that solid waste problems are worsening, even as wastewater problems are starting to be addressed. Finally, the privatization of municipal services will attract additional private capital and improve efficiency.

Despite the uncertainties, a $5.2 billion cumulative expenditure by 2010 is reasonable, given Morocco's commitment to ending ocean dumping, the institutionalization of environmental management, and perhaps most important, the likelihood that water shortages will mandate the reuse of water to meet the needs of a growing population and rapid industrialization. These factors will probably prompt prevention and control programs.

The estimates of annual industrial expenditure were developed through discussions with Moroccan government officials and economists. They were based on their projections of environmental needs and the portion of economic activity likely to be budgeted for environmental products and services (16 percent for public sector industries; 4 percent for private sector industries).

American companies interested in entering this market must strategize carefully. French and other European firms have significant advantages. They have developed local marketing organizations, and their governments provide soft loans. In addition, they have local language fluency and relative proximity to the region. However, American firms can still find many attractive opportunities for several reasons. First, the market is growing rapidly, creating opportunity for firms with improved technologies. This will be particularly important in sectors such as pollution prevention, where U.S. firms have leading edge technologies with significant cost and performance advantages. Second, disillusionment has grown in the public and private sectors about selecting technologies primarily on the basis of soft loans as was often done in the past. The hulks of many outdated or inappropriate technologies purchased with these loans are scattered across the countryside. Finally, increasing numbers of Moroccan business and technical leaders have been educated in the United States and are interested in doing business and establishing ventures with U.S. firms.

Pollution prevention is a new and encouraging market and an area where the United States is an acknowledged world leader. The prospect of decreasing production costs while reducing environmental emissions is very attractive for both new industrial facilities and retrofits. Considering Morocco's rapid industrialization, it is particularly important to protect public health while maintaining economic development. USAID/Morocco has worked to identify the United States as a leader in pollution prevention, stimulating Moroccan business interest in working with U.S. companies in this area.

Current Environmental Market: A Self-assessment by Business

A team of three investigators spent 18 person-weeks in Morocco from early June to late July 1992, assessing the supply and market for private sector environmental goods and services. The investigation was limited to characterizing the existing private sector environmental business, identifying the firms, and assessing their prospects for success. The assessment of demand for private sector environmental services and products included private and public purchases.

A second visit was made in December 1992, when FOCS, a market research and consulting firm in Casablanca, conducted interviews with leading government officials responsible for environmental budgets.

This profile is not a complete investor's guide to doing environmental business in Morocco, although it will assist in that effort. Price Waterhouse's expertise in that area was compiled in a *Guide to Doing Business in Morocco*. This profile determines whether private sector capabilities in environmental goods and services are sufficiently well developed to encourage the GOM to include the private sector in its national environmental management strategy and to attract foreign investors.

The answer to this question is an unequivocal "yes." Currently, 100 companies employing from 5 to 2,000 employees do environmental business in Morocco. For this profile, almost one-half of them were interviewed about their environmental business and its prospects.

The 43 companies interviewed were selected from a general business database of 3,000 corporations, only about 100 of which are truly environmentally capable. The names were picked by professionals in the field and by references made to competitors during interviews. The interviewers, graduates of ISCAE, a business school in Casablanca, were supervised by M. El Baz, a professor at the school and director general of FOCS.

The questionnaire was pretested and modified prior to the interviews. A report on the survey results is presented in Appendix D. The interviewing stopped after 43 interviews because the message became redundant. The team is confident of the stability of the results based on interviews with only one-half the companies in the sector. The remaining companies listed in Appendix E were not interviewed.

The 43 companies include a few from each major group; 2 architectural firms, 5 analytical laboratories, 3 cleaning and green space maintenance companies, 1 well-drilling corporation, 21 consulting engineering firms, 9 maintenance and waste treatment service and

equipment companies, and 2 energy-distribution companies supplying unleaded gasoline. All the firms except for water-treatment companies view themselves as environmental companies.

Some viewpoints were shared by the majority of the respondents. For example, 32 of 39 believe that environmental business is a growing sector in Morocco. Forty-one believe that the government will introduce environmental protection measures in the next few years. With few exceptions, they are optimistic about their environmental business prospects.

They do not, however, all agree on what is the most serious environmental problem facing Morocco. Air pollution is considered the most important problem by 14, surface water by 7, groundwater by 6, and coastal pollution by 4. It is not a serious disagreement, because if we add together the responses on surface water and groundwater, air and water become the primary problems designated by the respondents.

In government environmental meetings where priorities were set, similar diagnostic differences occurred. Some government officials, in the face of the high capital costs of reducing air pollution–for example, unleaded gas and sulfur removal–would like to postpone dealing with the problem for the present. Despite this official view, an effort is being made to import cleaner fuels, and unleaded gas is available in the country.

The respondents overwhelmingly recognized the obstacles to development of environmental markets. Almost all of them cited the absence of standards and enforcement as the first or second most significant obstacle. Only a few businessmen considered the lack of environmental consciousness of their customers to be a major obstacle. Standards and enforcement will drive the market. Nothing else comes close.

Next, the interviewers asked about the biggest hindrance to development of their particular business. Although respondents returned to the insufficient market as an impediment, the diagnosis expanded to include needs for financing and expertise. Indeed, over one-half (25) of the respondents put financing in either first or second place as an impediment to developing their chosen field. In particularly limited cases, such as laboratory services, government competition was mentioned.

When asked what would help most in developing the environmental sector, the response was consistent. Most of them reiterated the establishment of standards (21), with another group giving priority to financing (11). If both the first and second most important categories are included, all respondents cited both standards and financing. A small group of six or seven think education, expertise, and communication would develop the market, but the overwhelming consensus is that standards and financial assistance are the greatest needs.

These conclusions, drawn from personal interviews with nearly one-half the private sector constituency, directly influence the recommendations of this profile as presented in later sections.

Seeking other ways to support the sector, we asked if a monthly bulletin would be helpful and if so, what kind of information it should publish. The responses clustered around three points: 1) the publication of immediate business opportunities (for example, a *Commerce Business Daily* type of publication); 2) advance or early market news; and 3) a column on the latest technological solutions, including information on where to get equipment. No consensus exists about how much businesses would pay for such a publication, but $6 per issue appears to be a maximum cost.

Interviewers also asked respondents how they communicate with overseas sources to gather information. Almost all the companies have relationships with foreign companies, which they use to win business at home through subcontracts or joint ventures. For example, it is reputed that 80 percent of the environmental impact studies done in Morocco to date have involved foreign companies. A number of references were made to equipment suppliers, including some American water treatment technologies.

It might also be noted that almost all technical people met through informal interviews had been educated abroad. Morocco is part of the world economy through educational contact and business partnerships, a critical factor in developing environmental awareness and capability.

Companies with the skills to help the country clean up its environment and prevent future problems are already in business. An entirely new service infrastructure does not have to be built in the public sector or at government expense. The government's role is to set environmental regulations, standards, and norms that guide the industry to effective action and expand the funding and financing available to private sector businesses.

If the government can do so with financial and technical assistance, businessmen will remain optimistic about their future. Indeed, when we asked about plans to expand into other business areas, they cited a variety of market niches. Eight companies are interested in the treatment of industrial wastewater. Most respondents expected to expand their present areas of business. The environmental business sector can be characterized as dynamic, optimistic, capable, and poised to grow as soon as the government sets standards and begins to enforce them.

The Future of the Sector: Reinforcing the Assessment

The previous section presented the Moroccan private sector point of view on the future of environmental business. This section presents the judgment of the investigators, who have many years of experience in the environmental sector, to supplement the survey findings. The team concurs that a system of environmental regulation will be in place in the next few years. Morocco is ready to recognize that something must be done and the country has sought much outside assistance to help it establish a regulatory system. Discussions have been held regarding new environmental laws and institutions. With the assistance of the World Bank, a new Secretariat is strengthening and coordinating environmental institutions. International accords have been signed. Interest in environmental protection, especially preservation of natural resources, including water resources, is strong and probably irreversible. The team writing this report concurs with the domestic environmental business assessment that the future of environmental business is bright.[1]

The first qualification is that a perceived need does not create a market. Allocation of funds is necessary too. The needs assessment, Appendix A, is not a market analysis. A need is a necessary but insufficient condition for sales. Money must also be available.

Increasingly, however, the international donor community is making money available. Environmental awareness is opening budgets in Morocco. When the cost of river water treatment goes up by a factor of 14, as it did near Fez on the Sebou River, the government takes notice. (Ref. 46) Money will be available, and the process of developing environmental budgets for the next few years has begun. Billions of dollars are expected to be allocated over the next decade. It is worth investigating how and by whom this money will be spent.

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[1]One author, Morton Gorden, reviewed this report in the third quarter of 1993, confirming that events since the profile was drafted early in the year have reinforced the conclusions. The new Secretariat in the Ministry of the Interior has begun operations. The World Bank has signed accords for several million dollars. USAID has introduced a program of pollution prevention which should stimulate private sector service business. Significantly, USAID's multi-year effort to help municipalities privatize their environmental services has begun to bear fruit with Fez, Marrakesh, Safi, Meknes, and Casablanca all negotiating to implement solid waste services.

