

**THE KINGDOM OF BAHRAIN  
MINISTRY OF STATE, MUNICIPALITIES AFFAIRS  
AND ENVIRONMENTAL AFFAIRS**

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**NATIONAL REPORT  
TO THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT**

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## LIST OF ACRONYMS

|               |   |
|---------------|---|
| <i>AAQS</i>   | Ambient Air Quality Standard  |
| <i>ALBA</i>   | Aluminum Bahrain  |
| <i>CNA</i>    | Charter of National Action  |
| <i>EA</i>     | Environmental Affairs   |
| <i>EIA</i>    | Environmental Impact Assessment   |
| <i>GCC</i>    | Gulf Cooperation Council  |
| <i>GDP</i>    | Gross Domestic Product  |
| <i>GEF</i>    | Global Environment Facility   |
| <i>GHGs</i>   | Green House Gases   |
| <i>GPIC</i>   | Gulf Petrochemicals Industries Company  |
| <i>HDI</i>    | Human Development Index   |
| <i>IEM</i>    | Integrated Environmental Monitoring   |
| <i>MARPOL</i> | International Convention for the Prevention of Pollution of the<br>Sea by Oil |
| <i>NCWP</i>   | National Commission for Wildlife Protection                                   |
| <i>NGOs</i>   | Non-Government Organizations  |
| <i>NEAP</i>   | National Environmental Action Plan  |
| <i>NES</i>    | National Environmental Strategy   |
| <i>BAPCO</i>  | Bahrain Petroleum Company   |
| <i>ROPME</i>  | Regional Organization for the Protection of the Marine<br>Environment         |
| <i>SMEs</i>   | Small and Medium Enterprises  |
| <i>WTO</i>    | World Trade Organization  |
| <i>UNCLOS</i> | United Nations Convention on the Law of the Sea                               |
| <i>UNDP</i>   | United Nations Development Programme  |
| <i>UNEP</i>   | United Nations Environment Programme  |
| <i>UNFCCC</i> | United Nations Framework Convention on Climate Change                         |

## **1. INTRODUCTION**

### **1.1. Geographic Location and Climate**

The Kingdom of Bahrain is located in the Arabian Gulf. It is bounded by 25° 32'N and 26° 30'N latitudes, and 50° 20'E and 50° 50'E longitudes. The Kingdom is an archipelago formed of 36 Islands of which Bahrain is the main island. The total area of Bahrain is about 700 km<sup>2</sup>. The climate is arid to hyper arid. Average amounts of rainfall reach 74 mm/year and annual potential evaporation may climb up to 2800 mm. Arable and permanent crop areas do not exceed 6,000 ha. Natural vegetation is of limited extent, largely degraded and mainly xerophytic in nature.

### **1.2. Population Attributes**

The total population of Bahrain is estimated to be 650,604 in 2001 of which 62.4% are nationals. Average annual growth rate is estimated at 2.7% for the period 1991-2001. The majority of the population is young of which 28% is under the age of 15. Around 92% of the population is urban.

The Government of Bahrain has made significant improvements in raising the standard of living of the population by heavily investing in basic services and education. According to UNDP latest report on Human Development, Bahrain ranked 40 among countries of the World and the highest among Arab countries in terms of Human Development Index (HDI). A significant increase in life expectancy has been reached, from 63.5 in the seventies to 72.9 years in the nineties, with an index of 0.8 in 1999. Infant mortality rate dropped significantly from 55 per thousand births in 1970 to 13 in 2001. One hundred per cent of the population has access to safe water, sanitation and health services.

### **1.3. Economy**

Bahrain's economy is a market-based economy. The diversification of the economy is the main objective of the economic policy. Oil, which was the mainstay of the economy of the early stages of development, contributed around 18% of the real GDP in 2000. Manufacturing 12%, trade 13%, financial corporation 19%.

The Ministry of Finance and National Economy vision for the coming decade involves building and expanding a knowledge-based economy, with six clusters of activities being selected to lead the drive. These clusters are information

technology-based services, financial services, business services, healthcare, education and training and tourism, while developing downstream industries to accelerate economic growth.

In the context of fiscal policy, the Ministry's vision seeks to balance the budget over the medium term while maintaining low levels of external debt. In order to achieve this objective, the Ministry is in the process of diversifying the revenue base through enhancing non-oil revenues and increasing the role of private sector in the economy. The Ministry will continue to accord priority to safeguarding social welfare and supporting infrastructure projects.

Real Gross Domestic Product is estimated at 7.2 billion dollars in the year 2001, with an average growth rate of 4.4% for the period 1997-2001. Latest figure on GDP per capita was reported at US\$11,067. The economy is supported and served by modern infrastructure.

As a member of GCC countries, Bahrain is making significant steps to harmonize and integrate its economy with the economies of these countries. Being a member of WTO, additional significant efforts (enacting new laws, introducing certain economic measures, reducing custom tariffs on certain items) have been made to modernize the economy and integrate it in the international market. As a step towards globalization, the Government of Bahrain abolished import duties on a number of food and feed items and reduced duties on consumer goods to 5%. Additionally, no duties are imposed on import of raw materials or semi-manufactured goods.

