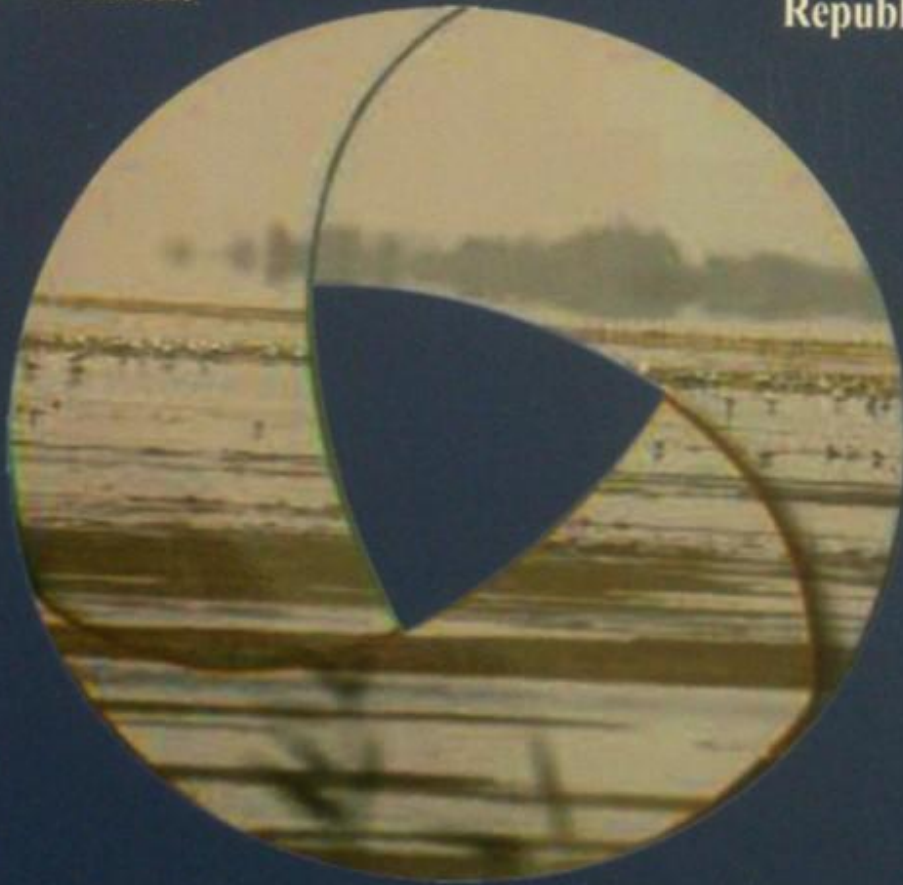




Ministry of Environment



Republic of Iraq



**THE NATIONAL ENVIRONMENTAL
STRATEGY AND ACTION PLAN FOR IRAQ
(2013 - 2017)**

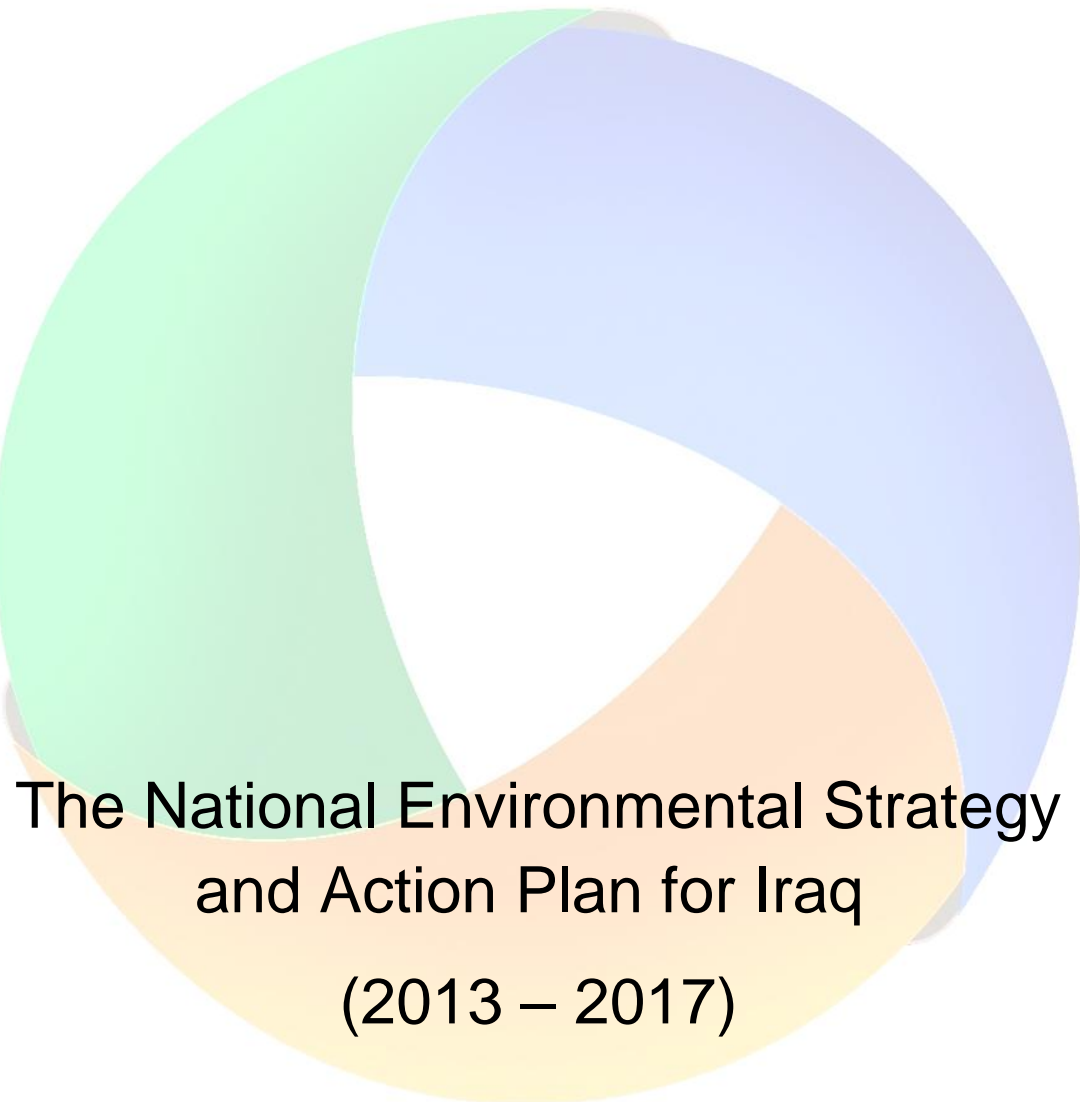


Republic of Iraq

Ministry of Environment



Republic of Iraq



The National Environmental Strategy
and Action Plan for Iraq
(2013 – 2017)

This document has been prepared in collaboration with the United Nations Environment Programme, United Nations Development Programme and the World Health Organization





Prime Minister Speech

Iraqis today look to upgrading their livelihood to the level of what was described by the country's constitution in its thirty-third article, "Everyone has the right to live in a sound environmental conditions," and it really is what the Ministry of Environment try to achieve and is represented by its sober emblem "environment gives us life, let's care for it". Perhaps this is what distinguishes the relentless pursuit of the government, and all its sectors, to achieve those aspirations and environmental benefits and privileges to live in a healthy, safe, beautiful, sustainable, multipurpose and productive environment.

The country has suffered in the past from a failure in the political and administrative decisions which led to a serious deterioration, and for decades, in the social and living conditions for Iraqis. Those circumstances later shadowed, and still, most of the wealth and environmental features in Iraq, and led to the aggravation of the suffering of individuals from the low level of welfare services associated with local ecosystems, and in conjunction with the weakness and lack of clear commitment to the application of the provisions of the legislation and the environmental laws and regulations .

