Environmental Policies Legislations and Standards

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1-Introduction

It is known that the environment includes the natural resources (renewable or depleted), (living or non-living) as well as the surrounding natural or manmade conditions which the living resources exist and derive their food and power. So it has a diverse nature having a complex of factors surrounding species of funa and flora, as well as human made activities. In fact the globe was balanced and stable but human activities especially after the Industrial and Oil revolution in the previous century led to pollution and degradation of the natural resources. Since then the international community tries to regulate human behavior in terms of conduct. All international environmental conventions and national laws tend to protect the environment. It urges environment conservation and promotion in one have and penalizes hand acts which cause and sort of pollution to natural resources or the cause of imbalance. It encourages sustainable development, so any law or legislation which aims at the achievements of the forgoing is environmental law regardless its title. Policies regulations and standards were developed during the last century both at global and national levels.

2.1. International Policies, Legislations and Standards

2.1.1. Policies and Regulations

There is an on-going debate on the environmental regulations and competitiveness in agro-industry that has important implication for policy making. On one hand there is deep skepticism among the environmentalists about the consequences of economic policies and reforms such as removal of subsidies the elimination of import restrictions, exchange rate and tax reforms that promote production and trade. Many of them consider these economic policies and reforms don't promote growth especially in developing countries. Instead they lead to economic stagnation. Because recessions increase poverty, these measures lead to the depletion of resources in the rural environment leading to immigration to towns where most of them live at shantytowns and slum areas thus become more vulnerable to pollution problems. It is argued that while stabilization may offer short-term relief from some resource management problems, it can also create or aggravate other environmental problems through its effect on poverty and dependence on natural resources. In sum from this perspective, depletion and degradation are the hidden cost of increasing exports.

Environmentalists also argue that economic growth leads to more environmental degradation because increased production and consumption mean more demand of natural resources and more emission of pollutants. This tension between economic and environmental objectives is greater in

developing countries, because their comparative advantages in natural resources means that free trade strategies would enhance their expansion. Since environmental regulations in developing countries are less strict than in developed countries, this also favourss the growth of pollution and intensive energy industries. A possible outcome of this in long-term is that developing countries would attract investments from pollution intensive industries that fleed developed countries and this means that higher production costs imposed by tighter environmental controls.

On the other hand, defenders of the economic reforms argue that free trade and capital flows bring more efficiency to economy and environment as well because:

i. Removing subsidies for energy-intensive sectors acts as an incentive to reduce energy consumption and therefore, emission and pollution.
ii. The reduction of trade barriers may lead to import modern state-of-the-art equipment. This equipment will be of less harm to the environment since they meet now environmental standards at developed countries where they have been usually produced.
iii. In case of exporting to developed countries, consumers there are increasingly concerned about the environmental standards of the products they buy. This will force developing countries to adopt environmentally friendly production patterns.

To conclude, the debate about environmental regulation and competitiveness cannot be summarized simplistic positions such as pro-industry policies are good or bad to the environment. The links between competitiveness and environment are complex and there are sound arguments for both, environmentalists and encomiasts positions.

Despite the above debate African countries have undertaken deep and serious institutional and policy reforms to comply to the World Trade Organization. Exchange rate, import policy and tax reforms have been effected in most of the African countries. Some countries have even introduced deeper policy in order to prepare themselves to participate in the world trade system.

In spite of all these efforts, Africa's trade opportunities will not be secured by only economic policy reforms. There is need to increase knowledge about environmental standards and regulations which are proliferating in countries which have formed tradional destinations of Africa's products. These regulations are part of the new non-tariff barriers and their threat to the Africa's market should not be under-estimated. The major one of these regulations and policies is the product and process environmental standards which is mainly concerned with the regulation of health standards. It covers products that may be considered directly or indirectly responsible for adverse effects, which may occur in the production or consumption chain.

Product and process environmental policies will pose a very serious obstacle to market access for African products because they tend to be very comprehensive, covering the whole life cycle of a product.

One the other hand European products will not face any obstacle in their products. European companies have taken voluntary measures to enable themselves to comply with process oriented environmental standards. They have adopted three major policies:

i. They have what are known as "Environmental Management Systems". These are quality certification standards under the ISO 9000. Chambers of Industry and Commerce have popularized these standards. Also companies have been encouraged to record information on their environmental policies subject themselves to inspection by competent authorities and obtain environmental quality certificates which they use as instrument for marketing and competition.
ii. The European commission established an "Environmental Management Audit Scheme". This scheme encourages voluntary environmental management audits. Successful companies are given a special logo that they use for marketing purposes.
iii. The third voluntary mechanism applicable in the EU is the "Annual Environment Report". Through which companies keep detailed records and give account of their achievements in implementing the international standards for environmental management (ISO 1400).

Another process policy that may affect African products is the waste management policy. For almost each product there are specific regulation aimed at reducing environmental problems which may arise out of disposed products or packing materials. Waste management policies and regulation will affect African products as importers will not accept products which do not meet the waste disposal or packing disposal guidelines such as recycling of waste. These standards are very high within European Union member states.