#### **1.4. Employment**

Work force constitutes around 47% of the total population in 2001, of which women's participation constitutes about 22%. However, women have stayed on the less advantage side as their income remains at 77% of men's income for comparable jobs. The unemployment rate has dropped from 6.3 in 1991 to 5.5% in 2001. Nearly 41% of the total work force is nationals and the Government encourages participation of nationals in all sectors of the economy. In fact, targets are being set to provide work opportunities for nationals in existing industries or by creating new opportunities in trade, finance, and tourism services, as well as in small and medium size enterprises (SMEs) and micro projects. Minimum wages are set by the Government and observed by employers, and child labor laws are strictly enforced.

## **2. THE NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT**

Although an integrated national strategy for sustainable development has not been developed yet, elements for sustainable development are being embedded in sectoral development plans executed by various Governmental bodies in the country. Nevertheless, adopted development schemes and achievements on various aspects of country's sectoral developments form the ground basis for formulation of an overall national sustainable development strategy. However, a number of obstacles were faced on the way to the development of an integrated national sustainable development strategy. These include among others, institutional, legislative and technical problems. The most obvious difficulty is the absence of an effective cross-sectoral body or structure to prepare and monitor such a policy, due to the nature of Government Ministries setup where work is carried out in a sectoral fashion according to the mandate of each Ministry. Although, the Environmental Affairs (EA) assumes such responsibility of integrating environmental concerns within plans of Government Ministries and coordinates activities regarding environmental issues among various stakeholders, it does not have the capacity to oversee the overall sectoral plans of each Ministry or work effectively across all sectors of institutions and agencies.

The political will and support for sustainable development in the country was expressed in the Charter of National Action (CNA) adopted by a referendum in 2001. The Charter is considered as a document setting the vision for future development in Bahrain. It lays the basis for the overall development of national sustainable policy aiming at achieving the balance between economic, social and environmental sectors. The Charter called for institutionalizing democracy, consolidating civil society associations, equity among citizens and transparency. Gender issue was a major concern too as the Charter explicitly referred to consolidating women rights, praised family values and called for legislation to protect them. The Charter emphasized the importance of education, culture and sciences and vowed state responsibility to advance them.

The issue of sustainable development was mentioned implicitly in the context of the CNA when it defines the objective of the rule in the State by stating "*the objectives of the rule is to maintain the State, promote its status, preserve national unity and achieve constant and comprehensive development in areas of politics, economy, society, culture and others*". Furthermore, chapter three of the Charter affirms the adherences of the State to the principles of economic freedom, guaranteeing private properties, economic justice and balance in contracts, diversification of the economy, protecting public funds and natural resources and protection of the environment and wildlife. It underscores the importance of

exploitation of natural resources taking into account the non-harmful impact to the environment and health of people. Thus, developing national sustainable strategy along with environmental strategy for the country was underlined.

Since the adoption of CNA, significant steps have been made regarding resource mobilization and consolidating civil society organizations, which in turn may spur and activate interest and participation in synthesizing sustainable development policies. Future initiatives in the country will concentrate on the development of a national sustainable policy that integrate all aspects of community sustainability, taking advantages of the positive atmosphere the Charter of National Action has created. It is anticipated within the next few months preparations for developing a national strategy on sustainable development be initiated and a setting that can locally and effectively set Agenda 21 in motion is being formulated.

A central committee for preparing a national plan to execute Agenda 21 has been formed from representatives of all Ministries, non-Government organizations, and academia. The main objectives of the committee are to:

1. Formulate and integrate vision regarding the work plan for agenda 21 and the mechanisms of its implementation.
2. Suggest appropriate approach and capacity needed for assessment and preparation of Agenda 21 report.
3. Identify priorities.
4. Give an opinion on other advisory issues.

The committee identified five national priority issues. Accordingly five sub-committees were formulated to deal with the identified issues. Those issues are:

- i. Management of water resources.
- ii. Conservation of marine environment.
- iii. Protection of the atmosphere.
- iv. Management of wastes and chemicals.
- v. Changing consumption patterns.

Building upon what has been achieved in terms of national goals for the past ten years, it is envisaged that the main elements of the proposed national sustainable

strategy be focused on integration, social justice, preventive measures, and wise management of renewable natural resources. The strategy must be guided by public participation in the decision-making process, information dissemination, efficiency, waste minimization, and scientific knowledge. It is noteworthy to say in this regard that guidelines for national sustainable policy are well articulated in various chapters of the CNA and can be drawn from it. Nonetheless, more effort should be put into translation of these guiding principles into vision statements with supporting goals as well as a plan of action.

Environmental management and sustainable development are mutual learning processes among Government agencies and other stakeholders. These two processes involve many disciplines and affect society as a whole. In that way, an interdisciplinary approach has to exist to overcome difficulties encountered with the issues of traditional way of planning, the sectoral planning. It is recommended that sustainable development policy be initiated by reviewing each Governmental sector plan by a working group representing Government agencies (Agriculture, Wildlife Conservation, Finance, Economy, Environmental Affairs, Health, etc.) as well as professionals from other society sectors including private sectors, academic institutions and NGOs. These professionals are to examine current and future development plans and reports of that sector with the aim of defining shortcomings, difficulties and challenges facing it. Once all issues of each sector have been identified, solutions and proposed policy measures and action plans are drafted with a timetable for implementation. A sustainable development coordination committee /unit harmonizes these recommendations at a later stage giving the way to review it technically by a technical advisory subcommittee and have it approved by higher authorities.