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Market Projections for Environmental Business: Types of International Markets

A generally accepted format for reporting on environmental markets is still being developed. Gradually, the U.S. Government is evolving a set of categories to supplement the Standard Industrial Code (SIC) in describing the cross-cutting environmental marketplace. [See "Capabilities and Competitiveness of U.S. Environmental Technologies, A Report of the Office of Energy and Infrastructure," March 1992. (Ref. 42)] Until there is a standardized definition of the environmental market, private sector business opportunities in Morocco will be reported in the following categories, which have been adapted from the other private sector profiles published in this series.

- Municipal Water and Wastewater
- Waste Recycling
- Industrial Wastewater
- Air Pollution
- Water Purification
- Municipal Solid Waste
- Renewable Energy
- Mobile Source Air Pollution
- Air and Water Monitoring and Testing
- Environmental Consulting

The discussion of business opportunities in this section will be augmented by the more systematic reporting format used in other profiles in this series, namely Egypt and Jordan. The absence of reliable market research data is a barrier to private sector investing. However, where there are reliable data, the competition is likely to already be there. These conclusions are qualitative, but include as many quantitative guides as possible.

Municipal Water and Wastewater

Wastewater treatment and collection and industrial pretreatment will provide an enormous market in the future. For the large cities of Casablanca, Agadir, Setat, Rabat, Fez, Meknes, Tetouan, Kenitra, Marrakesh, and El Jadida, master plans are under way and institutional arrangements will favor private participation in the form of concessions to build, own, and operate. (Ref. 47)

By the time Moroccan priorities are set and World Bank financing arranged, construction and sanitary engineering firms should be in a good position to establish themselves. The master plans call for expenditures to the year 2011. Indeed, several firms are already doing business in Morocco, often with ties to France. These are firms that believe they will be in line to expand in their "natural" marketplace.

In the wastewater collection and disposal market, the best quantitative starting point is to know the source of funds potentially dedicated to cleaning up the municipal wastewater problem. Sanitary sewage treatment is virtually nonexistent; only about 5 percent of urban sewage is treated before finding its way to the ocean. About one-half the population lives in urban areas, mostly along the coast. The need for miles of pipe and numerous treatment plants to serve about 15 million people is the basis for what could be a sizable business.

The wastewater collection and disposal business consists of building new collection systems, some with stormwater included and some with separated stormwater. Some cities may keep operating costs down by using sand beds and low-energy consumption treatment programs such as sand dune disposal in Agadir and lagoons in Marrakesh. These low-technology plants will probably be in demand early in the cleanup process. A Moroccan official familiar with the United States says that plants designed to operate at low cost throughout the Western states can serve as models for Morocco.

Moroccans have a strategy to employ native materials and local firms and to stress reuse of water for irrigated agriculture. Package plants will be sought for rural areas.

The Moroccan municipal tax system provides revenues for other municipal needs, suggesting that money should be available for environmental protection. The municipalities benefit from a 21 percent value-added tax on business transactions. Of these funds, 20 percent is allocated to municipal budgets to carry out their functions. In Morocco, this funding looms large, for it is a steady, committed source that can be used for municipal operating expenses. Environmental cleanup and prevention does not have to directly compete with operating needs.

The primary source of funds augmenting these taxes is a charge on fresh water for its ultimate disposal. Approximately one dirham of three charged for fresh water will be allocated to wastewater treatment in a "user pays" formula. The National Office for Potable Water (ONEP) is obliged to levy a treatment and disposal charge dedicated to cleanup. This is a condition for World Bank financing, estimated at $5 billion, to complete the program by the year 2011. The estimate is based on needs, not borrowing power.

Neither budget is employed at this time for sewerage programs, which is a source of tension with businesses that pay for the disposal service but are not yet served. The team visited businesses that are being asked to clean up, but the technical parameters are uncertain due to doubts about the eventual use of these tax revenues and about the pretreatment parameters.

The first money will be spent in Casablanca. (Ref. 47) An urgency is felt in such areas as Mohammedia, where firms have had open conflicts about hurting each other's business. Ocean disposal of wastes conflicts with tourism. Because of the need to remove

odors around the new Great Mosque in Casablanca, the bay must be cleaned up. Even intake water for manufacturing bears the mark of upstream polluters. In sum, people are not only getting on each other's nerves, but they are directly affecting each other's wallets.

Marrakesh, a leading tourist city, has taken two steps forward. It has a program for locating industry in an industrial park, which has separate storm and sanitary drains. The city has not, however, determined which drain is to be used by which group and has not yet installed a treatment plant, although a master plan calls for lagooning.

Reliable market research would require visits to each municipality and/or the Ministry of the Interior to determine who is ready to make major commitments. The cities listed above are in different states of readiness. When the cities go to bid, a notice will be posted.

Casablanca provides a near-term possibility. The city plans to spend 1,387.60 million dirhams ($167.3 million) between now and 1994, and 8,800 million dirhams ($1.02 billion) by 2011. These sums are for interceptors, pumps, outfalls, and treatment systems. Priority is going to the region of the Great Mosque. (Ref. 47) The large French firms are already involved with subsidized financing.

We recommend that entrepreneurs visit sites on their own. Marketing representatives should be prepared with important information such as financial schemes that stress privatization of municipal services. It will be necessary to compete on price, financial services, low operating costs, and reliability in an environment not normally dedicated to regular maintenance. Indeed, a sales approach that takes account of the limits of technical staff and provides a full range of services may create priorities for action. Availability of supply will affect the timing of demand.

Municipal wastewater has a high priority due to the availability of near-term budgets and master planning work of the Moroccan government. Innovative financing schemes based on the "user pays" formula in selected localities are assumed possible in making this favorable market judgment. The long-term (2011) market of $5 billion as planned is a high end possibility, assuming economic growth continues in Morocco.

The table on the next page ranks the opportunities in municipal water and wastewater treatment in four types of business. The rankings are marked in the circles according to the key. Note, however, that the key for "competition" assumes that less competition is better because it means the field is not crowded with local firms. The best level of competition, therefore, is designated with a dark circle rather than an empty one.

The apparently considerable competition in the design field all involves traditional firms creating energy-consuming, obsolete technologies without sufficiently considering

energy costs and sludge utilization. An American approach to resource management might reduce operating costs and remove competition.

Municipal Water and Wastewater Treatment

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
ENGINEERING AND DESIGN	●	●	●	●	●	●	●
CONSTRUCTION	●	●	●	●	●	●	●
EQUIPMENT AND SUPPLIES	●	●	●	●	●	●	○
OPERATIONS AND MAINTENANCE	●	●	●	●	●	●	○

KEY
○ = Low
◑ = Medium
● = Best

Waste Recycling

In a country like Morocco with such a range in income levels, one man's junk is another man's treasure. Goods cascade down, and in the case of antiques, move up the consumer chain with almost everything used and reused. Scavengers collect items thrown away as useless and bring them to a place where they are reused. Glass bottles are refilled; aluminum cans are brought to a neighborhood collector who sells them abroad for scrap. In addition, as a Moroccan friend pointed out, the flea markets illustrate that nothing is thrown away. There is a buyer for everything, even a pair of eyeglasses with only one lens.

Is there, therefore, a commercial recycling business as we know it with formal markets and resource recovery centers? Except for a few elements, the recycling model of the West is not a useful commercial model in Morocco. With more time, increased affluence, restrictions on scavenging. and better collection systems, a modern waste recycling business might be considered. Currently, everything is already recycled through informal channels. Valuable materials, such as lubricating oil, are recovered in Casablanca, but elsewhere they may be burned for heat. Other items, such as off-spec manufactured products, are limited because workers take these home.

Various types of plastics are hand segregated at the open dump, often by children, and washed, bagged, and stored until the volume warrants collection by a recycler. Questions about prices, pick-up times, ultimate destinations, and other information normally available in formal markets are lacking here. It was not immediately possible to penetrate the clandestine market.

In sum, if commercial automated recycling is introduced, it will compete with economic activity of social classes who have very little opportunity. If provisions are made to employ scavengers so that unhealthful practices stop, then it might be worthwhile to invest capital. Even then, it probably pays to wait several years until the national waste stream contains more results of affluence. Early signs of affluence exist in the more economically successful industrial areas. Waste plastics are already used and have become too expensive on the informal market to supply a waste plastics building material plant, according to a market researcher seeking plastic feedstock for a proposed plant.

The table below ranks the opportunities in waste recycling and associated businesses for three types of business.

Waste Recycling and Associated Businesses

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
SEPARATION EQUIPMENT AND SERVICES	◑	○	◑	◑	○	●	○
PLASTIC AND OIL	○	○	◑	○	○	◑	○
GLASS RECYCLING	○	○	◑	○	○	●	◑

KEY
○ = Low
◑ = Medium
● = Best

Waste recycling, already practiced in the informal sectors, has a low ranking, reflecting that it is too early to expect a change in the current status. Gradually, as regulations tighten and the flow of materials comes under the jurisdiction of regulatory agencies, high-value products such as solvents and lubricants will be collected for more formal disposal methods. In the next few years, local circumstances and particular materials will warrant joint venture investments.

The real problem for large-scale commercial scavengers is that children already provide a cheap labor force for recycling, working in very unhealthy conditions. American companies could not participate in this system.