2.1.2. International Environmental Conventions:

Sudan as party of the international community is committed to many environmental conventions which are related to Sugar Industry. These are summarized below:

i. **United Nation Convention on Biodiversity 1992** : The main objective of this convention to be pursed in accordance with its relevant provisions are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to

technologies, and by appropriate funding. Sudan signed this convention on June 1992 and ratified it on October 1995.

ii. **United Nation Formwork Convention on Climate Change UNFCCC 192** : The ultimate objective of this convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention: "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achivied within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner".

Towards this, the convention calls on member parties mainly Annex I parties (developed countries) to formulate, develop and implement measures aimed at mitigating climate change by addressing anthropogenic emission by source and removals by sinks of all greenhouse gases. Sudan signed this convention in August 1993 and ratified it in November 1994

iii. Kyoto Protocol 1997

At the third conference of partied (COP3) at Kyoto, Japan the UNFCCC parties approved a protocol with legal commitments and flexible machismos to facilitate its compliance. In this protocol industrialized countries assume the commitments to reduce their emissions by 5.2% on average compared to 1990 levels between 2008 – 2012 years.

It is important to underline that the protocol provides the so-called flexibility mechanisms to facilitate this process, known as Kyoto mechanisms. These are:

i. Article 6 carbon trading mechanisms called for the establishment of an international market of emission reduction certificates to serve as a base for funding projects to reduce emission and capture carbon.

ii. Article 12 and 17, Clean Development Mechanism (CDM) and Joint Implementation (JI), which allow for implementation of projects to reduce emissions among the developed countries. Developing countries can receive investment form industrialized countries aimed at curbing emissions or increasing the capture capacity and obtain reduction certificates called certified Emission

Reductions (CERs) that may be accredited to the latter, provided they are measurable and in addition to the efforts made in the territory of industrialized country involved. Part of the financial resources involved would be used to cover administrive expenses and to support developing countries that are particularly vulnerable to the effects of climate change.

The Kyoto Protocol, its definitions and mechanisms proposed to reduce the greenhouse effect open inretesting prospect for the use of energy biomass and the biofuel and alcohol fuel (ethanol) markets to recover CO_2 from the atmosphere

Within this context sugar industry for all the reasons outlined above, has excellent opportunities and competitive and advantages compared to other agro-industries to produce biomass energy and alcohol fuel as by-products beside the main production which is sugar.

iv. **United Nation Convention to Combat Desertification UNCCD 1992**:

The objective of this convention is "to combat desertification and mitigation the affects of drought in countries experiencing serious drought and/or desertification particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangement, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas". Achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabitation, conservation and sustainable management of land and water resources, leading to improved living conditions in particular at the community level. This convention is governed by certain principles to implement its provisions.

Sudan signed the UNFCCD on June 1992 and ratified it on June 1994

v. Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in the International Trade 1998:

The main objective of this convention is to "promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to

protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics by providing for a national deceion-making process on their import and export and by disseminating these decision to parties. It is worth noting that this convention applies only to:

a. Banned or severely restricted chemicals; and
b. Severely hazardous pesticide formulations. Example of hazardous pesticide formulations include: Aldrin, Captofol, Chlordane, Chlorobonizlate, DDT, dieldrin, heptachlor and hexachlorbenzine

Realizing its importance the Sudanese Council of Ministers has passed an order approving the state accession to it in April 2004.

vi. Basel Convention on the Control of Transpondary Movements of Hazardous Wastes and Their Disposal, 1989 and protocol on Liability and Compensation for Damage Resulting from Transpondary Hazardous Waste and their Disposal, 1999:

The overall goal of this convention is to protect human health and the environment against the adverse effects resulting from the generation, transpondary movement and management of hazardous wastes. It rests on two main pillars:

i. a global control system for the Transpondary movement of wastes; and
ii. the environmentally sound management of wastes

The Basel Convention seeks to regulate the Tranboundary movement of wastes by means of, inter alia, a system of prior notification of an intention to export hazardous wastes and other wastes. This system is called "prior informed consent or PIC" in which a written concent is required before shipments of any waste can transit or be imported into the areas under their national jurisdiction. The convention also stipulates general obligations on the member parties with regard to the importation of hazardous wasted or other wastes.

Sudanese Council of Minster approved the State accession to this Convention on May 2002.

In 1999 a declaration called Basel Declaration on Environmentally Sound Management were approved by parties which specifies a set of priority actions on which the convention is expected to focus during the first decade of the 21st century and reaffirms, as a fundamental aim of the Basel Convention,

the reduction of transboundary movements of hazardous wastes and other wastes subject to the convention, the prevention and minimization of their generation and the environmentally sound management of such wastes.

In 1999, the Protocol on Liability and Compensation for damage resulting from the transboundery movement of hazardous wastes and their disposal was approved by parties. It seeks to establish a mechanism for insuring prompt and adequate compensation for environmental damage or any other damage from the transboundary movements of hazardous wastes and their disposals.

vii. Vienna Convention for the Protection of the Ozone Layer 1985, and Montreal Protocol on Substances that Deplete Ozone Layer, Vienna, 1987

The main objective of the convention is to protect human health and the environment against adverse effects resulting from modification of the ozone layer. Adverse effects as defined by article (1) of the convention "changes in the physical environment or biota, including changes in climate which have significant deleterious effects on human or health on the composition, resilience and productivity of natural and managed ecosystems or on materials useful to mankind"

Sudan has ratified this convention, in 1995
In Montreal Canada in 1987 a protocol was adopted "Montreal Protocol on Substances that Deplete the Ozone Layer with main objective that "all states and regional economic integration organizations to control their emission of chlorofluorocarbons CFCs mainly CFC11, CFC12 CFC113, CFC114, CFC115, interalia in aerosols, by any means at their disposal including controls on production or use to the maximum extent practicable."