### **3. *THE ENVIRONMENTAL STRATEGY***

The transition to sustainable development in the Kingdom of Bahrain is not an option to choose, but rather an imperative choice for the society survival and the well being of future generations. Government officials in Bahrain are well aware that the real challenge of mounting a national sustainable development program for the Kingdom is to foster, test, and disseminate ways to change the process of economic development, so that it does not destroy the national fragile ecosystems that support life and make it possible. Indeed, the Government considers both the economic development and the sound environmental management as complementary aspects of the same agenda.

At the present time, the government of Bahrain operates without a National Environmental Strategy (NES). The development of NES is fundamental and

complementary to the national agenda 21 for the purpose of prioritizing the local environmental issues and visualizing the proper means of their management to secure sustainability of development at the national level. The current environmental trends of growing population, urbanization, industrialization, augmenting depletion of natural resources and biodiversity, and constant pressure on the natural environment suggest that inaction could prove to be detrimental and unfair for Bahraini future generations.

The execution of NES will start soon by developing two documents entitled “National Environmental Strategy” (NES) and “ National Environmental Action Plan” (NEAP). The formulation of these two documents will result into the creation of a national capacity capable through partnership of balancing the diverse interests of economic, environment and society development.

The partnership to be established will lead to the conception of a shared society vision of the future. This will ultimately systematize coordination and cooperation among the government authorities in Bahrain, its associated institutions, stakeholders, NGOs, target groups and communities at large.

Government authorities in Bahrain will have for the first time the proper guidelines and methodologies to effectively implement and monitor their sustainable development action plan. The involvement of all sectors, stakeholders, NGOs and target groups in the project will provide them with a learning experience and “ in-service” training opportunity in planning for sustainable development.

#### **4. *INTEGRATION AND PARTICIPATION***

Sustainable development in Bahrain was carried out in a more sectoral way in previous years. Due to the absence of an overall national sustainable strategy for developments and the dominance of sectoral development policies, the level of integration and coordination among various sectors and institutions is rather minimal. Nevertheless, a reasonable level of public participation, including women participation, on environmental issues has been reached. However, the role of public is still consultative in nature when it comes to decision-making process. It is hoped that the Charter of National Action will enhance and consolidate full public participation, through combining and strengthening the role of civil society associations, and allowing for a wider and more effective participation of stakeholders at decision-making levels. A good example of integration and participation is expected during the preparatory process of national environmental strategy and action plan, where full participation of stakeholders will take place and concerns of all sectors will be taken into consideration.

It is envisaged that formulation of sustainable development policy has to be coordinated by a high authority structure that enable all involved parties to participate and freely express their concerns and views. So far, the EA has managed to coordinate activities related to the environment among different Government and non-Government agencies. However, once sustainable development policy or strategy is put in place, it is anticipated that the mandate and role of EA will be widened and its capacity be enhanced to be able to better coordinate plans among different agencies in the country and monitor various environmental related activities.

## **5. NATIONAL PRIORITY ISSUES**

During the past ten years human development and caring for environment were the prime focus of the Government. Great attention has been given to the following issues as main elements towards sustainable development:

1. Health care.
2. Human resource development.
3. Management of natural resources and protection of the environment.
4. Diversification of economy.
5. Education.

However, national priority was given to issues identified by the national committee as a first step towards development of national environmental strategy and sustainable development strategy. These issues include; management of water resources, conservation of marine environment, protection of the atmosphere, management of wastes and chemicals, and changing consumption patterns. Prioritizing issues does not mean deferring other issues such as desertification or biodiversity conservation. However, these issues are addressed within the overall integrated approach of environmental management.

### **5.1. Water resources management**

Bahrain suffers from a scarcity of water resources. The population is totally dependent on groundwater resources and on desalinated water facilities to meet its demand for freshwater. Domestic water increased at 1.6% annually in the period 1976-1986 and since then at 6% per annum. Average per capita water use in the country has doubled since the seventies to reach an average well above 500-liter

per day in 2000, which is considered high compared to world average. Nearly 82% of water demand is met by groundwater abstraction, while desalinated water contributes to 13% and tertiary treated sewage effluents and agricultural drainage water are accounted for 4% and 1%, respectively. The unsustainable use of groundwater (125% over use) resulted in the drop of groundwater level, deterioration of groundwater quality, drying up springs, salinization and deterioration of agricultural lands, and increasing dependency on desalinated water. Bahrain had in the recent past years a million palm trees whereas currently palm trees do not exceed 400,000. This decline is attributed to salinization problem, over consumption of water, and conversion of agricultural lands into commercial and residential uses.

Water is given high priority among other national priority issues in Bahrain due to the limited fresh water resources and escalating water demand. A committee for protection of freshwater resources was formed with four main tasks as follows: (1) defining and evaluating freshwater resources; (2) protecting freshwater quality, ecosystems and preventing groundwater pollution; (3) integrating development and management of water resources; and (4) studying climate change effects on water resources.

Great management efforts have been made to deal with the problem of depleting groundwater resources. Work has been concentrated on rehabilitating and maintaining domestic water distribution network, thereby reducing water leakage from 35% to 10%. Programs and measures have been introduced including public awareness campaigns, launching water education programs in schools' curricula, rationalization of water use and development of alternative water resources.

Industrial sector depends on its self-produced desalinated water. About 7 Million m<sup>3</sup> is produced annually and the production is planned to increase to about 10 Million m<sup>3</sup> per year in 2010.