If landfills are better managed and municipal collection is privatized, steps that are now under consideration in Casablanca, Safi, Marrakesh, Meknes, and elsewhere, recycling efforts will be much more formal and business opportunities will thus change quickly. The table would, in those cases, appear more favorable for waste recycling.

Industrial Wastewater

A grassroots movement at the local level that addresses industrial pollution problems has often reinforced national concerns. The impetus for action may come from conflicts over commercial use of land and water. The problem of industrial wastewater is on the public agenda at the local level, and people are working at the national level to control pollution before they are overtaken by public demand for action. The market will also be encouraged by the privatization of more than 100 government companies in the next few years.

Does this mean there is a market for treatment of industrial wastes? The answer is yes; all signs point to more efforts to clean up and prevent pollution. The issue becomes selecting a business-development strategy that addresses timing and initial steps. The World Bank is funding pilot projects in anticipation of the market for industrial wastewater control in several cities. This process helps initiate early activity in such places as Safi, Fez, and Tazi, and such industries as tanneries and alcohol, sugar, and olive oil plants. The World Bank pilot projects are likely to cover the financial aspects of an initial $10 million investment in cleanup and prevention of industrial wastes.

Many companies will not wait much longer. SAMIR, the national oil refiner, plans to spend millions of dirhams on process upgrades and pollution prevention. The major soft drink bottlers are actively considering cleaning up their bottle-washing wastewater for reuse. Industry associations have formed pollution committees to discuss their common interests in cleanup. Patronat, the association of industry associations, is considering how to serve its members who see the "handwriting on the wall."

An American business-development strategy in industrial liquid wastes should also consider taking local firms as partners. Many American firms need bilingual partners familiar with the culture. Moroccan business fits neither francophone nor Arab stereotypes. A list of companies working in the field today is available through the Private Sector Initiatives Group at USAID in Rabat, Morocco. Contacts are listed in Appendix F to this report. Industrial wastewater is an area where local firms wish to expand. Chances are good that they will do

so over the next five years, and will be able to hold a substantial market share in the next 10 years.

The table below ranks the opportunities in industrial wastewater treatment for three types of business. The high rankings are based on the identification of locations, such as Mohammedia, where environmental consciousness has emerged from market losses. The assumption is that in two years environmental legislation and establishment of norms will be under way. Many industries will have grace periods, but within five years the market will be quite active, so establishing a market share is much easier now than it will be then. The expansion of sewerage systems will also put industrial pretreatment high on the national agenda. A strong market niche will exist among export industries already feeling the pressure to attain European norms in product quality and pollution control.

Industrial Wastewater Treatment

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
DESIGN AND CONSULTING	●	●	●	●	●	●	○
EQUIPMENT AND SUPPLIES	●	●	●	●	●	●	○
OPERATION AND MAINTENANCE	◑	◑	◑	◑	◑	◑	○

KEY
○ = Low
◑ = Medium
● = Best

A final positive note in this area is that Moroccan regulatory policy is likely to permit a great deal of technical flexibility in determining how to achieve standards. This gives much room for creative technological solutions other than end-of-pipe treatment. Foreign companies with in-process solutions will be welcome. USAID's new pollution prevention program opens a serious opportunity for markets not driven by regulation, especially sugar mills, pulp and paper.

Air Pollution

The air of Casablanca is visibly polluted. The major power and industrial plants are visible point source polluters as well. In the private sector survey, this problem received considerable attention. The Ministry of Energy is working on programs of fuel substitution, solar and propane, and low sulfur oil and is studying pollution-control measures. One measure the team is discussing for Safi is to substitute propane for the uncontrolled burning of waste and low-quality oils and then to burn the displaced dirty fuels in a gas-scrubbing municipal cogeneration facility.

Officials are aware of opportunities for cleanup over the long term. Gas cleaning, even with by-product collection at the site, is still believed to be too expensive. Until less costly, end-of-pipe technologies are available, or until political pressure changes, the alleged negative cost/benefit ratio will limit major expenditures. The largest market is probably in new investments and replacement of equipment where the clean technology applies even now.

The visibility of air pollution in Casablanca will accelerate growth in services. Quick-fix kinds of equipment might be the end result, but the potential will not be realized in the short term, except in conservation services.

The second air pollution market, mobile sources, could develop from a potentially popular campaign to convert buses to clean fuel. Propane conversion for buses has been discussed. The substantial private bus fleet along the Casablanca/Rabat axis might be approached either through a public appeal or regulatory authority. Car tuneups and inspection stations are probably five years away, especially if the bus problem is not tackled, and nothing else is done. Even so, grandfather clauses will probably be written to cover old cars. Controls over new cars will eventually limit the problem. It is difficult to quantify this market, for there is no official pressure to correct the problem.

Cities in the developing world have been polluted for many years, but Moroccans appear to be losing their tolerance for pollution. Generally, air pollution control is thought to be so costly that some officials fear addressing any part of it because the question inevitably arises: If you tackle mobile sources, why not go after the really big targets?

An effort to answer that question suggests that street-level pollution affects more people per day than any other source. It is visible and it creates anger. For public relations and consciousness raising, converting buses would pay handsome dividends. A few successes would show that people are not helpless in the face of pollution problems.

Not all elements of society wish to encourage this activism, but some elected municipal officials with independent authority would be attracted to a model program of inspection, compliance, and publicity for cleaner air. The first salesman to succeed can look

forward to a serious market share when other cities recognize buses as unnecessary polluters. There is no big market for mobile sources overall, but the highly visible target of buses would provide early cash flow. Automobiles might be targeted next. In 1991, 40,520 private cars were registered in Morocco–14,020 domestic and 26,500 imported. Casablanca is the home of 30 percent of the national total (13,660).

The tables below rank the opportunities in air pollution control in various types of business. The first table ranks point source air pollution and the second ranks mobile source air pollution.

Point Source Air Pollution Control

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
AIR POLLUTION CONTROL ENGINEERING AND CONSULTING SERVICES	●	○	○	○	○	●	◑
AIR POLLUTION CONTROL EQUIPMENT	●	○	○	○	○	●	◑
ENERGY CONSERVATION SERVICES AND EQUIPMENT	●	●	●	●	●	●	○
FUEL SUBSTITUTION	○	○	○	○	○	○	◑

KEY
○ = Low
◑ = Medium
● = Best

Mobile Source Air Pollution

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
VEHICLE TUNE-UPS AND INSPECTIONS	◑	◑	●	◑	◑	●	◑
ALTERNATIVE FUELS	○	○	●	◑	◑	●	●
LIGHT RAIL PUBLIC TRANSPORTATION	●	◑	○	◑	○	◑	◑

KEY
○ = Low
◑ = Medium
● = Best

The low ranking for most of the mobile sources market indicates that this problem will be solved at the level of vehicle manufacture and local tuneups and inspections. Eventually, the monitoring and maintenance market will grow, but only in a limited geographic area. The rankings reflect the location of the perceived problem in the Casablanca/Rabat corridor. Street-level pollution, especially at bus terminals, provides the most visible target. Casablanca, with the largest population, is the city most likely to be pressured to regulate mobile sources.

Water Purification

As long as water is the vehicle chosen to move wastes (on-site devices such as the Clivus Multrum toilet or grinding and burning incinerator boxes will not penetrate the urban market), water purification will provide a major market in Morocco. Drinking water will be in short supply, and every gallon of water in Morocco will be used and treated several times before it enters the ocean.

There are capable firms in the marketplace already supplying industrial makeup water, drinking water, and polishing in some home systems. This market will grow, even if complete pollution control is practiced. Although the relation between pollution control and water supply treatment has never been quantified, measurement and treatment will always be needed in a water-short environment.

There will also be a market for reuse of water on-site at bottling plants, and caustic removal and reusable wash water. The mining industry will provide a market for stabilization of wastes and water reuse, and with the increase in the costs of irrigation water, for agricultural processing water reclamation. Treatment of contaminated groundwater, especially demineralization, is a future market because avoiding the destruction of productive soils is now on the public agenda.

The table below ranks the opportunities in water purification systems in three types of business.

Water Purification Systems

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
INDUSTRIAL WATER PRETREATMENT	◑	●	●	◑	◑	●	◑
DESALINATION UNITS	●	◑	◑	◑	◑	●	◑
COMMERCIAL AND HOUSEHOLD WATER TREATMENT SYSTEMS	◑	◑	◑	◑	◑	◑	◑

KEY
○ = Low
◑ = Medium
● = Best

Water will remain a priority for Morocco, due to the shortages of drinking water and the connections that have been made between diseases and industrial and agro-industrial pollution. Clean drinking water costs 30 centimes a cubic meter, so ONEP will be an immediate client. This government company supplies almost one-half the drinking water in Morocco. It is programming about 1.6 billion dirhams ($186 million) in 1993 and 1.4 billion dirhams in 1994, during a multi-year expansion program begun in 1990 which is likely to continue through the decade with World Bank financing. (Ref. 46)

Industrial makeup water purification and conservation is also a market, but it is difficult to separate from other budgets. Moroccan industry grows at about 5 percent per year, with much of the expansion in wet industries. Much new attention is focused on water quality and reuse of water.

The silting of dams is another problem, but the solution may be difficult to find in the private sector. It does not appear to be in the province of private initiatives, except for the research aspects of it. However, new ideas are being encouraged such as terraced farming, in which the government grants the land and perhaps the water in return for soil stabilization efforts. The message is that new alternatives should be tried because the problems are so acute.