The protocol put time frames to implement the above objectives and special consideration to developing countries including technical and financial assistance to get rid of these substance in a time frame.

Sudan has also ratified the protocol in 1993.

viii. Stockholm Convention on Persistent Organic Pollutants (POPs) 22/5/2001;

Mindful of the precautionary approach as set forth in principle is of Rio Declaration on Environment and Development, the Objective of this Convention is to protect human health and

environment from persistent organic pollutants. These pollutants include aldrin, chlordane, dieldrin, endrin, heptachlor, hexacloro benzene, mirex, toxaphene, polychlorinated biphenyls, DDT polychlorinateddibenzo-p-dioxines and dibenzofurans, hexachlorbanzen and poly chlorinated biphenls.

General guidance to implement the convention is considering the following useful measures to prevent the formation and release of these chemicals:

i. The use of low-waste technology
ii. The use of less hazardous substances
iii. The promotion and recovery and recycling waste
iv. Good housekeeping and preventive maintenance programs
v. Avoiding elemental chlorine or elements generating it for bleaching
vi. Improvement of waste management programmes.
vii. Energy efficiency
viii. The need to prevent or reduce to minimum the overall impact of the realses to the environment and the risk to it
ix. The need to prevent accidents and to minimize their consequences for the environment
x. The need to ensure occupational health and safety at work places.

Sudan has ratified this convention recently in August 2006 and will become a party in November 2006.

2.2.3 International Environmental Standards:

Many regional and international bodies and countries realize the importance of the environment conservation in industry as general in and sugar industry in particular.

In Latin America and Caribbean Region the Sugar agro-industry is adopting measured aimed in some cases at facing the demands of environmental legislation in effect; and in others, at preparing for imminent reality of implementation in the respective nations of standards and controls to prevent environmental pollution.

Environmental standards in this region related to sugar agroindustry are those dealing with conservation of water resources, pollution and emission released into the air, disposal of liquid wastes or waste water and solid waste, noise and odors. As follows table 2.1 are the general parameters used world wide for characterization, standardization and control.

Table No (2.1): Measurement Units for Sources of Pollution

Pollutant	Measurement Unit
Waste waters	DBO_5, DQO, pH, electrical conductivity t^o, Q
Air emissions	SO_2, CO, CO_2, Particles, NO_2, NO
Solid wastes	DQO, DBO_5, t^o, Quantity
Noise	Decibels (dBA)
Odor	Sensorial tests

Source: Cane Sugar and Environment FAO, 2006

i. Water Protection Standards:

The information found in Latin America and Caribbean region dealing with standards providing for limits for protecting water resources depending on their use as well as limits on waste water, both domestic and industrial, that are released. The following table (2.2) show the ranges of maxim limits in Latin America and the Caribbean region of some of the parameters established for waste water dumped into water bodies receptors

Table No (2.2) : Environmental Standards, Latin America and the Caribbean Waste Waters

Parameter	Measurement Unit	Ranges
PH	-	5 – 10
t^o	C^o	$\prec 45$
DBO_5	mg/L	Up to 200
Fats and Oils	mg/L	Nil – 100
Sedimentary Solids	mg/L	1 – 1.2
DQO	mg/L	150 – 500
phenols	mg/L	0.02 – 0.5

Souce: same as above

On the other hand World Bank demands that pollutants levels in effluents from sugar mills not exceed the limits in table (2.3). Further as a preventive measure, it recommends that the effluent flow be reduced to 1.3 m3/t with a trend towards reaching a level of 0.9m3/t through implementation of water recycling schemes.

The following table (2.3) shows the World Bank pollutants levels in effluent of sugar mills as well as selected countries in Africa and Asia:

Table No (2.3): Pollutant Levels in Effluent of Sugar Industry Selected Countries and World Bank Level

No	Pollutant	Code	Unity	World Bank	India	Dubai	Pakistan	Thailand	EPA	Egypt
1	Hydrogen concretion	PH	-	6-9	-	6-10	6-10	5.5-9	6-9	6.5-9.5
2	Temperature	C	C°	≤3	-	-	-	-	-	-
3	Biological oxygen demand	BOD	mg/L	50	30	1000	80	20	50	800
4	Chemical oxygen demand	COD	mg/L	250	250	3000	150	120	250	1600
5	Oil and Grease	O&G	mg/L	10	-	-	10	5	10	15
6	Total suspended solids	TSS	mg/L	50	100	500	150	50	100	500
7	Total dissolved solids	TDS	mg/L	-	-	3000	3500	3000-5000	-	200
8	settle able solids	Set.S	mg/L	-	-	-	-	-	-	-
9	Ammonia Nitrogen	NH3-N	mg/L	-	-		-	-	5	5
10	Nitrate/Nitrogen	NO3-N	mg/L	10	-		40	100	10	10
11	Floating matters	FM	mg/L	-	-		-	-		-
12	Total value for the heavy material	-	mg/L	-	-		-	-		
13	Biological insecticides	-	mg/L	-	-		0.15	-		
14	Phosphorous	P	mg/L	2	-		-	-		