Agriculture plays an important role in the livelihoods of Bahraini families however; it consumes 66% of abstracted groundwater while its contribution to national economy is about 1%. Two guiding principles have been followed to manage water more efficiently in agriculture. The first approach has dealt with the issue of reducing groundwater abstraction, while the other has concentrated on finding alternative irrigation water for agriculture and ever-growing landscape projects. A number of actions have been worked on to reach these two aims. These include, enacting and strictly enforcing laws to reduce groundwater abstraction, increasing water use efficiency in agriculture, improving irrigation methods (modern irrigation techniques-75% of agricultural area is under flood

irrigation), replacing high-irrigation requirement crops with others of less water demand, introducing tariffs for using groundwater, and using treated sewage effluent.

The use of recycled wastewater started in the 1980s and has been increasing ever since. Currently 30% of sewage effluent from the main treatment facility is tertiary treated and being used in watering forage crops and landscapes. Current plans aim at fully utilizing recycled wastewater of the expected effluent of 200,000 m<sup>3</sup>/day by 2010, which will save 20% of current annual abstraction. Officials are very much cautious about the use of recycled wastewater in agriculture. All necessary precautionary measures have been taken to rationalize such use in order to minimize the impact of soil and groundwater pollution on human health.

The unsustainable use of groundwater resources has had a severe impact on the quantity and quality of groundwater resources. The magnitude of the problem will intensify as the population increases and various sectors of the economy expand. Future work in the field of water management will be directed towards the formulation of a comprehensive national water policy that emphasizes demand management rather than augmentation of supplies.

The problem of water deficit is not limited to Bahrain. Water inadequacy is widely known in the Arabian Peninsula states, which depend heavily on desalination. Water scarcity constrains plans and curtails agricultural expansion to meet demand for food. Thereby, water shortage as a problem has to be tackled regionally in cooperation with international agencies. Further, extreme aridity of the climate, limited water resources and high water demand of various expanding sectors of the economy are major constraints for the sustainable use of groundwater resources in Bahrain.

The deficit between available water and water demand is growing and is expected to increase in the near future. There is a need to review policy on water resources. A critical review must address legal and institutional reforms, economic considerations and water conservation and enforcing of existing laws and regulations, as well as investing in developing desalination technology. Cooperation and support of donors and related international agencies in research development, especially in the improvement of desalination technology, and capacity building are indispensable assets in this regard.

## 5.2. Conservation of marine environment

As an island state, the importance of marine and coastal ecosystems in Bahrain cannot be under-estimated. The country has about 126 km of coastlines and 8,000 km<sup>2</sup> of marine area. Nearly, more than 90% of the total population lives immediately along the coast or in very close proximity to it. Population densities may reach up to 900 person/km<sup>2</sup> especially in Manama city, the capital, where 28% of Bahraini population resides. Bahrain marine area is an important natural resource. It is a main source of wealth and has supported people with fish and pearls for hundreds of years. The total annual seafood consumption is estimated at 16.7 kg/person, however these resources are subject to pollution, to over-exploitation, and to coastal development projects that require extensive dredging and land reclamation.

Most important sources of pollutants are oil spillage from tanker accidents, oil explorations, oil shipping and loading operations. Additional sources include land-based pollutants where treated, partially treated and untreated domestic sewage, agricultural and industrial wastes are discharged directly or indirectly into the shallow coastal water. Nearly 106,000 m<sup>3</sup>/day of secondary treated water is dumped into the sea causing eutrophication problems and affecting mangrove stands.

Dredging and coastal reclamation projects are putting additional pressures on marine habitats, especially coral reefs. The consequences of these pressures are degradation of marine resources, declines in fish stocks and biodiversity loss. It is reported that about 82% of coral reefs in Bahrain's marine area are endangered due to bleaching events and pollution. Environmental Affairs future plans will concentrate on adaptations of policy measures on sea level rise resulting from climate change, and developing policies on siltation of sea floor, coral reefs, over fishing, integrated coastal zone management and conservation of marine resources in cooperation with the concerned authorities.

As a national obligation, with regional and international commitments to protect the marine area, EA has coordinated a number of activities aiming at protection of marine resources. A committee for the Protection of the Marine Environment was formed from various stakeholders including NGOs in the country. The main tasks of this committee are to: (1) prepare guidelines to protect coastal zones, (2) prepare an action plan to protect nationally and internationally important marine resources, (3) study the effects of sea level rise due to climate change on coastal areas, and (4)

prepare a plan to encourage research related to marine environment and effecting factors.

The committee has called for the adoption of an integrated approach for land reclamation procedures that harmonizes the need for development with sustainability of the environmental resources in the country. To this end, EA in coordination with other relevant Governmental authorities undertook an assessment of the impact of dredging and land reclamation on the environment. Appropriate alternative approaches concerning environmentally sound management of such activities have been formulated through the involvement of all authorities concerned with the process and impact of reclamation and land dredging on the environment to ensure sound decisions and reduced impacts.

The Environmental Affairs initiated a monitoring program with the ultimate goal of establishing sound management of effluent discharge into the marine environment. Through this program EA was able to build a database, define sources of pressures on the marine environment, establish and adopt national standards on effluent discharge into the sea, and implement periodical monitoring and evaluation activities. The final outcomes of these activities were a noticeable reduction in untreated discharged waste into the sea through the expansion of treatment units, installing treatment facilities in large industrial establishments, and promotion of self-monitoring policy of effluents of major industries. Most importantly, environmental impact assessment (EIA) was made mandatory for newly established projects.