Mine tailings fall into a similar category, which the private sector sees only as an expense. Once again, experimentation is possible. New techniques and treatments proposed by the Swedish members of the team warrant further consideration. Binders, stabilizers, and materials that render tailings safe and functional may also be feasible. (Ref. 45)

Municipal Solid and Hazardous Waste Collection and Disposal

The West views the need for municipal solid and hazardous waste collection and disposal as considerable, but the market size is overestimated. Papers, plastics, and vegetable wastes are visible everywhere. Non-biodegradable plastic shopping bags that have replaced the reusable net bags blow around in the country, the city, and at the seashore.

Sidewalk garbage collection brings boxes into the street, where scavengers–human, feline, and canine–spill out the contents. Is there a need for improved collection and disposal? Undeniably yes. Is there a market? Arguably yes, but only if the problem is rethought.

Some communities have tried such alternatives as composting, but with little success. Open dumping of solid wastes continues into rivers, precipices, valleys, and any place that appears out of the way. Although this practice is unsatisfactory to many, alternatives do not appear feasible. A management program for controlled landfills that protects groundwater is greatly needed. If there is a market, it is just beginning. Open dumps are cheap, while controlled landfills would be relatively expensive. After serious failures, composting is being tried again because it makes much sense in a country that needs soil amendments and soil nutrients. To date, technical problems have arisen with moisture content and inappropriate equipment chosen for Moroccan waste and waste management practices. Farmers have also rejected the soil amendment. There has been more disappointment than success and expensive equipment lies idle. Anyone who wants to take on the challenge of the 70 percent moisture content in the solid waste stream can find opportunity. Much interest in trying to solve the municipal waste problem is expressed verbally, but there is considerable frustration.

Much data has been collected and projected on Moroccan urban solid waste. Recent work in Safi, which comprises 2 percent of Morocco's urban population, indicates the current volume of waste generation and composition and the rate of increase as the society becomes more affluent. In a city of 270,000 people, .6 to .7 kilograms is generated per day per

person. This is up from .5 kg in 1981 and projected to be .8 kg in 2000 when 300 tons per day is estimated.

Samples of the waste are composed of 87 percent combustibles by volume: paper, 7.27 percent; putrecibles, 65.85 percent; wood, 6.72 percent; plastic and rubber, 3.67 percent; cloth, 3.22 percent; and leather and skin, .27 percent. The incombustibles (13 percent) include: metal, 1.07 percent; glass, 1.51 percent; and ash, 10.42 percent. (Ref. 43). A Canadian consulting engineering company, LBCD, estimates 500 to 600 kw per ton if waste is burned in a cogeneration unit. (Ref. 44)

Electricity tariffs are complicated in Morocco, the rate differing by voltage, fixed service charge, volume, and end use. On the average, however, .70 dh/kw is used to compare with other countries in Europe that average .44 dh/kw. (Ref. 48)

A prefeasibility study to generate steam and/or electricity is under way for Safi. Moroccan municipalities are looking for a solution to solid waste disposal; current technologies have not succeeded. Biodigestion has been discussed as another possibility.

Safi does not deviate substantially from national waste production figures, which show 3 to 5 kg per person in rural areas and 5 to 8 kg per person per day in urban areas. Of course, seasonal variation of humidity will show high numbers in the summer due to fruit consumption. Other studies show a 1,000 kcal/kg for calorific value on the average. (Ref. 45) The following table indicates further the stability of waste generation in the major cities. Each city averages a production of 0.6 kg/d/p.

Waste Generation in Selected Cities

City	Population 1990	Rate of Collection (%)	Total Daily T/d
Casablanca/Mohammedia	3,900,000	80	1,900
Rabat/Sale	815,000	80	400
Fez	725,000	70	320
Meknes	500,000	80	250
Oujda	380,000	80	200
Marrakesh	640,000	85	350
Tangier	410,000	85	230
Tetouan	290,000	75	150

Hazardous waste is often mixed with municipal waste and is therefore not a visible problem, but it is present in nine provinces. (Ref. 45) As regulations proceed and concentrated bottoms are created from cleanup, consciousness of the problem will grow. Discharges of mercury, chromate, and other toxic and persistent problems are now receiving publicity. No general awareness of the problem exists, however, and without regulation, hazardous substances will continue to be dumped in municipal uncontrolled discharge sites.

The municipal revenues from the value-added tax could be applied to this problem. Privatization is often discussed, and much groundwork has been laid to facilitate the process of private collection and engineered disposal facilities. Thus, in the next few years a few cities can be expected to conclude pending arrangements with private domestic and international waste management firms.

Outdated pesticide storage sheds are a major source of hazardous waste. About 5,000 tons of pesticides originally used for locust control were dispersed throughout Morocco in these sheds. (Ref. 11, 12, 32)

The privatization of collection and disposal has been discussed, and the groundwork laid by much donor community participation. Unfortunately, lessons from past failures must still be learned. The high humidity of the waste and low consumer spending have limited the potential of available Western technologies. A variant on scientific sanitary landfills initially developed for hazardous waste disposal will encourage this sector. Over the long term, and with the success of World Bank pilots, hazardous waste will generate substantial business. The competitive situation will change as privatization moves forward.

The table on the next page ranks the opportunities in municipal solid and hazardous waste collection and disposal for four types of business.

Municipal Solid and Hazardous Waste Collection and Disposal

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
COLLECTION EQUIPMENT	●	◑	◑	◑	●	●	◑
COLLECTION SERVICES	●	○	●	◑	●	●	◑
DISPOSAL SERVICES AND EQUIPMENT	●	◑	◑	◑	●	●	◑
HAZARDOUS WASTE	◑	◑	●	●	◑	●	Not enough information

KEY
○ = Low
◑ = Medium
● = Best

Renewable Energy

Several years ago a renewable energy program using photovoltaic cells was initiated in Morocco which involved considerable donor activity. USAID embarked on a training program at the University of Florida, courses in Rabat, visits to U.S. sites, and a solar laboratory in Marrakesh. Today, the small country of Morocco uses 4 percent of the world's photovoltaic cells. Furthermore, and significantly for tomorrow's market, a study is determining where to locate the electrical grid. Electrification will take place through a photovoltaic village utility where people come and pay to recharge the batteries that power their lights and television sets.

According to local engineers seeking business partners, the definition of grid limits will determine a large market for village electrification. The final study will quantify the market estimates. They know now that in 1991 there was an installed base of PV of 3 to 4 MGW. In 1991 an additional 1.5 MGW was installed. By March 1992 an additional 7 MGW was installed. This "mini-boom" was expected to continue with still another 6 to 8 MGW of non-residential applications installed. Most of this market share belongs to German and Japanese firms. Sigmatech is doing this study under contract to the GOM.

In addition to PU, there are 10,000 m^2 of solar thermal collectors installed, with projections to triple that number each year. (Ref. 15)

From an environmental point of view, deforestation can be slowed by using solar thermal power to replace the burning wood that now heats the baths. There is much impetus behind the solar movement in Morocco. It is unlikely that the market is saturated; investigations of the potential indicate that retail distribution channels are responsible for the underutilization of solar thermal power. Although the rural exodus sets limits on growth in the market, government efforts could be made to install more solar thermal to keep people on the farms.

The table below ranks the opportunities in renewable energy for four types of business.

Renewable Energy

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market
PHOTOVOLTAIC SYSTEMS	●	●	◑	◑	◑	●
SOLAR THERMAL POWER	○	◑	○	○	○	○
SOLAR WATER HEATING SYSTEMS	●	○	●	◑	●	●
WIND ENERGY	●	●	◑	●	●	●

KEY
○ = Low
◑ = Medium
● = Best

The renewable energy market has been proven in Morocco. Applications and market niches have been identified. The policy of grid extension takes photovoltaic. Wind energy remains the only renewable energy source with unrealized potential.

Air and Water Monitoring and Testing

Traditionally a market develops for air and water monitoring and testing early in the process of determining the quantitative dimensions of the problem during establishment of specific control requirements. This market is poised for rapid growth for that reason. The numerous government and private laboratories are learning how to switch from food export quality control to pollution monitoring. With the establishment of pollution-control norms and the heightened awareness that enforcement brings, this market will continue to grow. Firms already in the business are well poised to assimilate that growth.

A series of needs may soon lead to a focus on markets, at least in the form of planning for eventual civil engineering and hydraulics. Management of water tables to avoid salination of the soil is a future market. The problem could be partly alleviated by using better irrigation equipment and practices, and spraying rather than inundating, but there are reasons to use older and less energy-intensive solutions. A proposal for a monitoring and rapid response water management system would be welcome.

Generally, there is a substantial, recognized need to provide an agricultural extension service that deals with pesticides, fertilizer, and water management at the farmer level. It is not clear how this can be a profitable venture for the private sector. There is some interest in a proposal for a commission to examine how to avoid the damage that has been created by introducing modern chemicals without using modern methods.

Water testing will rapidly lead the way in this sector because water norms will be the first to be set. When water pollution is no longer tolerated, the consequent establishment of discharge limits will stimulate the market. Any new techniques, for reduced cost, enhanced accuracy, or improved management methods, will find a ready audience. Although government laboratories will provide competition until a no-compete rule is established, the market should be large at the start.