Source: Sudanese Standards and Metrology Organization

ii. Air Emission and Air Quality Standards:

The international standards governing atmospheric emissions are established according to the social and environmental impacts generated by their continous discharge. It has been found that particles below 50 micras released during long period of exposure, have an accumulative effect that alters people's breathing capacity. Sulfur dioxide SO_2 at certain concentration levels also has an effect on breathing, but what has been more seriously questioned is its role in the cause of acid rain, which affects large extension of forests and vegetation. Nitrogen oxides (NOx) has an impact because it is a photochemical precursor of ozone, which affects the breathing capacity of both humans and plants. And finally, CO_2 emissions are important as it is number one cause of greenhouse or global warming effect.

Latin America and the Caribbean Region issued special standards in this respect based on established types of stationary sources, or on mobile units rather than on standardized by type of industry.

Within this context, standards in this region in air quality is in table (2.4)

Table No (2.4): Air Quality Parameters (Latin America and Caribbean)

Air Quality Parameter	Limits (ug/m^3)
- Unspecified particles (Jamaica) - Total suspend particles (Ecuador)	60 - max (annual geometric average) 150 – max (24 hours (arithmetic average)) 80 – max 24 hr
- Sulfher dioxide(Jamaica) - Sulfer dioxide SO_2 (Ecuador)	50- annual average 260 – max 24 hr 300 – max 3 hr 80 – annual arithmetic average 400 – max 24 hr 1500 – max 3 hr
- Nitrogen dioxide (Jamaica) - Nitrogen dioxide (Ecuador)	100 – max annual average 100 – max annual average
- Carbon Monoxide (Jamaica) - Carbon Monoxide (Ecuador)	10 – mg/m^3 (9 ppm) – 8 hours average 40 – mg/m^3 (35 ppm) – 1 hours average 10 – μ ug/m^3 – 8 hours, Arithmetic average 40 – μ g/m^3 – 1 hours average
Sedimentary particles (Ecuador)	I mg/ cm^2 x 30 d
Photochemical oxidants expressed as O_3 (Ecuador)	200 – max 1 hr
Lead (Ecuador)	1.5 μ g/m^3

Source: Cane Sugar and Environment FAO 2006

For the particles form bagasse furnces, the credit institutions (World Bank) established emission standards for certain countries, which can be shown in table (2.5) :

Table NO (2.5): Emissions Standards for Particles form Bagasse Furnaces

Country or Institution	Emission Standard for Particles mg/Nm^3	Observations
South Africa	120	-
India	250 850	Grill-type furnace spreader stocker furnace
Mauritius Islands	400	-
Malaysia	400	-
Brazil	70 100 120	Preserved and metro polian areas New furnaces Existing furnaces
World Bank	100 150	In general Small furnaces

Source: same as above

The Arab Leaque Industrial Organization in which Sudan is a member also issued certain standards for discharge of industrial pollutants in the water environment and the maximum emission of air pollutants at source as shown in tables (2.6) and (2.7)

Table (2.7) : The Maximum Emission of Air Pollutants at Source

No	Pollutant	Code	Unit	Max limit*
1	Carbon monoxide	CO	Mg/m^3	250-500
2	Nitrogen oxides	NOx	Mg/m^3	300-3000
3	Sulpher dioxide	SO_2	Mg/m^3	1000-3000
4	Sulpher trioxide	SO_3	Mg/m^3	50-150
5	Total suspended particles	TSP	Mg/m^3	50-200
6	Lead	Pb	Mg/m^3	2-20
7	Antimony	Sb	Mg/m^3	1-10
8	Arsenious	As	Mg/m^3	1-10
9	Cadmium	Cd	Mg/m^3	1-5
10	Copper	Cu	Mg/m^3	5-20
11	Murery	Hg	Mg/m^3	0.5-5
12	Nickel	Ni	Mg/m^3	1-5
13	Total value of heavy metals**	Total value for heavy metals**	Mg/m^3	5-20
14	Hydrogen Sutplide	H_2S	Mg/m^3	5-10
15	Chlorine	CL_2	Mg/m^3	5-20
16	Hydrogen Chloride	HCL	Mg/m^3	10-100
17	Florine	F	Mg/m^3	1-20
18	Formaldehyde	CH_2O	Mg/m^3	2-20
19	Carbon	C	Mg/m^3	50-250
20	Silicon fluoride	$Si F_4$	Mg/m^3	10
21	Ammonia	NH_3	Mg/m^3	5-20

* The lower number is the maximum limit for pollutants in general, where as the upper number is the maximum limit for specific industries (eg industries producing the material)

** The heavy metals include, lead, antimony and its compounds, Arsenic and its compounds, cadmium and its compounds, copper and it compounds, mercury and its compounds, nickel and its compounds.