The development and protection of environmental quality and sustainability for future generations is a national duty, popular, and governmental, with shared responsibilities to achieve it by individuals, organizations and government departments alike. However, this ultimate goal will not come to light without the availability of several factors, not least the proper environmental planning and identifying approaches and environmental policies to be stated in a strategy for the future that is clearly defined and has guaranteed results .

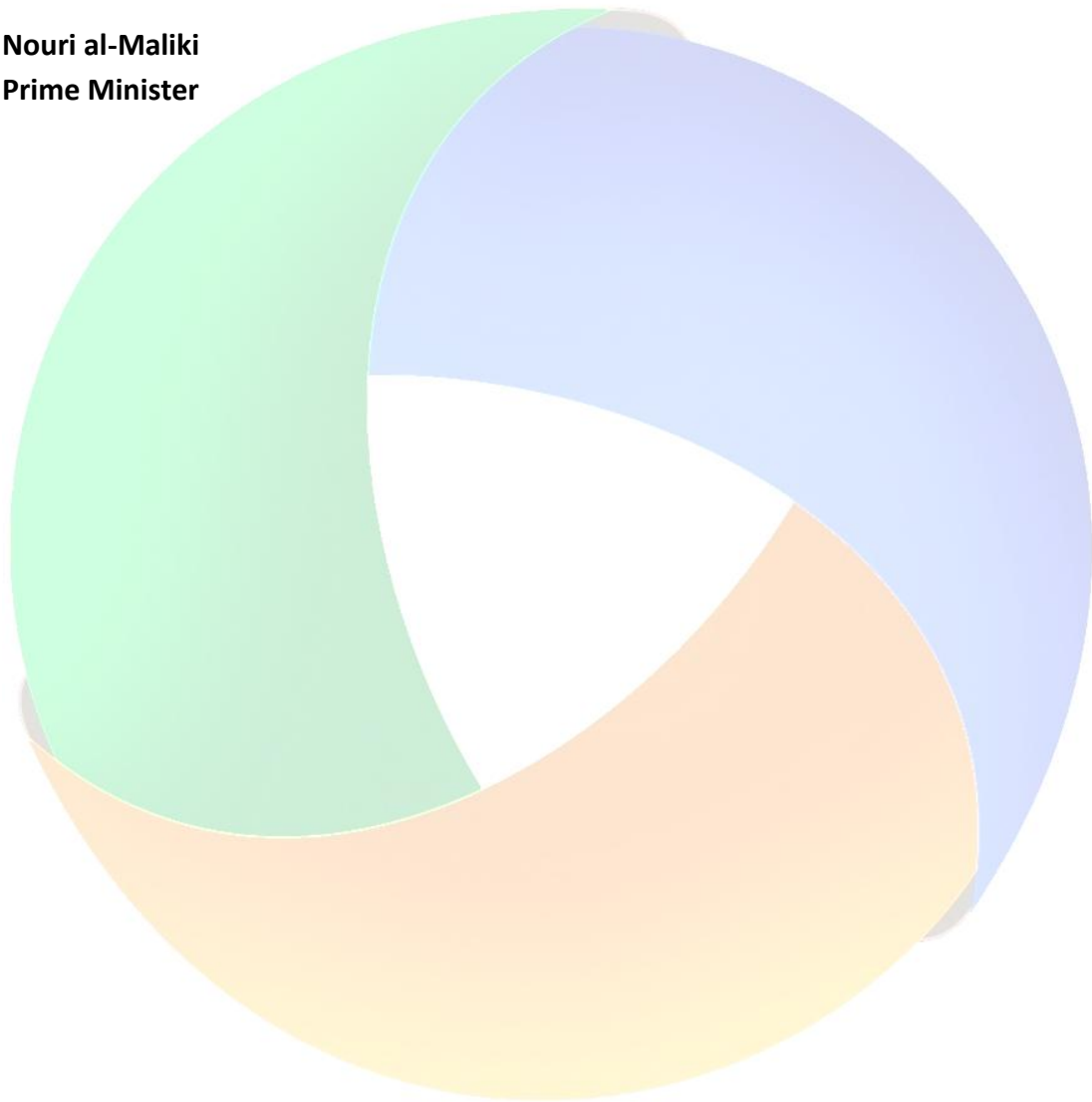
The government, over its past years has tackled the tasks of environmental protection and conservation of natural resources through the issuance of laws and regulations that aimed at that. As well, has ratified many regional and global conventions and protocols which have high content of support to what Iraq sought to achieve for the aspirations and objectives in this area.

We are delighted today to reap the first fruits of scientific work organized and played by the Ministry of Environment for planning and determining priorities, launching the first national environmental strategy specializing in environmental issues. Thereby, achieving the launch of attested work and effective realization of the

Action Plan, all aimed to protect ecosystems and biodiversity and to address environmental problems within the nature of Iraq .

Sincere thanks and appreciation is offered to all who contributed to the completion of this work, calling for God to help us all for the goodness of Iraq and humanity. Peace and mercy and blessings of God.

Nouri al-Maliki
Prime Minister





Minister of Environment Speech

I'm pleased to present the National Environmental Strategy and Action Plan (NESAP) for Iraq (2013 – 2017) to both citizens and decision makers in order to take all necessary measures to preserve the environment and ensure safe life and good health for Iraqis.

After the creation of the Ministry of Environment (MoE) in 2003, there was a need to develop programs and plans to address the deteriorating environmental situation in Iraq. In order to adopt an accurate technical approach, decisions makers sensed the need for an integrated national environmental strategy in Iraq taking the current situation and future prospects into consideration.

A nation's development and advancement can be truly measured by having future visions based on clearly defined strategies for different social goals and activities. Relations between governments and people are based on a series of commitments which can't be satisfied without previous knowledge of current and future conditions including environmental and strategic planning and long-term plans, as a trait of developed nations, which provide a true opportunity to address the actual and complicated environmental problems. Consequently, it leads to building an integrated national environment corresponding to the aspirations of the state and society. Lack of proper strategic environmental planning and random decision making have caused significant environmental deterioration in Iraq and reflected negatively on public health, ecosystems and living organisms in Iraq.

As everyone knows, Iraq has gone through extremely difficult conditions because of the repeated and continuous wars causing significant damage to all aspects of life. Today, the environment requires a practical reconsideration of the requirements to halt deterioration, protect the environment and biodiversity from pollution, change ways of addressing natural resources to sustainable approaches and activate the role of local authorities and population in planning proper environmental development and management.

NESAP highlights a vital issue, that is "state institutions and society shall adopt a proper and integrated environmental management approach by applying the concepts of sustainable development, encourage cleaner production, use environment-friendly technology and cleaner fuel, implement policies of optimal utilization of natural resources and promote environmental awareness to build a generation well aware of environmental issues."

NESAP aims at providing a distinguished quality guide for state institutions and society for environment protection in Iraq. Previous development plans were based on excluding environment protection projects from the priorities of other ministries and sectors for institutional and financial considerations. This Strategy, however, obliges the bodies concerned (as they have participated in the preparation process) to adopt environment-protection procedures and implement relevant activities during the period (2013-2017).

MoE has adopted an ambitious plan to pursue this task by bringing together its experts, other academic professionals from the Ministry of Higher Education and Scientific Research and international experts from UNDP and UNEP. The Strategy identifies urgent priorities such as protecting and improving the quality of water, soil and air; preserving biodiversity and marine and coastal environment; minimizing oil, radioactive and chemical pollution and waste in general; and developing the institutional and legislative framework. Furthermore, the Strategy has an implementation plan that includes several programs to protect and enhance the environment over the next five years. We should praise the efforts of the representatives of all ministries in the preparation of the strategic environmental analysis in collaboration with the World Health Organization, which has been one of the important sources that have been relied upon to develop this Strategy.