The GOM, for example, is seeking $9 million to establish a National Study Center for Oceanographic Research. The tentative site is outside Tangier, a location that would benefit from access to both the Atlantic and the Mediterranean. Such a center would provide good baseline data for follow-on activities.

The government competes with the private sector for laboratory work in selected areas. Attention should be paid to this fact before investing.

The table on the next page illustrates the opportunities in environmental monitoring and testing for three types of business.

Environmental Monitoring and Testing

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Morrocan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
TESTING AND ANALYSIS SERVICES	●	○	◑	○	◑	●	○
TESTING AND ANALYSIS EQUIPMENT	●	◑	○	◑	○	◑	◑
MONITORING MANAGEMENT	●	◑	◑	◑	◑	●	●

KEY
○ = Low
◑ = Medium
● = Best

Environmental Consulting

The market for consulting services to advise on plans and actions is already developing. Resistance and reluctance are giving way to a sense of inevitability. Consultants are already in place, most with foreign partners. Still, many of the firms interviewed see room for additional partners for financial or specific-equipment requirements. The market is not closed to new foreign entrants with competitive technologies and know-how. Furthermore, although Moroccan professional salaries are high by developing country standards, they remain below European levels, so there is a professional base for exporting services.

Foreign investors should know that good local talent is ready to embark on joint ventures. Working for the government in the studies market is risky, however, because the government has a poor reputation for paying on time. Once a study is published, it cannot be repossessed. Local businesses need to know pricing and defensive tactics.

The table below ranks the opportunities in environmental consulting services in three types of business. The high rankings for environmental consulting services reflects the need to define actions based on expected standards for pollution control and prevention. Clean technologies for new industries will be a large market and process engineers will be much in demand. Because many of these technologies will be new to local engineers who were educated abroad, they are receptive to foreign suggestions. End-of-pipe treatment will also provide business for some time, but industrial design improvements will eventually replace that market. Of course, how Morocco eventually relates to the Common Market and whether it becomes an industrial center for Europe and Japan will determine whether the environmental sector comes from indigenous or foreign sources. In a global economy, future North American trade patterns with Mexico, Japanese competition in Asia, and Common Market wage rates have more to do with the growth of business in Morocco than environmental sectoral analysis can determine at present.

Environmental Consulting Services

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Potential for U.S./ Moroccan Alliances	Near-Term Market	Long-Term Market	Level of Competition (● = Lowest Level)
CONSULTING FOR INDUSTRIAL WASTE MINIMIZATION AND MATERIAL RECOVERY	●	●	●	●	●	●	◑
ENVIRONMENTAL POLICY AND MANAGEMENT SERVICES	●	●	●	●	●	●	◑
ENVIRONMENTAL TRAINING AND PUBLIC AWARENESS CONSULTING	●	●	●	●	●	●	◑

KEY
○ = Low
◑ = Medium
● = Best

The table below summarizes the conclusions of this profile regarding market opportunities in the Moroccan environmental sector. Whether the readers of this report are optimists or pessimists, they can see that needs are great, consciousness is growing, and the market is potentially in the billions of dollars. The challenge will be to keep pace with events and to be ready to act when the time is right. Usually a local partner provides the lowest-cost method of acquiring accurate market information and precisely timing sales.

Most Attractive Features of Environmental Business Segments

TYPE OF BUSINESS	Fast Growth Expected	Opportunity for U.S. Business	Opportunity for Moroccan Private Sector	Near-Term Market	Long-Term Market
Municipal water and wastewater	●	●	●	●	●
Waste recycling	○	○	●	○	◑
Industrial wastewater	●	●	●	●	●
Air pollution	○	◑	○	○	◑
Water purification	●	●	●	●	●
Municipal solid waste	◑	◑	◑	◑	◑
Renewable energy	●	●	●	◑	●
Mobile source air pollution	○	○	◑	○	◑
Air & water monitoring and testing	●	◑	●	●	●
Environmental consulting	●	◑	●	●	●

KEY
○ = Low
◑ = Medium
● = High

Background, Current Situation, and Future Prospects

The sustained growth of the Moroccan economy 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 substantially affect 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.

Depletion of Water Resources. Water resources are limited in Morocco. The average annual precipitation is 150 billion m^3, varying from 50 to 400 m^3. Most of this precipitation evapotranspirates, evaporates, or flows into the sea. Only 30 billion m^3 is considered a renewable water resource. Of this total, 22.5 billion m^3 is surface water, whereas 7.5 billion m^3 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 m^3 of surface water and 3 billion m^3 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-Martil. The water flow in these rivers varies considerably by season. From 60 to 90 percent of the water runs off during the rainy season, while the flow in some of the rivers drops to almost nil during the dry season.

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, industry is expected to expand 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 rapidly increasing urbanization and 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. Land erosion in the watershed area is silting up the reservoirs, which reduces the water retention capacity of dams. The estimated loss of water storage capacity due to silting is 0.5 percent per year.

Long-range planners would alleviate the depletion of water resources by constructing 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.

Degradation of Water Quality. Concern is growing about the degradation of water quality in major river basins, especially the Sebou, Oum-Er-Rbia, and Moulouya basins, which are very industrialized and populated. 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 considered safe in other countries (50 mg/l).

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) although 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 damaging the fishing and tourist industries.

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 and pollution from 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, whereas oil refineries and chemical

industries, other significant sources of air pollution, are located mostly in the Casablanca-Mohammedia corridor.

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

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 (that is, the removal of glass and plastic bottles, metals, magazines, and so forth) 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 landfills, 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 with 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 dump coal ash and cinder into the sea, which is very detrimental to fish in the region.

Hazardous Waste. The single largest hazardous waste 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 serious issue requiring urgent solution.

Some industries (such as pulp and paper companies and 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 Casablanca 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 (such as contaminated soil or tannery sludge) that 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.

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 have led 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.

Summary of Environmental Problems. Table A1 on page A-7 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	fertilizer run-offs
biomass	sugar refineries, oil mills, canneries, textile mills, tanneries and municipal effluent
toxic organics	pulp & paper plants, textile plants
heavy metals	tanneries, textile plants
organic toxins	pulp & paper mills, tanneries
Pollution of ground water	
nitrates	excess fertilizer

Pollution of coastal water	
phosphates	ore handling, acid plant
cinder	electric generating stations
toxic organics	oil refineries
Pollution of air	
NO	motor vehicles
CO	motor vehicles
lead	motor vehicles
dust	cement plants
odors	canneries, tanneries
Solid waste	municipalities, industries
Hazardous waste	pesticides
Deforestation	overexploitation of forests
Desertification	overgrazing
Silting of dams	land erosion caused by overgrazing and deforestation

Remedial Actions Required. The primary principle of environmental control is eliminating or reducing 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 "Possible Solutions" have significant potential for private sector business in the experience of the consulting team.

Problem Area	Possible Solution
Surface Water	Water purification plants (intake) Water treatment facilities (industrial and municipal effluents)
Ground Water	Controlled use of fertilizer, pesticides
Coastal Water	Water treatment facilities (industrial and municipal outlets) Landfills for solids

Air	Vehicle emission control Unleaded gasoline Industrial emission control
Soil	Upgraded municipal garbage collection Controlled landfill sites Municipal incinerators
Hazardous Waste	Toxic material incinerators Toxic material landfill sites
Deforestation	Controlled logging Reforestation
Desertification	Controlled grazing Reforestation
Silting of dams	Terracing Reforestation Dredging

The Current Environmental Management Response. Environmental management activities are currently under way on three levels to address the above 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 that have not yet made a significant impact, but plan to expand.

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.

Table A1. Moroccan Industries With the Highest Pollution Potential

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

Table A1. Moroccan Industries With the Highest Pollution Potential (Continued)

Industry	Plants	Location	Production (1989)
Dairies	19	Casablanca (4)	572,000 l/day
		Marrakech	140,000
		Kenitra	140,000
		El Jadida	110,000
		Oujda	70,000
		Fquih B. Salah	60,000
		Fez	60,000
		Agadir	50,000
		Tetouan	45,000
		6 others	400,000
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
Oil Refineries	14	Casablanca(5)	196,000
		Meknes	33,000
		Kenitra	18,000
		Fez (2)	24,000
		Agadir	20,000
		Oujda	20,000
		Marrakech	6,000
		Beni Mellal	6,000
Tanneries	20	Fez	90,000,000 ft^2/y
	17	Casablanca	(53,000 t/y)
	4	Marrakech	in 59 plants
	4	Meknes	
	3	Tangier	
	2	Safi	
	2	Sidi Kacem	
	1	Beni Mellal	
	1	Kelaa Seraghue	
	1	Kenitra	
	1	Larache	
	1	Settat	
	1	Tetouan	

Table A1. Moroccan Industries With the Highest Pollution Potential (Continued)

Industry	Plants	Location	Production (1989)
Canneries	25	Safi	90,000 t/year
	16	Agadir	in 67 plants
	7	Casablanca	
	5	Essaouira	
	4	Al Hoceima	
	3	Nador	
	2	Oujda	
	2	Tangier	
	2	Larache	
	1	El Jadida	
	1	Kenitra	
Pulp Mills	1	Kenitra	
Paper Mills	3	Casablanca	
	2	Fez	
	2	Meknes	
	1	Kenitra	
	1	Tangier	
	1	Tetouan	
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
		Taroudannt	5,000
		Marrakech	2,000
Lead	4	Oujda	73,000
		Khenifra	13,000
		Anti Atlas	1,000
		Tafilalt	3,000
Zinc	2	Tafilalt	9,000
		Khenifra	5,000
Manganese	1	Ouarzazate	32,000
Silver	2	Ouarzazate	119,000
		Zellidja	32,000
Fluorine	1	Khemisset	105,000

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 under way:

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

- The formulation of a national environmental strategy financed by the United Nations Development Programme (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.