2.2. National Environment Policies, Legislation and Standards

Sudan has shown much commitment towards environmental protection since the mid 1970. This commitment was triggered by the outbreak of the environmental disasters, namely; desertification and drought which stricken the African Sahelian States; including Sudan during the years 1968-1973. Moreover, global awareness about the state of the environment and the need for regional and national cooperation to eliminate or, at least reduce the most pressing environment problems identified by the Stockholm Conference on Human Environment 1972, the Nairobi Declaration 1982 and the Proposed Legal Principles for Environmental Protection and Sustainable Development adopted by the World Commission on Environment and Development Experts Group on Environmental Law (WCED) and the successive relevant regional and international conferences had contributed positively in upgrading the level of national commitment towards the protection of the environment and human health.

2.2.1. Environmental Policies

The Sudan main objectives and priorities for sustainable development were spelt out in the National Comprehensive Strategy (NCS 1992-2002) which provided policy directions to all economic and social sectors. The NCS incorporates the country's environmental strategy, which states clearly that environmental issues must be embodied in all development projects including of course Sugar Industry. The NCS has served as a key reference document and basis for sectoral policies and measures. Among the directives of the NCS is the concern for poverty alleviation, popular participation and call for the incorporation of community based origination and indigenous knowledge in the development process.

In the field of environment and natural resources the strategy emphasizes the protection and improvement of environment that would lead to a balanced development. The National Comprehensive Strategy of the country devotes considerable attention to biodiversity conservation and encourages the private sector to invest in the conservation of natural resources. The establishment of additional protected area, public awareness involving local communities in conservation matters and strengthening cooperation with neighboring countries in the field of wildlife conservation are also highlighted in the strategy.

The major guidelines to attain sustainable development necessitates:

a. Protection of the natural environment, its development and putting it to good use. The preparation of healthy social environment, and its development is and important dimension for human dignity.
b. Every Sudanese citizen has a right to healthy environment that guarantees health, abundance and prosperity.
c. The better development it continues development that caters for the needs of present generation without prejudicing those of the future generations in satisfying their basic needs. Which

necessitates the rational handling of natural resource for the benefit of all generation and he protection of the natural and social environment.

d. Some enviroemtal problems neither recognize political nor geographical boundaries which necessitates regional and international cooperation for the protection of the environment and its development in respect of international covenants and agreements.

It is thus clear that the natural strategic objective is the protection of environment in the Sudan and its improvement to help in the realization of a balanced development. To do this the following are the main objectives:

a. Qualitative and quantitative environmental improvement for the Sudanese citizen, particularly in the rural areas that will enable him dignified honorable and prosperous living.
b. Poverty eradication is our important objective of the environmental policy of the Sudan. Poverty is considered as an important factor for the destruction of the environment particularly in catering for the basic needs for the poor.
c. Reconstruction of the tree covers to maintain the ratio of rainfall, the protection of waterfalls, soil protection against erosion and the prevention of agricultural and human settlement against desertification.
d. Conservation of a balance and stability of the basic environment ecosystems which consolidate the continuous feeding of the earth and renewable natural resources.
e. Rationalization of the exploitation of water, soil forests, pasture and wild-life and their protection from pollution, over-cutting, over-exploitation.
f. Raising the standers of environment feeding and consciousness that enable politicians and administration to adopt environmental conservation, and allow citizens and voluntary organizations to take environmental – oriented initiatives and the solution of its problems.
g. Application of chemicals for various purposes, their safety and sufficiency in such a way that enables protection of life and environmental safety.
h. Up-lifting the health of the environment.
i. Raising the standard of the urban environmental, protecting it from all types of polluting and the conservation of animals and their natural environment, developing them in a way that realizes the optimal utilization and the conservation of life diversity.
j. Safe-guard of the Nile River environmental and other rivers and the Red-sea. Develop their resources in such a way that contributes to the attainment of consolidation development.

The policies to reach the strategic objectives and hence the major objectives involve:

i. Development projects should be planned on the basis of its continuous productivity and renewal making use of local technology or imported technology suitable for local environmental and life-style of the people.
ii. The environmental impact for each project should be estimated in it feasibility study and this should be supervised by authority approving the project.
iii. Evaluation of present practices negatively affecting the environment and the existing projects with the intention of rectifying them and fending against future negative side-effects.
iv. Enforcement of HCENR as the central body for environmental administration for the protection of environment with adequate resources and branches at the state and province levels to draw policies, propose legislation, supervise and follow-up implementation of governmental decisions.
v. Promulgation the necessary legislation, embodying strong punishment, to guarantee environmental protection.

Policies has been culminated by 2001 Environmental protection Act. The Environmental Protection Act is intended to provide a legal framework for policies, legislation and executive action of federal state organs. It is also intended to implement the general environmental policy in collaboration with the governmental departments and the private sector. Sectoral environmental policies shall be the implementation of the general policy in each sector of the environment, without prejudice to the commitment to international conventions. The following principles guide decision-makers in implementing the environmental policy:

- Integrative methodology in analyzing and solving developmental issues.
- The fulfillment of the needs of the coming generations or the principle of intergenerational equity.
- The fair distribution of resources.
- The efficient utilization of ecosystem in developmental projects.
- The recognition of poverty as a cause and consequence of environmental degradation.
- The polluter pays principle imposing the costs of environmental rehabilitation on the polluter.
- Popular participation and decentralization in the Implementation of programmes.