Internationally, Bahrain ratified the Ramsar Convention in 1998 and a number of special coastal interest areas were declared as protected sites. These include mangrove stands at Tubli Bay and Hawar islands and their marine surrounding. The country signed the United Nations Convention on the Law of the Sea (UNCLOS) in 1982 and the International Convention for the Prevention of Pollution of the Sea by Oil (MARPOL) in 1985.

Regionally, Bahrain is a member of the Regional Organization for the Protection of Marine Environment (ROPME). Thereby, Bahrain has signed and ratified the following protocols: (1) Kuwait regional convention for the cooperation on the protection of marine environment from pollution, (2) Protocol concerning regional cooperation in combating pollution by oil and other harmful substances in case of emergency, (3) Protocol for the protection of the marine environment against pollution from land based sources, and (3) Protocol concerning marine pollution resulting from exploration and exploitation of the continental shelf.

Although a number of laws were enacted to protect marine and coastal environment. Nonetheless, these laws need updates, revisions and clear emphasis on sustainable development of coastal and marine resources. EA plan is concentrating on the development of strategic plans for coastal zone management and integrated management of marine resources. Capacity building and pooling resources of agencies and institutions working in marine resources are needed to effectively contribute to the development of sustainable marine resources management policy including development, implementing and monitoring in light of increasing interest in coastal and offshore tourism development projects.

### **5.3. Protection of the atmosphere**

Being a low small lying island and an oil-producing country, Bahrain is concerned about climate change and its impact on sea level rise. Such impact may affect coastal areas in the country as well as other inland ecosystems and man made establishments. Even though its contribution of CO<sub>2</sub> to the World total is less than 0.1%, Bahrain is firmly committed to the protection of the atmosphere and abating global warming. This commitment was reflected in endorsing the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. Immediately following this ratification, a National Climate Change Committee of major stakeholders was formed and a national program aimed at controlling activities that harm the atmosphere was initiated with the support of GEF/UNEP enabling activity program. The program includes an inventory of green house gases (GHGs), conducting vulnerability assessment, and adoption of mitigation measures. The study is at its final stages of completion whereas quantities of GHGs were identified and amounts of these emissions were quantified. Risk assessment study yielded important information showing the vulnerability of coastal areas and other ecosystems to be affected by various changes in sea level. Currently, EA with full participation of stakeholders are considering formulations of policy options and mitigation measures to cope with possible impacts.

The increase in energy production as well as the ever-increasing number of vehicles is the main source of air pollution in the country. Generally, the ranges of air pollutant parameters do not exceed the international Ambient Air Quality Standard (AAQS) with exception of ozone and inhaleable particulates, which occur during the dust episodes. Nevertheless, the concentrations of the pollutants show little spatial variation across the Island.

Considerable accomplishments have been achieved in the protection of atmosphere. These include, establishments of air pollutant monitoring stations, adoptions of national standards for air quality, and control of emissions. Unleaded

gasoline was introduced in 2000 and it is planned that lead gasoline will be phased out completely within 5 to 6 years. Environmental Affairs is working with industrial companies to control pollution emitted from operations of these industries and in this respect, a number of industries submitted their plans to reduce pollutants. Bahrain National Gas Company for example adopted certain codes and measures to minimize environmental damage including monitoring of raw materials, liquid and solid wastes and controls on emissions. Furthermore, the company adopted a clean production policy ("*no venting, no flaring*"), safe and secure operational practices and "accepting responsibility for the protection of the environment in all aspects of its operations". The policy of caring for the environment that EA is promoting and industry's acceptance of such an approach reflects a change in mentality of industrial sectors in the country, which in turn promote environmental accountability among companies working in Bahrain. Other industries like ALBA, BAPCO, GPIC follow the same trend.

Bahrain endorsed and acceded to the Vienna Convention for the Protection of the Ozone Layer. It also ratified the Montreal Protocol in 1990 and the London Amendment in 1992. An ozone office was established within the Environmental Affairs and a program to phase out ozone depleting substances was implemented. Along with that, public awareness campaigns explaining the importance of preserving the ozone layer and the consequences of depleting ozone layer are being initiated on regular basis. A comprehensive legislation and institutional structures and capacity buildings need to be taken into consideration for effective continuation of these programs.

Institutionalizing the issue of climate change and protection of the ozone layer need a comprehensive legislation addressing various aspects of these problems. Unfortunately such legislation has not developed yet. Additionally, inadequacy of trained human resources in various fields of climate change is apparent. Laws and codes within the framework of comprehensive legislation are to be set in a more integrated way to address these issues in particular, and to institutionalize the process in order to build needed human resource expertise.

#### **5.4. Management of wastes and chemicals**

Rapid industrialization and population growth for the past two decades have generated a broad spectrum of waste in terms of quality and quantity. Solid waste management has thus become a major national concern and now it draws intense attention as one of the priority management areas due to its environmental consequences and public health implications. The waste is classified into municipal liquid and solid wastes, industrial effluents and solid waste, healthcare waste, and

chemical waste. It was reported that 1000 tons of municipal waste are generated per day, which give an average of 1.67 kg/person/day or well above 600 kg/person/year, which is considered relatively high compared to the averages of developing countries. Domestic waste is increasing annually by 3.4%, whereas industrial solid and oily wastes as well as solid healthcare wastes are on an annual rise by 1.2% and 5% respectively. Most of this waste is dumped in landfill sites.