- 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.

Local Government Activities. Many environmental problems in Morocco have relatively localized impacts (for example, 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 the 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 that 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 (for example, landfills), and a sister city program with Raleigh, North Carolina, to share information and environmental strategies.

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 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 (EC) health standards to ensure access to that export market. This "better housekeeping" label 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 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 below, is the lack of government regulations stipulating environmental protection.

External Influence on Environmental Problems. Morocco is sensitive to the world around it for many 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. Because 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's middle class 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 evident in various forms: a written report, officials' references to conference discussions, the foreign ministry's call to end ocean dumping, 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. UNDP 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. The Germans have built a significant laboratory capability. The French have a variety of environmental programs, especially in 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. Changes in European standards have influenced adoption of the principles of source reduction and recycling.

Even the chlorofluorocarbons (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 that 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 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.

Doing Environmental Business in Morocco

A guide entitled, *Doing Business in Morocco,* published by Price Waterhouse, covers the facts and figures of the country's basic laws and demography. The guide is updated periodically and provides basic information for businesses. The government provides up-to-date investment guides that focus on particular business situations. (Ref. 49)

No guide to *environmental* business exists, however, because the situation is very much in flux with laws, regulations, organizational structure, and personnel commitments undergoing major change. This appendix, written in January 1993, will be soon outdated. Appendix C presents a summary of the current legal framework. This appendix discusses some forces that will greatly influence doing business, especially environmental business, in Morocco. Because few facts are available and because the outcome of implementation is still uncertain, the discussion is often based on subjective experience.

General Climate for Environmental Business. Morocco wants to attract foreign capital. It has a burgeoning young population and jobs need to be created faster than domestic forces alone can create them. The incentives to attract capital to Morocco include repatriation of profits, liberal rules for foreign ownership, a strong move toward a free economy, a serious privatization program, a young stock market, and a banking system that is introducing modern mechanisms.

On paper, a number of custom allowances make possible duty-free import of various classes of goods. Environmental capital goods are particularly favored. Duty free imports, tax credits, and banking credit are all said to be available in the environmental sector. It would be wise in each specific instance to verify how incentives will be applied to each specific case.

Environmental expertise is sought particularly. All companies interviewed already had foreign partners, but there are still markets (such as industrial wastewater) that local firms wish to address with foreign support. Owners of consulting firms were particularly interested in tapping foreign knowledge about approaches and equipment. They showed flexibility in creating mechanisms to do business together. In the next few months, the clean technology approach will get some free publicity from USAID and it would be appropriate and timely to seek partners based on American expertise in this area. Pulp and paper mills, for example, are candidates for closed cycle technology. Joint activities based on foreign expertise and Moroccan materials, labor, and consulting engineering skills could accomplish such jobs competitively with good returns for all parties.

Profit margins for firms selling expertise appear to be similar to corresponding firms in the United States, but the markets are less saturated. In seeking bids for services, the prices were very much in the same range as American services, but the cost of doing business was lower.

An Entry Strategy for American Firms. In all cases, it is recommended that local partners be secured as one element of an entry strategy, so that the business culture is infused with Moroccan culture. Inter-personal relations influence business relations. Linguistic traditions influence thought processes which translates into fundamental assumptions. If an American negotiates on a win/win strategy with the assumption that the economic pie will grow, he should have a Moroccan partner who can explain that strategy and assumption. Many Moroccan customers will assume that the negotiation is based on a zero sum strategy–that is, any gain must come from an adversary's loss. Deals fall through because sharing the increment of growth made possible by technological gains in productivity is less familiar than the economics of the bazaar.

Clearly, these cultural differences do not characterize all sectors of the economy. Generally speaking, the younger the Moroccan client and the more modern the sector, the more likely that business can be done without an intermediary. Some Moroccan firms are managed by principals who hold either a French or an American MBA. The environmental market, however, consists of many government-owned industries not yet privatized and local partners are very helpful in working through the vicissitudes of getting paid on time.

More than 100 firms of all sizes are now in the environmental business, as listed in Appendix E.

Timing of Entry. As reported in the body of this report, these firms believe the environmental future will be bright once norms and standards provide meaningful targets for their clients. Such norms and standards are likely on their way, and at this time, it would appear that with the exception of hazardous wastes, methods of meeting standards will be negotiated rather than prescribed. This approach creates a market for foreign environmental services where the knowledge of alternatives is great and where side-by-side negotiations will be based on knowledge of what is possible.

Environmental management steps are expected to start in 1993 in the form of donor training programs for regulators. This regulatory process might be in place by early 1994. Now is the time for maximum impact on future regulatory action; Moroccan industries either individually or in association should be willing to seek assistance before these negotiations begin. Actually, a good case can be made to begin planning before the suggestions for standards are implemented. This is especially true for industries to be privatized in the next few years that anticipate expenditures for environmental purposes.

With the assistance of Moroccan partners who have already done the prospecting, cash flow can be anticipated early in 1994 for those firms in place in 1993.

Even today, a market exists for exporting firms in packing materials and product quality. Early industrial pollution-prevention markets exist in provinces that have environmentally proactive governors, such as in Mohammedia, Tetouan, Fez, and Safi.

In the coming year, relations between the economies of Southern Europe and Morocco will develop further. Rather than making investments in Spain, France, and Italy, entrepreneurs from those countries are considering transferring production to Morocco where labor costs and environmental regulatory factors are more favorable. This transfer of production to less restrictive environments is happening throughout the world. There are, however, countercurrents and green movements that will complicate life for Moroccan industry. Pollution-prevention strategies combined with the liberalization of the Moroccan economy may make it possible to attract the industries without adding stress to the environment. As suggested in Appendix A, environmental stress is so severe during low flow season that water supplies are affected. The dilution factor in Morocco is too limited to believe that the problem can be transferred from Europe without marked visibility.

Of course, as Moroccan colleagues have pointed out, if there are low-cost solutions for Morocco, then those solutions must exist for Spain too, making transfer unnecessary. U.S. marketing directors can take this phenomenon into account either way.

Diversification Policy to Attract New Partners. As part of the policy to broaden its capital base, the GOM wishes to broaden the base of its foreign partnerships. French companies have traditionally had the major share of Morocco's foreign purchases. This dominance comes in part from linguistic and cultural compatibilities, population exchanges, and the Moroccan role as purchaser of textiles and other unfinished materials for finishing in Morocco. This comfortable fit has deterred other foreign partners from considering business in Morocco.

Now, however, the GOM is officially seeking other partners and is succeeding in Spain and Italy. Although the gross national statistics of trade are yet unaffected and French predominance continues, the door to change has been opened. Americans are eagerly sought; Moroccans believe that if a few large American companies locate there, the multiplier effect for small companies will be large.

Admittedly, American companies are at a disadvantage because of the financing benefits Europe and Japan give to their national companies. Long grace periods until first payment, subsidized interest rates, tied aid, and other mercantilist techniques employed by America's competitors make it difficult to compete in Morocco. This problem is addressed in the GAAT negotiations and the political dynamics are conducted on a global stage rather than in Morocco. Until the larger solution is in place, joint ventures with foreign partners having financial advantages may make an American bid more attractive. American companies may have an edge in environmental technology but they need Moroccan partners to augment their entry strategy.

In sum, Morocco has undergone a pervasive environmental consciousness raising. For example, before international commitments made in Brazil at the U.N. Conference to protect the oceans, the coastline was treated like a dumping site. Solid waste disposal, untreated ocean outfalls, and sand mining were damaging the coastline. Now alternatives for preventing further damage are being created. The Ministry for the Quality of Rural Areas has a mandate to introduce environmental awareness in cleaning up the coast, designing highways, and training personnel. Environmental concerns are now design factors for Moroccan engineering firms.

Legal Framework

Global environmental awareness is just dawning in Morocco. It is rare to meet a literate person who has not heard of global warming. The U.N. Conference in Brazil had an impact to the extent that ocean dumping and the decline of fisheries are now perceived to be related. This awareness is slowly gaining a foothold in the official administration of government with new environmental appointments and articulated concerns. The characterization of the legal framework, therefore, depends on whether one focuses on the immediate past or the near future.

The conclusions from the immediate past are that the definition of environmental policies leaves much to be desired, that coordination is not assured, that the law, even where it would be efficacious, is not applied. (Ref. 45) A new environmental law designed to replace old outmoded texts was drafted in 1985, but has not yet been passed.

Cynics can conjecture from this that Morocco has a laissez-faire policy regarding environmental degradation and that no matter what consciousness raising has accomplished, neither laws nor enforcement will alter behavior. This interpretation giving inertia the benefit of the doubt is plausible, but ignores the counterforces that are growing in strength.