2.2.2. National Environmental Legislations:

The Sudan was one of the first African countries to promulgate legislation concerning protection of the environment. Studies have shown that there are about 150 Acts and orders and related regulations addressing environmental issues. Many of these were enacted before independence 1956. Examples include but not limited to: the Diseases of Animal Act 1901, the Calcium Carbide Act, 1917, the Agricultural Pest Prevention Act, 1919, Foodstuff and Necessaries Act, 1926 and the Provincial Forest Ordinance 1932. However these laws are sectoral, fragmented and lack comprehensive look to the overall environment. Since 1984 efforts were made to improve these laws by formulating an umbrella law with strong policy orientation that provides a basis for coordinated work.

A survey of the relevant national legislative concerning the environment and relevant to sugar industry are as follows:

(a) Constitutions of the Republic of Sudan:
Realizing the importance of environment protection the National Assembly passed the 2005, Interim National Constitution of the Republic of Sudan in which there is a clear commitment towards the environment protection. With respect to the protection of the environment chapter 2 article 11 of the Interim National Constitutions of the Republic of the Sudan States:

i. The people of the Sudan shall have the right to clean and diverse environment; the State and the citizens have the duty to preserve and promote the country's Biodiversity.
ii. The State shall not pursue any policy, or take or permit any action which may adversely affect the existence of any species of animal or vegetative life, their natural or adopted habitat.
iii. The state shall promote, through legislation, sustainable utilization of natural resources and best practices with respect to their management.

It is worth noting that the previous 1998 constitution was also committed to the protection of the environment. Article 13 refers to the role of the State in the protection of the environment in its purity and natural balance in pursuance of safety and sustainable development for the benefit of generations. The constitution also in Article 9 refers to natural resources as national heritage and public property regulated by law and "the state shall provides plans and appropriate conditions for the development of the financial and human resources necessary for utilizing such weath"

(b) Environment Protection Act 2001:
This Act represents an important development in harmonizing different environmental sectoral laws. It sets environmental standards, requires the injection of environmental dimention in development plans and requires that Environmental Impact Assessment EIA be carried before implementing any

project. The Act also calls for the protection of the biodiversity, prohibit pollution, raises environmental awareness and popular participation in setting policies and decision making. The main objectives of this Acts as stated in article 4 is to achieve the following:

a. Protection, purity, natural equilibrium and preserving the constitutions of the environment, or basic elements and the social and cultural systems thereof in achievement of safety and sustainable development, for the benefit of generations;
b. Promoting the environment, rational and sustainable use of the natural resources, for the purpose of development and conservation thereof;
c. Linking between the issues of the environment and development.
d. Ascertaining the responsibility of the competent authority, for protection of the environment, and the serious striving to achieve such protection.
e. Activating the role of the competent authority, and the organs belonging thereto, and preventing laxity and short comings of performance.

By virtue of article (5) of the Act, the Higher Council for Environment and Natural Resources (HCENR) is established under the supervision of the President of the Republic. According to article 6 of the Act, the council is presided by the federal Minister of Environment and Physical Development and membership of the competent ministers and a number of members of those in whom sufficient know-how, experience and interest in the affairs of the environment and natural resources are present. Article 17 stated that any development project should be subjected to environment impact assessment study EIA. The EIA study must include the following:

a. The expected impact of the proposed project, upon the environment
b. Such negative effects on the project, as may be avoided upon excution of the project
c. The available alternatives of the proposed project
d. Sufficient explanation that the short term exploitation of the natural resources and the environment does not affect the proffering of such resources, in the long run.
e. Where the project is connected to exploitation of the non-renewable natural resources, the study shall include the continued exploitation of such resources
f. Such precautions, as may be adopted, for containing and restricting the negative effects of the project.

Further more articles 18 of the Act provides policies and directives for the protection and promotion of the environment.

Contravention are included in article 20 of the Act which state "Notwithstanding the provisions of any other law, there shall be deemed to be contravention of the provisions of this Act, any of the following acts:-

a. Pollution of air, by affecting any change in the constitutes thereof, quantitatively, or qualitatively, as by natural may be injurious to man and other living organisms, or any elements of the environment;
b. Pollution of water sources, such as rivers, seas, lakes, ponds, channels, canals courses and natural and artificial water storage and reservoirs and otherwise, wherein water is kept, for man and animal use;
c. Pollution of food, by living organisms, such as harmful bacteria, worms and insects causing disease, or by natural, or artificial inputs, or by chemicals, heavy metals, or dust of the types thereof, or ashes of the types of the same,
d. Pollution of soil, by adding materials, or compounds injurious to the constituents thereof, or increasing the salts therein above the usual limit, or throwing refuse, or natural, or artificial materials injurious to the health in the soil;
e. Epidemic pollution, which causes affection with infectious and fast spreading micro-organisms, such as cholera, plague, leprosy and otherwise of diseases;
f. Radio-active pollution resulting from nuclear explosions, nuclear diffusion and otherwise;
g. Acoustic pollution resulting from high sounds, noise or uproar;
h. Photo pollution, by exposing any person to artificial excessive, or unsuitable lighting;
i. Endangering animals and other living organisms, by excessive hunting, or attacking the environments and natural reserves thereof;
j. Removal-and felling of trees and desertification of vegetation.
k. To change the natural pathway of water, rivers, valleys, floods and trespass thereof.
l. Dispersal of genetically modified organisms without compliance with the regulatory measures.