A multi-disciplinary committee for environmentally sound management of waste and chemicals was established to prepare a national strategy for implementing Agenda 21. The main tasks of the committee are to: (1) prepare a mechanism to control industrial chemicals and their daily usage, (2) propose an appropriate legal mechanism and to increase awareness in controlling waste and chemicals, (3) prepare a documentary system for the packing and storage of chemicals, (4) prepare a mechanism to prevent the transboundary transportation of hazardous waste, (5) suggest effective procedures to encourage the reduction of waste through recycling, (6) study a proper location for the disposal of industrial waste, (7) study the choice of regional treatment of waste, and (8) suggest a mechanism to disseminate the available studies in the field of waste and chemical materials.

A range of initiatives in waste minimization and management are being undertaken at various levels. Of the implemented activities in the field of waste management are:

1. Preparation and enforcement of national legislation: A number of ministerial orders and decrees have been enacted and adopted by the Environmental and Municipalities Affairs pertaining the issue of wastes and waste management. These legal measures aim at controlling, reducing, minimizing and eliminating threats caused by these materials to the environment and human health.
2. Standards and environmental criteria for waste management: standards for healthcare waste management were finalized and adopted in June 2001, whereas standards for industrial waste management (collection, storage and handling, transportation, recycling, etc.) are expected to be finalized soon. Criteria and parameters for management of used oils have been prepared for adoption.
3. Management and monitoring of wastes: EA has suggested an integrated environmental monitoring (IEM) approach to be developed which involves various activities, some of which are already implemented. These activities deal primarily with constructing a database for waste management along with

other activities involving technicalities of waste management (site visits, scrutiny of waste manifest forms, expediting export procedures, construction of storage sites, etc.) as well as evaluations of municipal waste management system and monitoring groundwater quality near toxic waste sites.

4. Waste minimization: The Government encourages industries to convert for cleaner production, prevention and minimization of wastes, and increasing production efficiency. In this regard, assistance of international organizations and concerned institutions are needed.
5. Waste recycling: EA places great emphasis on waste recycling and re-use of wastes. A number of wastes are being recycled including oily wastes, aluminum dross, solvents, wastepaper, aluminum cans, etc.
6. Waste export: wastes that cannot be recycled in Bahrain especially hazardous wastes are exported to countries that have the facilities for recycling. Exports are usually done according to codes and regulations of Basel Convention.
7. EIA for new projects: EIA became mandatory and for all new industrial as well as non-industrial establishments including those that generate hazardous wastes. EIA clearance is usually given by EA in coordination with the Ministry of Industry.
8. Ratification of regional and international conventions and protocols: The Kingdom of Bahrain is a signatory and rectifier of Basel Convention. The kingdom has also signed the Protocol on the Control of Marine and Transboundary Movement and Disposal of Hazardous Waste and Other Wastes. Other regional and international protocols and conventions have been actively pursued like MARPOL 73/78 for which a National Steering Committee has been formed and regional meetings have been held.

Difficulties in dealing with waste management in the country include among others, lack of an efficient and updated database for waste management, absence of an appropriate waste classification and categorization system, and lack of waste analytical capabilities. Additional difficulties include, inadequate industrial and hazardous waste treatment facilities, and lack of trained enforcement officers to monitor hazardous waste movements across boundaries

EA plays a vital role in monitoring waste management and coordinating works among agencies. Future plans and targets of work will concentrate on devising policies that foster a change towards more sustainable pattern of waste management. The plans include; (1) developing solid waste management master

plan, (2) preparation and implementation of waste management policy and environmental management system for industries, (3) minimization and recycling wastes, and (4) personnel training on solid waste management.

### **5.5. Changing consumption patterns**

Eco-efficiency has been considered as one of the criteria that measures the environmental costs resulted from human activities. It reflects changes in production and consumption patterns of resources, which ultimately affect the rate of environmental degradation. Greater efficiency means maximization of resource use and minimization of wastes. In this regard, some resources are being used unsustainably in Bahrain. It is reported that water consumption, energy consumption, waste produced per household are on the increase within the Bahraini society. This increase may reflect inefficiency in resource use.

Total energy consumption has been on the increase coupled with increasing the per capita energy consumption. For instance, electricity consumption per capita (kilowatts-hours) has increased by a factor of 1.54 in 1998 compared to 1980 level, which is relatively high compared to World average. This increase is attributed to the subsidized energy prices in part and excessive use of resources by people in their daily activities. Dependency on private cars, as an indispensable means of transportation contributes to the increasing hidden environmental, economic and social costs of these vehicles. Additionally, it marginalizes the public transportation system as an effective means for reducing energy consumption and putting a ceiling on carbon dioxide emissions in the country.

Over the past ten years, the Government of Bahrain has encouraged the society to reduce wastes by increasing efficiency of resource uses. A committee on changing consumption patterns was formed to: (1) participate in suggesting programs and policies to encourage change in consumption pattern, (2) define the effects of irrational consumption on economic growth, (3) encourage consumption patterns and development in a way to minimize the environmental overstrains, (4) develop a better understanding of the consumption role and pinpoint more sustainable development patterns, and (5) participate in evaluation of the relation among production, consumption and environment.

Public awareness campaigns were launched to increase public perception towards consumption patterns. Eco-efficiency, recycling and individual behaviors were the subject of these campaigns. The issue of behavior is very critical and pattern consumerism is not easy to change and needs time and persistent efforts. On the other hand, production pattern is easier to deal with through incentives, legislation

and law enforcement. Along that line, a number of industries adopted energy saving technology and cleaner production measures. An example can be cited here as a success story where at the Aluminum Bahrain (ALBA), high production efficiency was achieved through strict controls on inputs and outputs.