This interpretation overlooks such stories as that of a populist governor who personally broke up the waste pipes of a factory with a sledge hammer to avoid further direct discharge into the Sebou River. It ignores the closure of a drinking water treatment plant on the same river when the cost of treatment increased 14 fold before the shutdown. It ignores the pressure on export industries to conform to European standards or have their products shut out of markets. It ignores German legislation that forbids the import of goods packed in nonbiodegradable materials unless provision is made to take back the packing materials. The forecasters of environmental lethargy fail to realize that Morocco cannot even stand still economically unless it changes its relations with the environment.

Of the more than 350 laws in Morocco for environmental management, many support a zero discharge philosophy that would be the dream of environmental activists everywhere. The laws are so severe and so old, however, that they are not practical today. New texts have been prepared in 1985, 1987, and 1990 but are not yet enforced.

It is not likely that a business entering Morocco's mining sector would be regulated by the "Law of the 25th of August 1914 regulating unhealthy, incommodius, or dangerous establishments" in any way that a lawyer could predict. Ignoring environmental factors in choosing a production technology would be foolish, however. Changes of attitude and political activism have been too great to risk ignoring the issue.

For example, the law cited above has been implemented in the form of land use planning: an industry will not, in principle, be given a zoning permit if it pollutes the environment or otherwise menaces public health.

Nor is underground wastewater injection immune from the law. Although the laws are general and vague, an investor cannot ignore that public health effects are already evident in some regions. The stories of pollution worldwide are carried in the press, from Indian chemical plant explosions to tanker spills off Scotland.

Laws dating back to the 1920s to protect water quantity and quality authorize police powers, but the police are not about to test them because the legal "system" is so out of date.

Yet gross violations are expected to reactivate laws unused for decades and produce the legal reforms sought by many. No foreign company should risk testing this statement, especially regarding toxic discharges. When a coastal plant released mercury into the water and a fish kill ensued, the king personally prohibited further production at that site.

In sum, official environmental laxity should not be exploited because public opinion in 1992 is far ahead of the laws of 1922. Furthermore, in an emergency, those laws are still valid.

The matrix on the next page is taken from a September 1992 survey by a Swedish/Moroccan consulting team for the World Bank. (Ref. 45 "Institutional, Legal, and Pollution Study," page 73). It explains the general structure of environmental management at that date. There are changes under way that may modify and clarify the regulatory duplication and legal authority.

Table C1. Management of the Environment

Medium	Institutions	Environmental Function
Management	Interior/DGUATE	Coordination Publicizing Setting norms
Coastal Waters	T.P./Hydraulics T.P./Zoning Classes MARA/Eaux et Forêt Santé/Salubrité	Management of water Polluting industries Rural waters Rural drinking water
Ocean Environment	T.P./Zoning Pêches, MM/	Polluting industries Fish
Air	Transports/ Inspection vehicles T.P./Zoning	 Inspection vehicles Polluting industries
Agricultural Lands		
Irrigated	MARA/ORMVA	Regulation of irrigation
Non-Irrigated	MARA/Agriculture	
Pesticides, etc.	MARA/Dir. Vegetation	Homol. pesticides
Human Establishments		
Industry	MCIP/Env. Prot. Serv.	Polluting industries
Mines	MEM/Cellule Env.	Polluting mines
Artesianal		
Sanitation	Interior/DCL	Liquid pollution
Solid Waste	Interior/DCL	Solid waste pollution
Forests	MARA/Eaux et Forêt	Forest management
Natural Resources	Interior/DGUATE	Management of natural resources

Key:
T.P. Ministry of Public Works, Professional and Staff Training
MCIP Ministry of Commerce, Industry, and Privatization
MARA Ministry of Agriculture and Agrarian Reform
MEM Ministry of Energy and Mines

67

Report on Survey of 43 Companies

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 activites 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 apparait 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°, en second et en 3° 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 ?

	d : Pollution atmosphérique			a : Pollution des eaux de surface			b: Pollution des eaux souterraines			e: Pollution côtière		
Rang ---------->	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° 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 ?

	a : absence normes			b: Manque mesures d'application			c: Sensibilisation clients		
Rang ---------->	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 maraîchères.

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** : Minage, 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'irriguation 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. réguleurs de paliers.

TRAITEMENT DE CHIFFONS :

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

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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 AQUATRA** : Etude, mise ai 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

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Appendix E

Companies in the Environmental Business Sector

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COMPANIES INVOLVED IN ENVIRONMENTAL PROTECTION IN MOROCCO

LEGEND

1 Disinfection, pest control
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5. Manufacture nonpolluting
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7. Solar, wind, other renewable energy
8. Heating, ventilation, air conditioning
9. Analytical laboratories
10. Construction supervision
11. Prospecting and petroleum research

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Réf.
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	15
3	6	GETRADIS	Espaces verts	Ali EL MOUDNI	50,AV du SOUSS RABAT	75-38-14	SARL 1 000 000	8
4	6	SETEL SIEMENS	Espaces verts	Mazes SOWAN	Km 1, Route de Rabat Ain Seba Casa	35.10.25	SA 10 000 000	125
5	6	ELECTRO-MOTOR	Espaces Verts	Mohamed AMAR	34, Rue Termidi Casa	25.39.56	SA 120 000	25
6	6	AGRO-MAROC	Espaces Verts	Ahmed RINGA	30, Av. de l'Armée Royale - Case	31.40.04	SA 1 000 000	20
7	3	CHIFFONCOM	Traitement des dechets textiles	Laheen AMALAY	6, Rue des Pélicans Oasis - Casa	25.56.77	SA 10 000	17
8	3	C.M.E.F.I	Traitement des dechets textiles	Abdelghani LAMHABI	300, Bd Ambassadeur Ben Aicha Casa	24.09.01	SARL 10 000	18
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 dechets 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	2
12	3	UNIONMATEX	Traitement de déchets textiles	Karl FREDRICH	4, Rue Abdelouahad Az-zaqqaq Casablanca	30.18.82	SA 80 000	4-5
13	1	ASSIANA	Entretien D'usines	Mohamed MOUTAOUAKIL	Rue Ibn Khafaja Mohammedia	32.79.28 32.79.29	SA 100 000	132
14	1	BREYTON	Entr			24.19.39	SA 324 000	25
15	1	FOUR LAGADEC MAROC	Entr			35.41.63	SA 1 000 000	65

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N°	Code	Dénomination	Object	Responsable	Adresse	Téléphone	Forme juridique du capital	Réf.
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	60
17	9	VERITAS	Laboratoire d'analyses, essais de matériaux	Jean Paul CHITRY	2 Bis, Rue Molière Casa	39.11.48	SA 400 000	9
18	9	LABOMETAL	Laboratoire d'analyses, essais de matériaux	Lahcen AFQIR	160, Route des Zenatas Ain sebaa Casablanca	35.32.62	SA 665 000	6
19	9	SOLAR	Laboratoire d'analyses, essais de matériaux	Othman ALAOUI	12, Rue de Angola Rabat	72.15.00	SA 600 000	35
20	10	APAVE	Controle Technique des constructions	Henri CASANOVA	3, Rue de Champigny	30.00.58 30.91.61	FILIERE	40
21	2	PROMOCORSULT	Bureau d'etudes . Assainissement	Omar BENNANI	174, BD Med Zerktouni Casablanca	22.12.31 22.11.01	SA 2 000 000	85
22	10	GETB Ingénierie	Bureau d'etudes .Hopitaux Cliniques . Hotels	Simon BORROS	127, Av Moulay Hassan 1er Casablanca	27.74.29 26.88.44	SARL 100 000	17
23	6	AGRO INGENEERING	Bureau d'etudes . Agronomie.Elevage.Agriculture	Abdellatif [illegible]	215,Avenue [illegible]	[illegible]	SA 2 000 000	10
24	6	S.A.S.M.A	Bureau d'etudes . Agronomie.Elevage.Agriculture				SA 10 000	98
25	6	SIGMA Tech	Bureau d'etudes . Agronomie.Elevage.Agriculture				SA 350 000	40
26	11	INGEMA	Bureau d'etudes.Prospection du sol recherche petrolière				SA 4 000 000	46
27	11	BRPM	Bureau d'etudes.Prospection du sol				Affaire personnelle	1430
28	11	MAGHREBS PROJETS	Bureau d'etudes recherches minières				SA 700 000	35

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N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Réf.
29	11	C.C.L.T	Bureau d'etudes,Prospection du sol,recherche miniere	Hassa HALIB	159, Bd Yacoub El Mansour CASA	25.99.16 23.66.86	SA 100 000	15
30	11	SAVERY ingenierie	Bureau d'etudes,Prospection du sol,recherche miniere	Marc SAVERY	1, Place de l'Istiqlal ex Mirabeau	30.00.25	SA 400 000	14
31	11	SEREC	Bureau d'etudes,Prospection du sol,recherche miniere	Mohamed DAHMAN	10, Place Mohamed V	20.33.05 27.10.16	SARL 50 000	40
32	11	AFRIQUIA	Bureau d'etudes,recherche miniere	Aziz ARHNHOLCH	Rue Ibnou Louannane	35.17.35	SA 20 000 000	571
33	11	SOMEPI	Bureau d'etudes,recherche miniere	Hadj Mohamed ANHAL	139, Bd My Smail CASA	40.12.89 40.19.52	SA 37 000 000	222
34	3	NOHMDIC	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 35-45-49	SA 250 000	8
36	3	SOBROMA	Application de bromure de méthyle pour désinfection des sols.	Mr Elie levy Mr Md El Alami	42, Av Armée royale	31 34 11	SA 400 000	13 - 10
37	2	Architecte		Mr Mounassir abdelwahed		26 09 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	Omtec Maroc	Traitement des eaux par procédé C..F.E.C France	Mr Md BENNANI	87, Allée Orangers Lot le départ n° 9 bis AS	35 59 01 35 59 02	SA 600 000	50-100
40	3	SIRMEL SA	Matériel concassage de c industriels broyage			40 08 83 40 08 84	SA 7500000	80-100
41	8	VENTEC MAROC	Conditionnement d'a dépoussiérage				SA 15.300.000	70 - 90
42	7	CASA BLOC	Panneaux Solaires					40 - 50