We extend our gratitude to all parties participating in accomplishing NESAP, especially UNDP-Iraq office, UNEP-West Asia office, MoE experts and academics from the University of Baghdad. Special thanks to head and members of Health and Environment Committee in Iraqi parliament for their valuable comments on this documents. May God grant us all success to do good for our beloved country and serve humanity.

Eng. Sargon Lazar Slewa

Minister of Environment



Speech of the Head of Health and Environment Committee at the Iraqi parliament

One of the most important features of progress today is the care and attention a nation may provide to environment. Environment has direct and indirect impact on the human health and also on various social and economic aspects of life in different countries.

Having suffered much from the scourge of wars, Iraq needs diligent and methodical efforts to repair the ravage caused by those wars. Meanwhile, natural changes, most prominently the climate change and drought, have started to negatively affect our environment.

The first step toward improving the environmental conditions is an in-depth analysis of the environmental circumstances in Iraq and the development of adequate strategies and action plans to reform the whole environmental system and protect environment against the so many wrong practices which are unfortunately still prevalent as mentioned in this document.

We highly appreciate the MoE initiative to develop the national environment strategy and the related 5-year action plan. This document, which was developed last year by national experts in collaboration with UNEP/UNDP consultants, provides a realistic strategic analysis of the environmental situations in Iraq.

What distinguishes this MoE strategy prepared is the realistic identification of the priorities of environmental action in Iraq as well as the most important environmental challenges and problems facing the country. The strategy proposes programs and projects to address these problems in order to protect and improve the environment in Iraq. We, as a legislature, are responsible of this sector. We support and adopt this document with a view to providing a good environment worthy of the children of our country. We recommend all parties to cooperate with MoE in implementing its tasks. We also call all individuals, government institutions and NGOs to provide physical as well as moral support to MoE to enable it to fulfill its duties.

God bless

Dr. Liqaa Alyassin
Head of Health and Environment Committee-Iraqi Parliament

Abbreviations

BOD	Biochemical Oxygen Demand
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNG	Compared Natural Gas
CoR	Council of Representatives
COSIT	Central Office for Statistics and Information Technology
CSOs	Civil Society Organizations
DNT	NESAP's Development National Team
EFTs	Environment-Friendly Technologies
EIA	Environmental Impact Assessment
EPI	Environment Protection and Improvement
EPIA	Environment Protection and Improvement Authority in Kurdistan
EPIC	Environment Protection and Improvement Council
EPICGs	Environment Protection and Improvement Councils in the governorates
GIS	Geographic Information System
GoI	Government of Iraq
HECP	Health and Environment Committee in the Parliament
HECGs	Health and Environment Committee in the Governorates
HR	Human Resources
ID	Iraqi Dinar
IDP	Institutional Development Program
IM	Integrated Management
IT	Information Technology
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
IWTPs	Industrial Wastewater Treatment Plants
KRSO	Kurdistan Regional Statistics Office
KVA	Kilovolt-Ampere
LNG	Liquid Natural Gas
LPG	Liquid Petroleum Gas
M&E	Monitoring and Evaluation
MMPW	Ministry of Municipalities and Public Works
MoA	Ministry of Agriculture
MoB	Mayoralty of Baghdad
MoC	Ministry of Culture
MoCH	Ministry of Construction and Housing
MoCom	Ministry of Communication
MoD	Ministry of Defense
MoE	Ministry of Environment
MoElc	Ministry of Electricity
MoH	Ministry of Health
MoHESR	Ministry of Higher Education and Scientific Research
MoHR	Ministry of Human Rights
MoI	Ministry of Interior



MoIM	Ministry of Industry and Minerals
MoJ	Ministry of Justice
MoLSA	Ministry of Labor and Social Affairs
MoO	Ministry of Oil
MoPDC	Ministry of Planning and Developmental Cooperation
MoST	Ministry of Science and Technology
MoT	Ministry of Trade
MoTr	Ministry of Transportation
MoWR	Ministry of Water Resources
NDP	National Development Plan
NEFTs	Non Environment-Friendly Technologies
NESAP	National Environmental Strategy and Action Plan
NGOs	Non-Governmental Organizations
PCCD	Public Commission to Combat Desertification
PPM	Parts Per Million
R&D	Research and Development
ROPME	Regional Organization for the Protection of the Marine Environment
SD	Sustainable Development
SM	Sustainable Management
SMWR	Sustainable Management of Water Resources
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WHO	World Health Organization
WWTPs	Wastewater Treatment Plants

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Preface

The environment of Iraq has suffered, and still, many problems caused by natural and human factors, and wrong policies which isolated Iraq from the world for many years, and as a result of successive wars and international sanctions. During the recent decades, in particular, Iraq has been affected by a range of political changes, wars, which were negatively and directly reflected on the reality of Iraqi society and the Iraqi citizen. As a result, the issue of preserving and upgrading the environment and protection of the resources from depletion has come on top of interest, at the lead of local level, and a national responsibility in general. Nothing is more indicative than what it was confirmed by the Prime Minister HE Mr. Nouri al-Maliki in his opening speech of the strategy document: " Protection of the environment is a national duty that requires stakeholders to work hard to take care of it and take the necessary measures to preserve it". He also stressed the urgent need for the procedures, regulations and laws related to the required level of seriousness and rigor to protect the environment. In addition, it was also confirmed by HE Eng Sargon Lazar Slewa, the Minister of Environment, in introducing the strategy: "the true measure of the civilization of the nation and progress comes through ownership of future visions which are based on strategies and the goals and activities of interest to the community, including environmental planning, and for the long-term strategic plans". As pointed out by Dr. Liqaa Alyassin, Chairman of the Health and Environment Committee in the Iraqi Council for Representatives (the parliament), about "the importance of setting priorities for environmental action in Iraq and identifying the most important environmental challenges and problems facing the country and then propose programs and projects to address these problems in order to protect and improve the environment".

The causes of environmental degradation can be attributed to the increasing population growth (population pressure) and the increasing need for resources of food, energy, housing and water, and the increasing pressure on the environment due to increased disposed solid and liquid wastes, and those practices that threaten the continuation of life in ecosystems such as deforestation and destruction of forest areas and soil degradation and illegal hunting of wild animals and birds and urbanization (urban growth), desertification and land degradation, and poor environmental awareness and poor environmental monitoring systems, wars and political situation. The effects of environmental degradation in Iraq can be summarized by several aspects, including scarcity of water sources and pollution of water and air, and the degradation of biodiversity and pollution of the marine waters. The Ministry of Environment has recently prepared the first study of its kind in which it calculated the cost of environmental degradation in Iraq, where the cost was estimated between 4.9% - 8.0% of the annual gross national production.

Since the establishment of the Ministry of Environment in 2003 concern was focused on the implementation of the state policy in the field of protecting and improving the environment and to meet the challenges and complex problems facing the Iraqi environment. The Ministry seeks, in its general approach, the adoption of the concepts of sustainable development and integrated environmental management.

The pursuit also encouraged the use of clean energy and environmentally friendly technology, and the consideration of the optimal use of natural resources, and consolidates the principles of re-use and recycling. The ministry has also sought to activate the role of Iraq in the international arena, which has by now become an active member in several international environmental agreements and protocols, such as those on climate change, biodiversity, combating desertification and ozone, RAMSAR, and others. Also, the Ministry of Environment actively cooperates with the United Nations Environment Program and with other UN organizations in the implementation of capacity-building projects for the Iraqi staff officials.