Still, there is more to be done at the regional, national, family and individual levels to foster the concept of resource efficiency and resource recycling in daily life of citizens. Further actions need to be taken in the fields of reducing energy costs, management of urban areas and public transportation.

## **6. GLOBAL CRITICAL ISSUES**

### **6.1. Education**

Education is a process that empowers people with required knowledge to deal with developmental and environmental issues among the other issues. It is one of the most important tools by which people have the capacity to assess and address their sustainable development concerns. Recognizing the importance of education, the Government of Bahrain has given great support for development and improvement of educational systems in the country. Curriculum development was built upon three foundations, which contribute to fostering sustainable development within the Bahraini society. These foundations concentrate principally on the Bahraini individual (the outcome of the educational process). The first pillar emphasizes the values of education based on traditional heritage and Islamic culture. The second is promoting science education through accessing the most advanced scientific and technological knowledge and linking education to labor market. The third is taking innovative measures in curriculum development and moving towards continuous education. Although the phrase of sustainable development is not worded in these principles nevertheless, the concept of sustainability is embedded in these pillars.

The Ministry of Education has persistently pursued the three fundamentals and great deals of investments have been devoted towards this end. As such, the country has made great strides in educational achievements. The gross enrolment ratio in primary schools reached 106% along with 94% in secondary schools and 18% in third level of schooling as of 1999. The illiteracy rate dropped from 21.0% in 1991 to 12.3% in 2001 with a 17.0% among females compared to 7.5% among males. These percentages are considered low compared to other countries in the region whereas the overall illiteracy rates among men and women in Arab countries in 1995 were 31% for men and 57.2% for women. Public expenditure on

education reached 4.4% of GNP and 12% of the Government expenditure in the period of 1995-1999.

Future vision of the educational system in Bahrain incorporated a great deal of environmental related directives as well as the underlying principles of sustainable development. The vision was engineered to fit Bahraini society development needs while benefiting from the broad base of provisions contained in the Universal Declaration on “Education for all”. The followings are the main directives contained in a project document that has been approved by the Government in 1996:

1. Making education accessible to all citizens and promotion of equality.
2. Insisting upon learning acquirements.
3. Broadening the scope and means of basic education.
4. Promoting learning environment of education process.
5. Reinforcing contribution in development of education system.

The Ministry of Education has put considerable efforts to realize these principles and directives through developing programs and adopting activities to fulfill objectives of the educational system. To harmonize the educational system with sustainable education and life long learning, number of projects conducted during the nineties; most importantly are the studies of the compatibility between labor market requirements and the outputs of the educational system with the help of UNDP. Additionally, formal and informal educations have been adopted and vocational training has been broadened to cope with market needs. Computer technology was introduced into curricula schools and environmental education was introduced through seminar sessions, awareness campaigns, scouts and school clubs.

To end with, although the guiding principles for environmental protection and nature conservation have been introduced into the educational curriculum, the broad concept of sustainable development has not been fully integrated into the curriculum yet as a plan of work. Society in general still lives in the environmental paradigm and has not been fully integrated in the sustainable development course of work. Thus, more time is needed to create and foster such a change. However, it is fair to say that innovative approaches to learning have been incorporated in the educational curriculum and efforts of reorienting education towards sustainable development have made significant progress for the last ten years. Future activities

need to promote a sustainable development course of change. These initiatives may include, developing multi-disciplinary courses and emphasizing innovative teaching methods to promote sustainable development thinking in minds of young generation. Capacity building in this regard is needed to prepare a program of work in education within the framework of setting the local agenda 21.

## **6.2. Public awareness**

In the aftermath of the referendum on CNA new societies primarily (NGOs) were officially declared and started their activities. Some of which are dedicated to promoting environmental awareness and sustainable development. Environmental societies are campaigning in schools and public places for the protection of environment.

Communication media has become part of the daily life of the Bahraini society. The number of internet hosts (per 1000 people) has jumped from 0.2 in 1995 to 3.6 in 2000. Telephone mainlines (per 1000 people) increased by a factor of 1.3 compared to 1990 figure. Same is true for cellular mobile subscribers where the factor increased by more than 20 in 1999 compared to 1990 figure. This trend contributes to expose the public to sustainable development concepts by increasing access to information and exchange of ideas that will eventually lead to an increase public concern towards environmental issues.

## **6.3. Training**

The training institutes in Bahrain are sectoral in nature and job specific focus. The Ministry of Works and Social Affairs along with the private sectors have established a series of vocational training centers covering wide range of training programs and activities. Some of these centers are specifically designed to address certain needed expertise in industry or commercial and financial businesses. Vocational training, on job training and re-training programs are widely spread in the country. However, environmental and sustainable development training have not been completely introduced as a training program or fully integrated into other programs.

## **7. THE WAY AHEAD**

Sustainability is a continuing and dynamic process that involves all aspects of human life. With its three interactive pillars, economy, society and environment, it becomes one of the most complex issues to be evaluated or assessed. Sustainability is usually assessed in terms of criteria and indicators related to these aspects. In general there is a common understanding that maintaining a high and stable level of economic growth, securing social needs and protection, and wise use of natural resources form the basis of sustainability. This means achieving economic and social prosperity with minimum harm to the environment.