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N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Réf.
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 · Expot de panneaux solaires : Photovoltaiques	Mr Rachid BENLEMLIH	20. Rue Ibn Hajjr - Rabat	77.98/74	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 BAHI	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 Dakok, Ouled Saleh Nouasser Casa		SA 500.000	----
48	5	SODIPI	Produit primagaz (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 déliégeage travaux de reboisement et création d'espaces verts	-------	11,Route de Midelt AZROU		SA 10 000	
51	1	DISTRUBA	Désinfection Dératisation Désinsectisation	Mme Chekroun Saadia	149,Rue lalla Yacout			10 - 25
52	2	PROTEC	Traitement des eaux - [illegible]	[illegible]bert GAIGN	625, Bd Mohamed V	24.84.41	SA 4.560.000	80 - 90
53	7	ELECTRO-MOTOR	[illegible]	[illegible]han MAR	34,Rue TERMIDI Casa	25-39-59	SA 120 000	25
54	2	3IDEN	[illegible]	[illegible]		74-03-50	SA 1000000	50

(1) Le [illegible] : Co[illegible] [illegible]as d[illegible]

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55	7	SODIREL	Energies renouvenables Fabrication d'accessoires d'energie solaire	Mr Mohamed BENHADDOU	22, Rue de Charleville	24.70.68	SA 20.000	10
56	7	SOCOCHARBO	Chauffage so	Mr Mounir Aoud	44, Rue l'écrivain	24 07 20 24 04 62	SA 21.329.400	200
57	7	CDER	Promotion e énergies ren	Abdelhaq FAKIHANI	Rue Machaar El Haram bp 509 Marrakech	(04) 43 51 09 43 51 41	-------	5
58	6	SOTRAVAR	Boisemen agricole	Mr Ali BENCHEKROUN	190, Bd My Ismail		SA 100 000	10 - 15
59	2	Hydro systèmes	Etude et ré traitement d	Mr Ali Abdellaoui	36, Bd Anfa	20.24.28 22.06.40	SA 200.000	10 - 35
60	2	Atrial		Mr Abda	1, Chemin des glaïeuls		SA 4887.75	375
61	1	Pro-Entretien		Mr Abdelmajid Bassou	142, Bd Emile Zola	24.28.52 24.27.31	SA 10.000.000	25
62	3	S.O.S N.D.D				30.35.26 30.39.43	SA 150.000	25 - 200
63	2	GETRATER			Armée	35.39.51	SA 10000000	35 - 45
64	2	ZNATI				26.23.33	SA 800.000	50 - 200
65	2	SONER			eskini	31.23.91	SA 1.000.000	
66	2	E.C.U.M			n Ell			20 - 120

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10. Construction supervision
11. Prospecting and petroleum research

N°	Code	Dénomination	Objet	Responsable	Adresse	Téléphone	Forme juridique & capital	Eff.
67	2	ECOMA	Entreprise voirie	Mr JAMALI	16, Avenue El Massira El Jadida	34.33.08 34.17.16	SA 400.000	70 - 100
68	3	DIVERSEY	Fabrication et commercialisation de produits chimiques, matériel pour traitement des surfaces soles	Mr Jacques VEDIER	Route 110, Km 12,5 Ain Sebaa	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	[illegible], Bd Ibn Tachfine, n° 21	30.35.00 31.64.34	SARL 100 000	15
70	2	MACOBATE	Entreprise de traitement des eaux	Mr TOUNSI	Quartier Takadoum, lot 48 Rabat	75.96.46	SA 500.000	25 - 50
71	2	MOUKHA	Traitement des eaux usées chloration pompage	Mr Larbi TAZI	2, Rue Oqbah Sabat	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 Reoé GEISSMANN	Rue Charif Idrissi 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 Nakhai	[illegible]		50 - 400
77	2	P.T.I	Fabrication de produits anti-pollution	Ismail CHAOUKI	50,Av ARMEE ROYALE	[illegible]		15
78	[illegible]		Traitement des eaux énergie solaire	Mr Roger OUAKNIN	Rue Tarik Ibnou Ziad			

COMPANIES INVOLVED IN EN IENTAL PROTECTION IN MOROCCO

LEGEND

1. Disinfection, pest control
2. Water treatment
3. Treatment of industrial wastes
4. Cl g f rivers and ports, lution
5. e nonpolluting
6. F , sanitation products
7. S other renewable energy
8. F tilation, air conditioning
9. A boratories
10. n supervision
11. and petroleum research

N°	nombre			Responsable	Adresse	Téléphone	Forme juridique et capital	Ref.
79	E	raitemen t indus			ue ra l	30.85.07	SA 500.000	20
8	R S	raitemen			ie / ne	70-74-42	SNC 100 000	10
8					A ou		SA 100 000	4
8					m es	35.57.88	SA 3.990.000	55
8						24.72.02	SA 300.000	14
8						65.25.59	Ab. Penal	10 - 20
8						24.84.02	SA 700.000	30 - 18
8						77.03.53		8 - 12
8								
8					it			
8								
90								
91								

COMPANIES INVOLVED IN ENVIRONMENTAL PROTECTION IN MOROCCO

LEGEND

1. Disinfection, pest control
2. Water treatment
3. Treatment of industrial wastes
4. Cleaning of rivers and ports, marine pollution
5. Manufacture nonpolluting
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

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	8	CLIMAIR SYSTEME	Climatisation, ventilation dépoussiérage	Mr Abdelkrim ALHAKKAK	22, Rue de Bethune	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 Royan	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 antimouches antimites désinsectisation	Mr Ouahid SAHHAKI	52, Rue Socrate	25.60.76 25.36.51	SA 1080.000	1700
97	3	EASI MAG	Traitement des déchets textiles	Rafik DERROUGH	4,Rue Montaigne	25-98-81	SA 250.000	10
98	2	S. C. E. T Maroc	Bureau d'études en hydraulique	Abdelhafid BENJAMAA	30, Bd Al Alaoulyine - 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 ZERKTOUNI	22-12-31	SA 2 000 000	65
101	6	AGRO INGENEERING	Bureau d'études, Agronomie, Elevage, Agriculture	Abdellah BELMADANI	215, Av AMBASSADEUR BEN AICHA	24-44-14	SA 2 000 000	10

ADDITIONAL COMPANIES IN ENVIRONMENTAL PROTECTION IN MOROCCO

LEGEND

1. Disinfection, pest control
2. Water treatment
3. Treatment of industrial wastes
4. Cleaning of rivers and ports, marine pollution
5. Manufacture nonpolluting
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	Téléphone	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	600 - 800	

DISTRIBUTION OF COMPANIES BY TYPE (CODE)

LEGENDE

Code	Domaine d'activité	Nombre de Sociétés
1	Désinfection Dératisation 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, eolienne, energies renouvelables	8
8	Climatisation, ventilation, dépoussiérage	2
9	Laboratoire d'analyse	5
10	Contrôle technique des constructions	2
11	Prospection du sol - recherche petrolière	9

1 Disinfection, 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

Persons Contacted

1.	**Banque Mondial**		
	Sherif Arif	Chef de Mission	
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2.	**USAID Morocco**		76.22.65
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	Eric Loken	Senior Environmental Officer	
	Rick Scott	EDM Project Officer	
	Criss Juliard	Business Consultant	
	Joe Kitts	Locust Control	
	Mark Kraczkiewitz	Economist	
	Joyce Holfeld	Health	
	Michele Moloney	Health	
	Harry Birnholz	Urbanism, Tétouan	
	Taha Burata	Urbanism	
	Grant Morill	Tourism	
	Richard Burns	Private Sector, Chief of Division	
	David Dreiman	Project NED	
	Marty Dagada	Mission Director	
	M. Mulenax	Agriculture	
3.	**RCG/Hagler, Bailly (GEM)**		75.95.52
	Niels de Terra	Chief of Mission	
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4.	**SWEEP/Scandiaconsult**		
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	Lennart Danielson	Managing Director, SWEEP	46 8 799 15 40
5.	**Ministère de l'Intérieur**		
	Mme. Layachi		
	Mr. Alaoui		76.84.23
	Dris Toulali		

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**		
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	Laallam Lahcen	Chef, Div. Prot. Nat.	76.25.55
	El Kabiri M Lahcen	Chef, Serv. Prot. Nat.	76.26.94
	Mohammed Ribi	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

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	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
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	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	57.97.48.12
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

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