The Ministry of the Environment envisaged the urgent need for the preparation of the National Strategy for Environment and the executive work plan, to realize the aim of improving the quality of life for the population of Iraq. The ministry seeks, from the perspective of environmental and health, as well as the assessment and inventory of all issues related to the reality of environment, to propose solutions and alternatives of environmentally sound green technology, green economy, eco-tourism and the concepts of changing types of fuel currently in use to those of less harmful-to-humans and the environment. It is hoped to help developing a strategic reference guide for those who are responsible for environmental affairs in the various sectors of the country and for inclusion in the new environmental policy strategies and future plans for these sectors and institutions. The environmental strategy will also help to build awareness of the application of the principles of sound environmental management for various projects including the creation of, and the reality of new, concepts of values of volunteerism in environmental practices at all levels of social classes, and the optimal use of environmental resources, without waste or abuse to the natural balance of ecosystem or to the biodiversity. The National Environmental Strategy will also contribute to the development of short and long-term solutions for significant problems on the local and regional levels such as climate change and potential environmental disasters and to build the necessary capacity in the field of advanced environmental monitoring systems.

In this context, the ministry has embarked on the preparation of this strategy and its Executive program with the active participation of all the relevant authorities and experts at the national level, and with the technical support of United Nations Development Program UNDP, the United Nations Environment Program UNEP and the World Health Organization WHO during the period July, 2011 to June, 2012. The Ministry of Environment as a national umbrella and supervisory environment sector has adopted the preparation of strategic and operational plan as a participatory approach between stakeholders of government and non-government and was taking into account the lessons learned from their experiences and comparative advantages that they attain. A working group was formed from national experts in addition to a number of distinguished international experts.

In this context, several meetings for the team were held and bilateral meetings between the team members and experts and stakeholders in the various institutions, in addition to organizing workshops for centralized groups to discuss some of the issues and consultation.

The strategy consists of four chapters in addition to the fifth special chapter on the executive plan. The first chapter includes the introduction while Chapter II deals with a general description of the state of the environment in Iraq and the third chapter covers the diagnosis and analysis of key environmental issues and identify strategic objectives, and finally monitoring and evaluation mechanisms and roles of different institutions has been included in the fourth chapter. The fifth chapter presents the Executive Program and the National Plan for Environmental Protection, which includes an array of programs and projects for the implementation of each of the strategic goals. Ten key objectives of the strategy (strategic goals) have been identified including all subjects and environmental affairs. These goals came as a result of in-depth analysis of the environmental issues and priorities, and the active participation of all stakeholders and intensive consultations that took place during the preparation of the strategy. The report forms strategic analysis of the environmental sector in Iraq, which was prepared in cooperation between the Ministry and the World Health Organization (WHO), is an important source and a key for the preparation of the present document. It has been taken into account the compatibility of those goals with the five axes of environmental sustainability which appeared in the National Development Plan 2010-2014, namely: air pollution, water pollution and soil pollution, desertification, solid waste and waste. It should be noted that these strategic objectives are integrated and interrelate with each other, and were here arranged by the logical sequence of the objectives and must be dealt with through a unified and comprehensive perspective. Solutions and interventions needed to deal with each issue have also been proposed. These ten objectives are to protect and improve air quality, protect and improve water quality, reduce land degradation and desertification, preserve coastal and marine environment, conserve sustainable use of biodiversity, development and improvement of waste management, reduction of oil pollution, reduction of radioactive contamination, Integrated Management to hazardous chemicals, and the development of the institutional and legal framework for the sector of environment.

The process of monitoring and evaluation is considered the most important tool to review progress made in the implementation of the strategy, and thus improve performance efficiency and optimum utilization of resources. It is therefore a burden on the shoulders of the Ministry of Environment that the monitoring process will be carried out by its competent provincial directorates and institutional structures. With regard to the assessment process, it will be implemented by third parties during 2014 and 2017. Instructive Indicators have been identified for monitoring and evaluation. It should be noted that these indicators are only indicative, and more specific numerical indicators will be selected for the Plan and the consequent strategies, so that they will be linked with and determinants to national standards and be measurable and reviewable.

The executive program and the national plan for the protection of the environment are an interpretation program for the implementation of the ten strategic objectives of the environment during the period 2013 – 2017. Each of the strategic objective is comprised a set of axes, which were also identified a set of related issues in the strategy document. When preparing this plan It has been taken into account a group

of programs and projects contained in the National Development Plan for the period 2010 - 2014, which is currently being implemented or will be implemented by the end of 2014. These were noted in the matrix of programs and projects in addition to propose a set of new projects needed to achieve strategic objectives through the three-year-plan. This plan covers the first phase of the implementation of the strategy will be followed by a future plan, or plans, to coincide with other forthcoming national development plans. The total estimated cost will be assessed through preparation of an operational plan that describes the stages of implementation and the amount of time and resources, and human and technical resources necessary to determine in detail the responsibility for implementation. It is worth mentioning that a number of ministries and government and non-governmental and private institutions will co-share the implementation of this plan. The Ministry of Environment, as well as sharing implementation of some projects that do not fall within the business of other institutions' responsibilities, will function as coordinator and evaluation and monitoring body for programs and projects of the plan.

Finally, the full implementation of the objectives of this strategy on both, the near- and long-term, perspectives will ensure a balanced and healthy environment for individuals and the society, and maintain the numerous natural resources from pollution. It will also help to disseminate the culture, and the application, of the principles of sustainable development as a concept that is fundamental to future generations, to enable them interacting with the environmental challenges faced by Iraq.

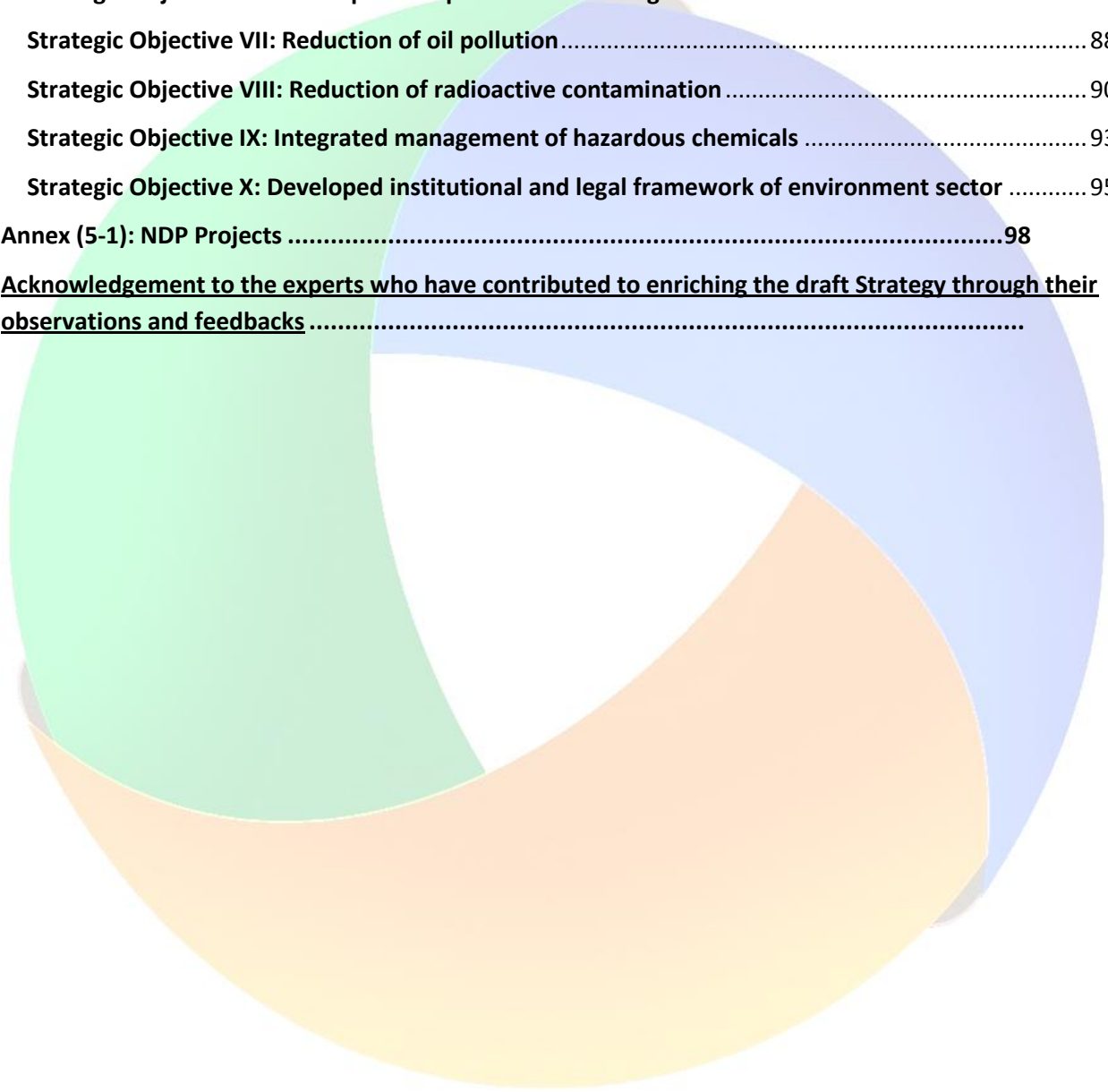
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Chapter I: Introduction