The Government of Bahrain has made significant achievements in various sectors of the economy and social prosperity but in some cases at the expenses of the environment. Despite fluctuations of oil prices, which Bahrain's economy is linked to, the Government has managed to maintain a reasonable economic growth rates for the past years. Enormous improvements have been made in education and health sectors that brought the country to be ranked at present among the countries with the highest human development index in the World. Presently, in the wake of sustainable paradigm, the Government has been trying within the available resources to change the course of development in favor of environment. Thereby, the due course in the past ten years in the country has witnessed genuine efforts concentrating at maximizing the use of limited resources through increasing efficiencies and maintaining a healthy environment. Some success had been achieved in paving the road to sustainability whereas some difficulties and failures were encountered.

The Charter of National Action (CAN) has created a new atmosphere in the country and generated new spirit among groups of the society. It represents the most significant development in governance reforms towards consolidation of democracy and setting a new path for sustainability. This new spirit will be able to change development due course from the business as usual approach towards a policy reform due course. Furthermore, consolidation of democracy will empower civil society towards wider and more effective participation in decision-making processes for the country.

Since its establishment in 1996, EA and other environmental agencies, such as the National Commission for Wildlife Protection (NCWP) have given great attention and made considerable effort to promote the concept of sustainable development among various agencies as well as among public. Spurred by the momentum international conventions have created, EA is pushing for revision of development plans towards incorporating environmental considerations and sustainable

development elements in these plans and activities. EA has made good progress in managing different programs and coordinating various activities regarding environmental issues. However, issues of sustainable development are broad in nature and must be tackled within a framework that far exceeds the mandates of managing environmental problems. Initiating sustainable development strategy requires input and genuine participation of all stakeholders of development in the country and a cross cutting constitution to oversee the implementation of this strategy empowered by a package of legislation geared towards sustainable development.

Major challenges that remain to be tackled for the next ten years include:

1. Developing a national strategy for sustainable development: To develop a sustainable development strategy that forms the core of planning processes urgently. Such a policy must be backed with proper institutional structure and supported by comprehensive and integrated legislation.
2. Finalization and adoption of national environmental strategy and action plans: It is of great importance that national environmental strategy and action plans be adopted within the frameworks of national sustainable development policy. Such a policy would ensure integration of environmental management into overall development objectives of the country. Furthermore, adoption of environmental strategy and action plans form a major step towards transition from unsustainable forms of development to a sustainable model.
3. Broadening measures/programs of capacity building for EA are needed as an agency to increase its capacity to deal with cross-cutting issues for more effective handling of environment management and coordination of sustainable development policies. These measures are considered essential for delivering an environmental, as well as a sustainable development policy. This includes allocation of necessary resources required to coordinate activities and to be associated with planning processes in the country.
4. Developing a comprehensive legislative package to promote sustainable development including activation of economic instruments.
5. Consolidation of full and effective public participation in sustainable development issues: Involvement of people in formulating policies and reviewing programs of action as to change the way decisions are made is one of the basic policies EA is adopting in creating the atmosphere for sustainable development. Public participation in the decision-making process promotes

ownership and the sense of responsibility; thereby affecting individual behavior, which is necessary for making a transition from excessive waste generation to more of rational forms of consumption. The role of public participation must be institutionalized; information promoted and carried out in a transparent way to enable people to participate effectively in decision-making process.

6. Institutionalization and consolidation of environmental impact assessment policies: EIA enhances environment and contribute to better development of policies, laws and projects. EIA is conducted in systematic steps supported by other laws and codes. Furthermore, harmonization of EIAs among Gulf countries would promote development standards for EIAs, which is necessary to ensure environment quality in the region as a whole.
7. Tourism/eco-tourism and tourism facilities are ever expanding in Bahrain. It is most likely to be one of the most contributing sectors to national economy in the near future. Consequently, more emphasis should be given to the impact of tourism on all sectors of the economy and natural resources. Tourism may end up as the most critical crosscutting issue for sustainable development in the near future. As such, EA endeavors to place tourism at the highest level of national sustainable planning development.

On the national priority issues, the followings issues need further action at a decision-making level:

1. Compilation of already existing data on sustainable development into a national database along with development of monitoring criteria and indicators.
2. Increasing efficiencies through better management and investment on research aimed at investigating the potentiality of reducing reliance on non-renewable natural resources to cope with water shortages.
3. Development of coastal zone management plan for better conservation of coastal areas and marine resources.
4. Initiating programs to foster efficiency and departure from unsustainable consumer patterns towards more sustainable forms by concentrating and revitalizing family tradition, ethics and religious values of the Bahraini society. These include activities to increase energy efficiency in housing and industry and avoid wastage, minimize waste, recycling and reuse of materials.

5. Promotion of sustainable energy and adoption of mitigation measures and reform policies regarding climate change resulted from climate study.
6. Rehabilitation and promotion of public transportation to reduce urban pollution and alleviating the socio-economic and environmental implications of the ever-increasing number of cars in the country.
7. Promotion of programs directed towards adjusting public behavior and individual actions to foster sustainable development concepts and attitudes among public.

To summarize, the Government of Bahrain is committed to sustainable development and to the principles of AGENDA 21. Nevertheless, institutional and technical obstacles remain to be major challenges in developing sustainable development strategy. Assistance is needed to help in reorienting development plans and reform institutional setup to cope with the new challenges ahead.