The Act also set punishments and penalties ranging from fines to impressment or both implemented by special environmental courts as stated in Article 20, 21 and 22 of the Act.

(C) The Pesticides Act, 1994:

- This is one of the most important legal instruments specifically designed to legislate for the management of chemical pesticides. These include insecticides, fungicides, herbicides, rodeneticides, acaricides and avoids used for the control of pests in agriculture, public health and veterinary.

- It is made known and available to the public through the official journal gazette.
- The main objective of legislation is to regulate the registration, importation, distribution, usage, storage, transportation, disposal and formulation of pesticides and workers protection
- According to the provisions of the Act, the National Pesticides Council is powered with administrative procedures relating to registration of pesticides, licensing traders, endorsement of recommendations by technical committees regarding risk assessment classification and labeling etc.
- The implementation of the Act is monitored through technical reports and also by inspectorate committees. Violators are punished by fines, revocation of licenses, shut down of facilities and imprisonment.
- No databases have yet been established.
- All data concerning newly registered active ingredients are regarded confidential and protected by the Act.

In addition to the powers granted to the Pesticides Council, section (7) of the pesticides Act 1994, prohibits the following acts:

(2) No person shall:

a. Manufacture, prepare, store, circulate, transport, use or offer for sale any pesticide or product combating pests except in accordance with the regulations passed under this Act;
b. Put any label or trade mark on any pesticide or products for combating pests in such a way as may lead to confusion or false belief as to the quality, ingredients or safety use of such substance and product;
c. Circulate or deal in any unregistered and unlabelled pesticide or products for combating pests.
d. Import or offer for sale any unregistered and unlabelled pesticide or products for combating pests.

By virtue of section 7 (2), in case of any unforeseeable damage caused by the use of a pesticide or product or combating pests, it is no defense that such substance or products have been registered.

For the purposes of section 7(1) © of the Act, any pesticide or product for combating pests is considered counterfeited if:

a. Any substance has been added, eliminated or reduced from its ingredients that may affect the quality and nature of the substance or product for combating pests prescribed in accordance with the regulations of the Act, or

b. It violates the original label or trademark which indicates its source, validity date (lifespan) or composition

Section 8 (2) of the Act also considers any pesticide or product for combating pests as counterfeited if its composition, chemical, physical or bio characteristics have substantially or partially changed in such away as to render the substance or product unfit or dangerous for the human health, animal and the environment in general.

Section (9) of the Act provides penalties for breach of any of its provisions or regulations passed in accordance with the Act. The penalties include: imprisonment or a fine. The court may impose the two penalties.

(d) Environmental Health Act and Regulations:

The main objective of the 1975 Environmental Health Act is to protect human health and environment. Relevant articles are: Article 8 (A,B,C), article 12 (A+B), article 13 (A+B) article 15 and article 16.

The regulations stipulated by the Environmental Health Act 1975 can also be resorted to, at least, to limit hazardous emissions to a minimum level. Section 13 (1) of this Act sets out the following conditions for air pollutions control:

a. Sources of pollution such as industries should be established at an appropriate distance from schools and public utilities.
b. The height of chimney should be reasonable to allow the spread of vapors, fumes, gases, and prevent their concentration.
c. Factories of chemicals, oils, or textiles, which discharge gases, shall be provided with cyclones and filters for the absorption of the gas or to decrease its concentration.

It is obvious that these regulations are not intended to eliminate air pollution, but rather to reduce pollution to a permissible level.

(e) Labour Act, 1977:

The main objective of this act is to protect workers in any establishment; it includes some provisions of relevancy to industrial safety such as the number of employees in any factory, their term of employment and the work environment, it also authorize the concerned authority to appoint industrial security inspectors to implement regulations prescribed under this act. The owner of the industrial establishment has to acquaint his employees of the risks associated with their work, and measures to be taken to avoid them, it is

also his duty to take precautions and protect his employees from industrial accidents and other related diseases.

A table No (6) annexed to the Act stated hazards which are caused by various chemicals such as:

a. Carbon monoxide and carbon dioxide
b. Fumes and dust of sulpher and its compound
c. Fumes and gases of benzene or similar substances or derivatives of nitrogen, ammonia and pathological admixtures
d. Carbon tetrachloride
e. Fumes and dust of carbon disulphide
f. Fumes and gases of methyl bromide

f. The 2002 Forest and Renewable Natural Resources Act

This act allows for the creation of "Reserved Areas" by a virtue of a decree at the request of owners or if deemed in the public interest without compensation to the owners. The reserved areas should be used in a sustainable manner. The act stated the Forest National Corporation as the competent authority and enacted it with the following responsibilities,

a. Lay down general policies for forests and their development and the implementation of such policies
b. Technically supervise all forests in the country and increase the reserved forest up to 20% of total area of the country
c. Propose laws and disseminate awareness and encourage the tree planting at all levels.
d. Develop the production of gum Arabic and care for other forestry products.

The act also included that at lest 5% of all irrigated schemes (such as Kenana) should be preserved for forests. This is 10% for the rainfed agricultural schemes.

g. Occupational Health Regulation:

The articles of these Regulation concentrate mainly on the hazards cused by lead, its fumes and dust. The necessary measures taken to protect the workers who are exposed, in addition to hazards caused by the gases and fumes of some inorganic metals. Regulation requires periodic medical examination for workers to determine the level of metals in their bodies.