Introduction

Iraq faces several challenges, particularly preserving and improving the environment, solving its problems and harmonizing it with national, regional and international requirements. The process of preparing and adopting integrated, flexible and applicable strategies with clear goals in light of the available human and financial resources constitutes an urgent need for decision makers in Iraq and an SD prerequisite and fundamental condition.

Environment in Iraq suffers from several problems which can be attributed to natural and human factors and incorrect policies that isolated Iraq from the rest of the world for many years due to consequent wars, international sanctions and the execrable economic blockade. These factors, among others, have formed significant pressures on the environment. Therefore, rehabilitating and improving the environment quality entails multi-level collaboration of stakeholder efforts to develop environmental strategies and action plans to achieve the goals of reaching a promising future where we and future generations live safely and stably in a healthy and sustainable environment. This supports Iraq's objective to embrace the future by adopting integrated, flexible and applicable strategies with clear goals and guaranteed results.

Active environment-concerned organizations comprehend executive and legislative public bodies (MoE, HECP, HECGs, EPIA, ministries, bodies not associated with a ministry within the EPIC, EPICGs and environmental police), CSOs, international institutions specialized in the field of environment like the UN organizations and donors.

MoE is the government institution concerned with implementing the state's EPI policy, and has assumed this task since its creation in 2003 as a natural development reflecting the deep understanding and attention Gol attaches to environment and responding to the urgent need to practice environmental work in order to face the grave environmental challenges and problems. Until 2003, the environmental tasks in Iraq, i.e. legislative, regulatory and executive tasks, had no real sponsor and been subject to political will. The independence of environmental decision, as a technical and professional decision naturally biased to the rights of citizens and nature, is one of the most important EPI requirements.

The creation of MoE came as a complementary step to the establishment of the Higher Commission for Environment in 1974 after Iraq's participation in Stockholm Conference on the Human Environment in 1972 in addition to the creation of the Environment Protection and

Improvement Council in 1975, the issuance of Law No. 76 of 1986 which provided for the establishment of the Supreme Council for Environment Protection and Improvement and Law No. 3 of 1997. MoE was established in 2003 followed by the introduction of the Iraqi Constitution in 2005 which highlights the development of environmental policy and securing environment protection in Article (114-3). A complementary step came later with the issuance of MoE Law No. 37 of 2008 and EPI Law No. 27 of 2009. Article 33 of the Constitution states that: "Every individual has the right to live in a safe environment" and that "The State undertakes the protection and preservation of the environment and biological diversity".

In the same context, the National Development Plan (NDP) 2010-2014 highlights the importance and necessity of integrating environmental and socioeconomic dimension as a development basis in Iraq.

MoE seeks to adopt SD concepts; follow the approach of integrated environmental management; and combat poverty, poor environmental awareness, low income and environmental deterioration. MoE also encourages the use of clean energy and EFTs while optimally utilizing natural resources, establishing the principle of reusing and recycling, and promoting community-level environmental awareness.

Since its creation, MoE has developed its organigram to comprehend the required

tasks; reviewed, updated and enacted several EPI laws and regulations; and conducted environmental impact assessment (EIA) for different projects to identify their conformity with environmental determinants. It has also implemented a number of nationwide environment protection programs, e.g. air, water and soil pollution control; and created environment-polluting activities database and digital maps.

MoE also seeks to develop solid and hazardous waste management and assess the pollution of former military manufacturing sites and conflict zones, especially the remnants of weapons contaminated with depleted uranium.

MoE has collected radioactive waste in specific locations for final treatment in cooperation with MoST, and supervised the demining program in coordination with other stakeholders, whether government formations or international organization.

In addition, MoE has supported and implemented several projects for nature preservation, such as biodiversity protection, supported the creation of nature reserves and encouraged using EFTs and modern technology. It has also supported the formation of environment police to enforce environmental legislations as MoE inspection teams control and assess different industrial, agricultural and service activities to reach a clean and pollution-free environment.

MoE also supports activities aiming at promoting environmental awareness by organizing public workshops, seminars and awareness programs. On school level, the education curricula has been updated to include the concepts of environment protection and several bulletins and reports covering the environmental situation in Iraq were issued.

MoE has undertaken another important role to introduce Iraq on the international level. Iraq has become an active member in many important international environmental conventions such as climate change, biodiversity, combating desertification, ozone, RAMSAR, etc. In the past, Iraq wasn't a signatory of any international environmental convention.

MoE has actively cooperated with UNEP and other UN organizations to implement local capacity building projects as well as other environmental projects on top of which is the global Marshland Project which has greatly contributed to unveiling the crime of drying the Marshlands. In addition, MoE is working on a new project to register the Marshlands as environmental sites of global importance which helps convince the neighboring countries to provide sufficient water to re-flood the Marshlands, in addition to other projects to control drinking water quality and enhance urgent environmental management through environmental assessment and capacity building.

As for capacity building and training, MoE has engaged most of its technical and administrative staff in training courses inside and outside Iraq to develop their experience and implement the entrusted tasks efficiently. As an additional step to support MoE development, a number of university consultants and researchers has been contracted to provide technical and scientific advice to conduct studies and research, especially in the field of natural systems.

Over a relatively small number of years, MoE has collected and registered field information and data for these purposes, established a website and issued technical and scientific reports. In this regard, MoE has, since 2004, been annually publishing the environmental situation report in Iraq, which is the result of ongoing efforts to circulate environmental information on a periodical basis and make it available for M&E purposes.

Strategy rationale and objectives

Despite the aforementioned achievements, MoE has considered the Strategy for the following reasons:

1. Improve quality of life and livelihood from an environment and health perspective, protect natural environment, and use and support sustainable practices;
2. Assess issues relevant to the environment situation in Iraq, suggest environmentally-sound solutions and

- alternatives and adopt the green technology principle;
3. Prepare a guide for officials responsible for environmental affairs in different public sectors (ministries, departments, NGOs, etc.) to incorporate new environmental policies in future strategies and plans of those sectors and institutions;
 4. Minimize the potential impact causing environment deterioration, build institutional and educational awareness to preserve the environment, design a clear roadmap to implement the principles of proper environmental management in different projects, and use natural resources optimally without loss or damage to the natural environment or prejudice to the ecological balance or biodiversity;
 5. Develop short- and long-term strategic solutions for global environmental variables (climate change) and their reflections on the local and regional level, strengthen the supervisory and inspection role of MoE bodies and build the necessary capacities in the field of advanced ecological monitoring systems;
 6. Engage different social categories, whether institutions or individuals, in decision making and implementation; and
 7. Develop specialized IT system(s) to identify environmental problems and damages and their measurement and control methods, and prepare plans

for management of potential environmental disasters and crises of natural or non-natural cause.