The provisions of the Regulation are implemented through inspection monitoring and evaluation of the work environment.

The Regulation poses penalties on those who contravene with the provisions, which sometimes extend to stoppage of the industrial activities.

h. Other Relevant Legislations:

I. Fresh Water Fisheries Act (1954) amended 1988 with the objective to protect the freshwater fisheries of the Sudan and to regulate and control fishing.
II. Irrigation and Drainage Act 1990, which calls for all irrigation and drainage activates require a license from the Ministry of Irrigation.
III. Civil Transaction Act 1984 which regulates the relationship between landlords and tenants.
IV. The water-hyacinth control act 1960 for the control and prevention of the spreading of water-hyacinth in rivers and water-ways in Sudan.

3.2.3. National Standards:

The Sudanese standards and Metrology Organization started to issue national environmental standards. In May 2002, it issued the national standard No. MSDG 173, regarding the minimum water pollutant levels after treatment inside the factory. This means that this is applicable to any factory regard less its size or location or type of industry. The following table (2.8) shows the maximum allowable water pollutant level in Sudanese Industry after treatment inside the factory.

Table No (2.8): Maximum allowable water pollutant levels in Sudanese Industry after Primary treatment at Factory

Pollutants	Maximum allowable levels
Hydrogen Concentration (pH)	7. 18
Electrical Conductivity (Ec)	1.5 ds/m
Sodium (Na)	200 mg/L
Calsium (Ca)	120 mg/L
Magnesium (Mg)	56 mg/L
Potassium (K)	30 mg/L
Chlore (CI)	200 mg/L
Sulferdioxde (SO2)	150 mg/L
Ferrus (Fe)	0.75 mg/L
Zinc (Zn)	0.2 mg/L
Copper (Cu)	0.5 mg/L
Manganesium (Mn)	0.03 mg/L
Cadmium (Cd)	0.03 mg/L
Nikel (Ni)	0.03 mg/L
Chrome (Cr)	0.09 mg/L
Boron (B)	0.53 mg/L
Lead (Pb)	0.15 mg/L

Source: Sudanese Standards and Metrology Organization

Regarding the final treatment the Sudanese Standards and Metrology Organization issued the stranded No MSDG 174 in which maximum allowable levels of industrial pollutant after final treatment to be discharged in Rivers as shown in table (2.9) below

Table (2.9) Maximum Limits for Discharge of the Industrial Pollutant (final treatment) in Rivers and Near beaches

Pollutant	In Rivers	Near beaches
Concentration of (hydrogen)(ph)	6-10	6-10
Temp (C°)	2° ≻surrounding	2° ≻surrounding
Suspended Solids (SS)	40 mg/L	40 mg/L
Biological Oxygen Demand (BOD)	35 mg/L	35 mg/L
Oil and Grease (O&G)	3 mg/L	3 mg/L
Mercury (Hg)	0.1 mg/L	0.1 mg/L
Caduim (Cd)	0.01 – 0.02 mg/L	0.01 – 0.02 mg/L
Synide (Sc)	0.1 mg/L	0.55 mg/L

Source: Sudanese Standards and Metrology Organization Khartoum May 2002

Recently a technical committee formed by Sudanese Standards and Metrology has developed and approved a national standard for the sugar industry, which is expected to be indorsed and finalized by the competent authority very soon. The draft is shown in table (2.10) below:

Table No (2.10): Pollutant Levels in Effluent of Sugar Industry in Sudan (Draft)

No	Pollutant	Code	Unity	Qnantity
1	Hydrogen Concentration	PH	-	6-9
2	Temperature	C^o	C^o	≥ 3
3	Biological Oxygen Demand	BOD	Mg/L	25-30
4	Chemical Oxygen Demand	COD	Mg/L	250
5	Oil & Grease	O&G	Mg/L	10
6	Total Suspended Solid	TSS	Mg/L	50
7	Total Dissolved solids	TDS	Mg/L	1200
8	Settle able solids	Set.S	Mg/L	5 after 10 minutes 10 after 30 minutes
9	Ammonia Nitrogen	NH_3-N	Mg/L	5
10	Nitrate/Nitogen	FM	Mg/L	50
11	Floating matters	-	Mg/L	0
12	Total value for the heavy material	-	Mg/L	1
13	Biological insecticides	-	Mg/L	≥ 0.05
14	Phosphorous	P	Mg/L	2

Source: same as above

Similarly the same committee has drafted and approved and waiting for the final approval a standard for the maximum emission of air pollutant at source in sugar industry as shown in table (2.11)

Table No (2.11) : Maximum Emission of Air Pollutant at Source

Substance	Formula	In inhabited areas	
		Highest single concentration	Average daily concentration
Nitrogen dioxide	No_2	0.085	0.085
Nitrogen oxide	No	0.25	0.25
Sulphuric anhydride	So_3	0.3	0.1
Sulphurous anhydride	So_2	0.5	0.25
Carbon monoxide	Co	3.0	1.0
Benzpyrene	$C_{20}H_{12}$	-	$1x10^{-6}$
Vanadium pentoxide	V_2O_5	-	0.002
Soot (grit)	-	0.15	0.05
Dust (ash particles)	-	0.5	0.15

Source: same as above

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