The Strategy mainly aims at developing and implementing environmental policy and plans; conducting audits, assessment and correction; and reviewing the management system. Strategy's adoption of effective and sound environmental policies, legislations and strategies; existence of programs to monitor and enforce relevant laws properly; inclusion of environmental considerations in all development plans and strategies in the country; and adoption of the principle of spreading environmental culture and awareness in the social structure, would eventually minimize environment deterioration and its costs which amounted to 6.5% of GDP, according to the first relevant study based on limited information of 2008.

This ensures the optimal implementation of the Strategic Objectives on the short and long term and the achievement of the following:

1. Healthy and balanced environment for individuals and society and protected natural resources from pollution;
2. Promoted culture and implemented SD principles as a main concept for future generations to interact with environmental challenges in Iraq;
3. Green technology, green economy, ecotourism and special concepts on substitution of currently used fuel

with less harmful types to man and nature;

4. Promoted concepts of voluntary work among individuals, groups and institutions and encouraged CSOs in this regard to create a new reality and concepts of voluntary environmental work on different social levels and classes;
5. Fined polluters, whether governmental or non-governmental organizations, natural or corporate bodies or individuals. This will consequently incite society to adopt environmental standards and approaches to develop its practices and limit environmental risks. For example, follow the principle of redress with respect to damage to selected environments;
6. Obligated producers or importers of different products to observe paragraphs governing their activity within the Strategy institutional and legal framework which ensures reducing the use of fossil fuel, decreasing the production and manufacturing of wastes, developing products to become recyclable and importing environment-friendly materials;
7. Application of the 4R principle (Reduce, Recycle, Reuse, Recovery) in the Strategy to ensure optimal use of resources without damaging the environment; and
8. Creation of multi-level integrated environmental system comprising all

EPI-concerned sectors to cooperate among themselves in terms of information and experience exchange and common decisions.

Strategy Development Methodology

Preparing this Strategy qualifies as an interpretation of the content of NDP and the strategic environmental analysis document prepared by MoE with the participation of the ministries concerned, CSOs and WHO. This Strategy complements the document and corresponds to the requirements and orientations of international agreements and conventions.

In this context, MoE has requested UNDP and UNEP's advice and technical support to provide DNT with international and local experiences and the needed logistic help to achieve long-term integration among environment, SD, management and strategic planning. The request includes as follows:

1. Prepare NESAP which comprehends short, middle and long term priorities including the identification of implementation timeline and estimated cost;
2. Evaluate the needs of institutional development to implement NESAP; and
3. Develop institutional activities achievement indicators, monitor and evaluate the progress and introduce the necessary modifications.

NESAP development process has adopted a participatory approach between MoE, as the national umbrella supervising the environment sector, and several governmental and non-governmental stakeholders taking into consideration the lessons learned from their experience and comparative advantages. Strategy development has employed multiple methods and approaches outlined as follows:

- Formulate the DNT and attract local and international experts
- Hold several DNT meetings as well as bilateral meetings among DNT members, experts and stakeholders in different institutions and organize workshops for central groups to discuss certain issues. Following are major workshops:

Table 1-1: Most important consultative workshops to develop the Strategy

Meeting	Place and date	Details
First meeting or preparatory workshop	Amman, Jordan, 2-3 July 2011	The meeting/workshop was attended by the leading cadre at MoE, a number of international experts, and representatives of UNEP and UNDP. The meeting/workshop aimed at: <ol style="list-style-type: none"> 1. Assessing environmental planning in Iraq; 2. Identifying priority environmental issues and agreeing on the Strategic Objectives and directions; and 3. Developing detailed road map to set and update the Strategy and assess the MoE organizational development.
Second meeting	Amman, Jordan, 28-29 September 2011	It was the first meeting of the Strategy developers and was attended by the MoE representatives, local experts (national consultants), and international experts of UNDP and UNEP. It aimed at: <ol style="list-style-type: none"> 1. Reviewing progress and the strategy that was developed as it was agreed to complete what MoE had achieved with WHO in preparing the previous strategy (analytical document); 2. Agreeing, as a group, on priorities, Strategic Objectives, and indicators; 3. Reviewing the Strategy table of contents which was agreed on in Amman workshop; 4. The Action Plan, its contents and components; and 5. Reviewing the roadmap which includes all activities carried out until the adoption of the Strategy, timetable, and responsibilities.
First symposium on the Strategy	Baghdad, Iraq, 24 October 2011	It was attended by the MoE developers of the Strategy in addition to national consultants. It aimed at showing the stages of developing the Strategy to all staff of MoE where they were given the opportunity to conduct a discussion with the developers and present comments and

			feedbacks.
Third meeting	Amman, Jordan, 15-16 November 2011		It was the second meeting for the Strategy developers and aimed at reviewing its developed parts, providing feedbacks and conducting necessary amendments.
Fourth meeting	Beirut, Lebanon, 20-23 January 2012		It was the third meeting for the Strategy developers and aimed at reviewing its developed parts, and developing programs and the Action Plan.
Fifth meeting	Baghdad, Iraq, 15 March 2012		It was attended by the MoE developers of the Strategy, and discussed a number of relevant matters.
Second symposium on the Strategy	Baghdad, Iraq, 25 April 2012		All the MoE employees were invited to discuss the notes of the first draft Strategy which had been circulated around a month prior to the symposium.
Third symposium on the Strategy	Baghdad, Iraq, 20 June 2012		It was attended by representatives of all ministries to have a discussion with the Strategy developers and present comments and feedbacks.
Sixth meeting	Amman, Jordan, 25 June 2012		It was attended by the MoE developers of the Strategy as well as the UN international experts to review all feedbacks and draft the Strategy in its final form.
Fourth symposium	Baghdad – Iraq 7 November 2012		For showing the strategy to the Parliament Council / Health and Environment Committee.

- Fill-in questionnaires regarding the institutional performance inside and outside MoE
- Prepare, discuss and finalize drafts by DNT members, as well as prepare and discuss the NESAP's preliminary draft in a national workshop to gather remarks, comments and recommendations before drafting it in its final form and adopting it by the state
- Approve and adopt the Strategy

Strategy development was initiated during a DNT workshop held in Amman on 2/7/2011 and consultation continued till June 2012.

The Action Plan will develop bases and form a roadmap for the proposed programs and procedures to achieve the Strategic Objectives. The institutional and legal framework constitutes a prerequisite for successful implementation and M&E. Therefore, particular attention has been given to this issue by preparing a special document for the MoE Institutional Development Program (IDP) to address both institutional and legal aspects to conform to the new Strategic Objectives.

The Strategy comprehends 4 chapters in addition to the Action Plan as follows:

- Chapter I: introduction

- Chapter II: general description of the environmental situation in Iraq in terms of natural resources; economic activities; population; overall and sectoral policies and strategies; relevant international agreements and conventions; challenges, problems and constraints facing the environment in Iraq.
- Chapter III: diagnosis and analysis of key and priority environmental issues and identification of the Strategic Objectives that will develop a framework for institutions and determine the course of environment in Iraq over the next 5 years in light of

assumptions and information included in this Chapter

- Chapter IV: M&E mechanisms. This Chapter comprehends the methodologies, mechanisms, methods and roles of different institutions in M&E processes at the level of the program and strategic plan.
- Chapter V (last chapter) is the Action Plan for implementation of the National Plan for Environmental Protection. It includes projects matrix for each strategic objective.

Chapter II: Iraqi Environment Status Quo

Introduction

Over the recent decades, Iraq has gone through several political variables and wars which negatively affected society, population and environment in Iraq. As a result, environment preservation and promotion and protecting resources against depletion have become a public national responsibility and assumed priority at the local and international level. This has been accompanied by the introduction of a number of international and regional agreements, conventions and organizations to preserve the environment and ensure sustainability.

Environment preservation means maintaining fauna, flora, resources and ecosystems while using them and the economic resources and wealth in sustained and rationalized manner to promote population living standards and enhance environment without damaging or prejudicing the balance of ecosystems at different levels.

Reasons of environmental deterioration in Iraqi

There are several reasons that have affected the living and non-living components of the environment either directly due to direct contact, or indirectly due to internal and external factors. Types and reasons of environment deterioration can be summarized as follows:

1. Population increase (pressure)

All studies indicate that the population growth rate of Iraq has been steadily increasing since the 1950s, putting pressure on different environment aspects and causing increased rates of environmental deterioration and prejudiced population-resources balance through the following:

- a. Increased needs of food, energy, shelter and water resources
- b. Growing pressure on environment due to increased liquid and solid waste
- c. Population practices such as logging, deforestation, soil degradation and overhunting of wild animals and birds threaten the continuity of ecosystems

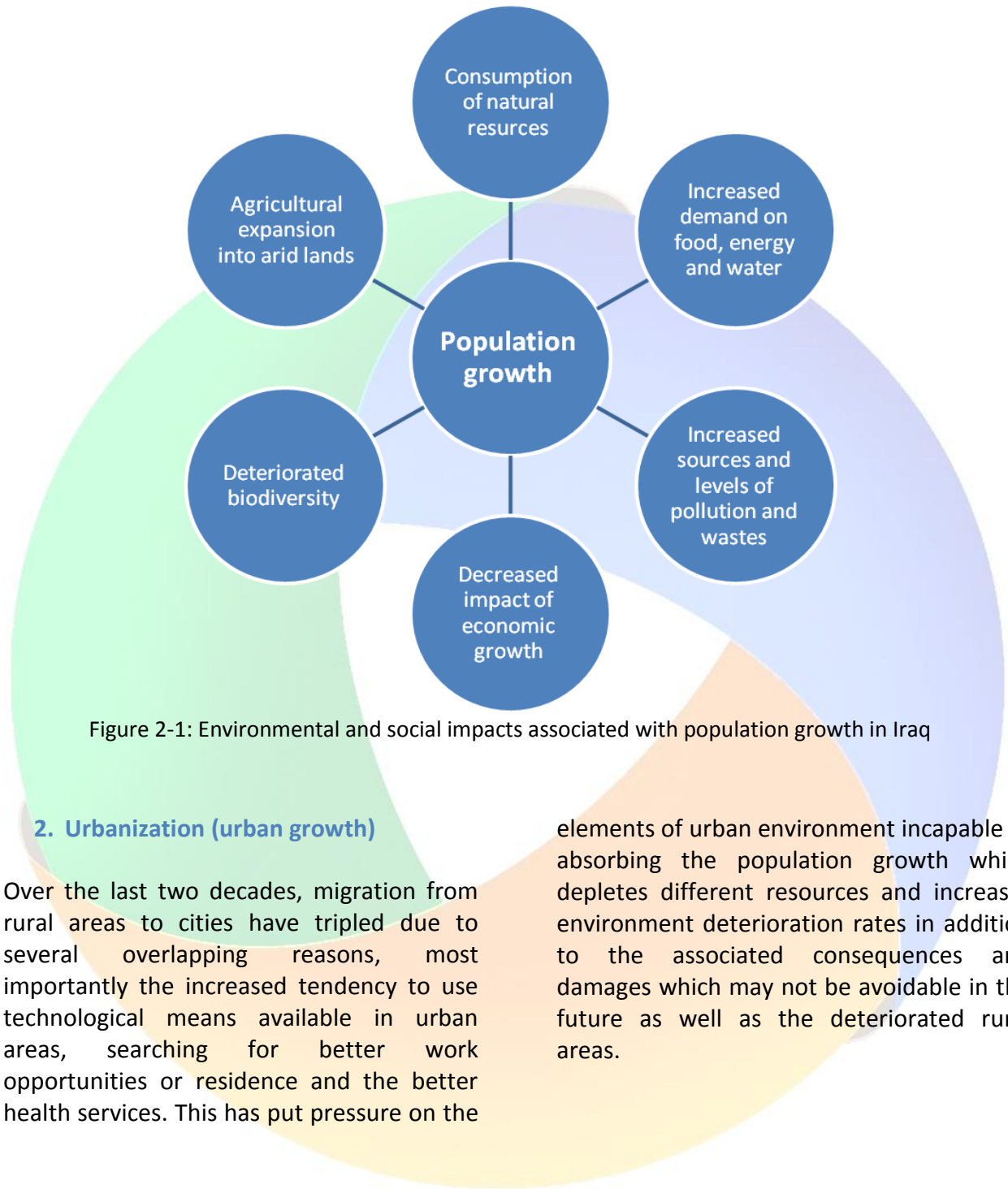


Figure 2-1: Environmental and social impacts associated with population growth in Iraq

2. Urbanization (urban growth)

Over the last two decades, migration from rural areas to cities have tripled due to several overlapping reasons, most importantly the increased tendency to use technological means available in urban areas, searching for better work opportunities or residence and the better health services. This has put pressure on the

elements of urban environment incapable of absorbing the population growth which depletes different resources and increases environment deterioration rates in addition to the associated consequences and damages which may not be avoidable in the future as well as the deteriorated rural areas.



Figure 2-2: Environmental and social impacts of urban growth in Iraq

3. Desertification and land degradation

Scientific studies indicate that deserts constitute approximately 42% of the total area of Iraq. Moreover, a large percentage of lands exhibit desertification factors such as soil erosion, sand and semi-sand dunes, salinization, waterlogging and natural vegetation deterioration. Desertification has had negative impact on the environment and has directly affected the life of the population and different aspects of natural and environmental life by increasing rates and frequency of sand and dust storms in major cities like Baghdad to unprecedented levels. Hereunder are the most important reasons of desertification:

- a. Natural conditions: 90% of areas in Iraq have dry climate with temperatures hitting 56°C in the long and dry summer, increased evaporation, decreased rainfall rates to around 150 mm in most areas, prevailing type of wind and natural characteristics of soil.
- b. Human activities: indiscriminate cutting of natural vegetation, overgrazing, lack of proper systems for irrigation and drainage, lack of effective systems to preserve green spaces, urban sprawl through road construction and earthmoving, and unsustainable use of natural resources.

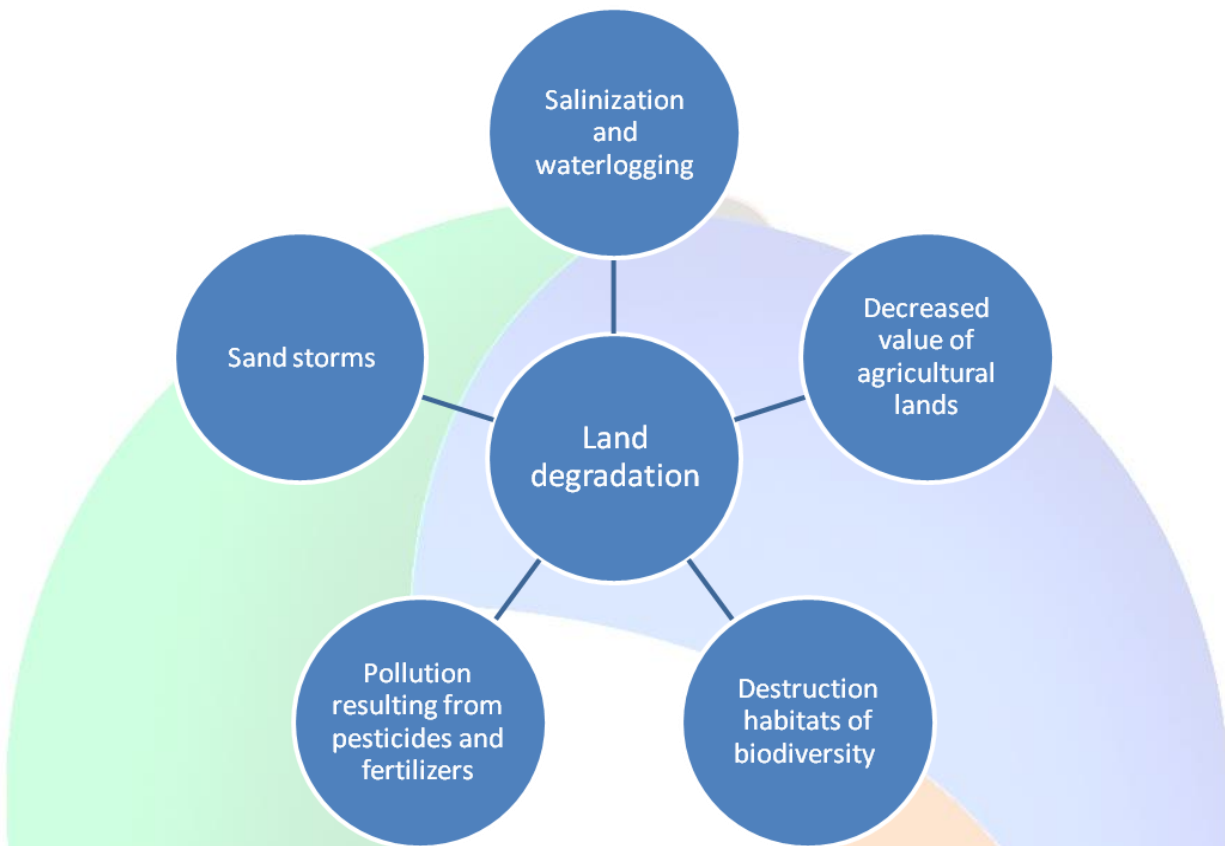


Figure 2-3: The most important impacts of desertification and land degradation on environment in Iraq.

4. Lack of environmental awareness

Environmental awareness at the societal level (individuals and institutions) is a major pillar in developing the environmental level and performance of any social system. Poor public awareness is however noticeable despite the tireless efforts of MoE, environment departments and directorates in different ministries and CSOs. This can be attributed to the following reasons:

- a. The concept of environmental awareness is new in the Iraqi society in addition to the limited individual and institutional awareness due to the economic and security priorities under the current conditions.

- b. Failure to integrate the environmental dimension in the educational framework, which aims at promoting environmental awareness at all social levels.
- c. Society and individuals follow behavioral patterns of negative impact on health and environment.

5. Inadequate environmental monitoring systems

Environmental monitoring systems serve as a safety valve to alert to the beginning of any environmental deterioration process. Obsolescence of some monitoring systems and lack of ongoing follow-up and analysis cause environmental problems.

6. Wars and political situation

For four decades, Iraq suffered from external wars with neighboring countries, conflicts and internal instabilities, which adversely reflected on all the components of environment, whether directly or indirectly.

The region witnessed severe geopolitical, economic and social changes during few decades, which has led to serious and dangerous reflections on local and regional environment in general. Major changes are drying the Marshlands, low water inputs to Iraq, declined green spaces, and negligence regarding the violation of environmental instructions and laws.

Impact of environmental deterioration in Iraq

The previous reasons have caused a number of negative impacts on the environment, which can be summarized as follows:

1. Scarcity and pollution of water resources

Iraq suffers from water scarcity and pollution. This can be mainly attributed to population increase, economic growth climate change, and low water inputs from upstream countries. Consequently, it has become necessary to identify the annual water needs to satisfy the requirements without damaging or depleting water resources. Agricultural needs are estimated at 51 billion m³ to irrigate 11,300 km². Civil (population) needs to keep pace with the social and health developments are estimated at around 10 billion m³ annually. Needs of the industrial, oil electricity generation are estimated at 5 billion m³ annually. The increased water loss due to

evaporation from rivers, dams and tanks estimated at 8 billion m³ in addition to water needs to recover the Marshlands shall also be taken into consideration.

Water pollution results from the lack of IWTPs and WWTPs, which affects the quality of water discharged into rivers without proper treatment. Other contaminating factors that increase environmental deterioration include random unlicensed industries in houses and shops which produce and discharge untreated water directly into rivers, animal and veterinary activities, popular electroplating plants, car washes, etc. Furthermore, there is a poor control over such industrial activities, poor enforcement of applicable laws that aim to alleviate the negative impact of discharged untreated water, and inadequate implementation of closed cycle and water reuse policies.

2. Air pollution

The deterioration of air quality in Iraq has negatively affected the environmental and health conditions as chronic respiratory diseases and allergy levels have increased. This deterioration can be attributed to the following reasons:

- a. Significant increase in the number of vehicles in general. Old vehicles constitute a large percentage and use fuel inconsistent with the environmental specifications. On the other side, road networks haven't been developed to accommodate such increase
- b. Shortage of national electric power generation because stations are obsolete and citizens use domestic

- generators (small and large) and the associated noise and pollution
- c. Sabotage and fires affecting oil and derivative pipelines, which increase air pollution.
- d. Citizens tend to incinerate waste as a substitute to the poor garbage collection activities
- e. Over-cutting of trees and forest areas in general and palms in particular to cover citizen needs of fuel; thus, decreasing green spaces

3. Deterioration of biodiversity

Natural biology has deteriorated and decreased in terms of kind and density as a result of wars and implementing many projects on agricultural lands. Dividing and fragmenting agricultural lands have had a significant impact on decreasing green spaces as natural habitats of different living organisms. Furthermore, drying the Marshlands has directly affected migrating birds. Deterioration of biodiversity can be attributed to the following:

- a. Overhunting; represented in poaching during mating seasons or using poison, electrocution and explosives
- b. Impact of chemical and physical factors like high salinity in lakes and rivers
- c. Ecological pollution of different kinds and sources like wastewater, air pollution, plant wastes and thermal pollution from power plants
- d. Bringing new and exotic types of fish and animals has caused competition between different species for the already limited food and shelter, which, in turn, reflected negatively on the indigenous species in their natural habitats

4. Pollution of marine waters

The total area of Iraq's regional waters in the Arab Gulf is 900 km². Coastal waters belt has a high fertility rate which attracts the Gulf fish during mating seasons. It is also the passageway for migrating fish from the Gulf into Iraqi waters entering Shatt al-Arab, Khor al-Zubair and the Marshlands where natural food is abundant. In 1978, Iraq acceded to Kuwait Action Plan which provided for the establishment of ROPME.

In terms of exporting crude oil and derivatives, Iraq depends on harbors in Shatt al-Arab and the Arab Gulf. Over the recent years, oil pollution problem in the ports of Iraq came to light due to large encroachments causing significant damage to regional waters, prejudiced biodiversity and negatively affected fisheries. As a result of wars, more than 100 ships have sunk in Shatt al-Arab and the navigational channels of all Iraqi ports. Different factors have contributed to increasing salinity in Shatt al-Arab to very high concentrations as some readings exceed 30,000 ppm.

Cost of environmental degradation

MoE has recently conducted a first study of its kind to calculate the cost of environmental degradation in Iraq, as a component of the emergent Environmental Management project funded by WB, to provide decision makers with a financial image in numbers on direct impacts of environmental pollution on economy.

Based on the information of 2008, this study estimates the cost of environmental degradation in Iraq at 4.9-8.0% of GDP (an average of 6.4% or ID 6.3 trillion (US\$ 5.5 billion) a year). Major reasons are:

1. Diseases resulting from drinking water of poor quality;
2. Increased respiratory diseases due to polluted air;
3. Neglected and pressured agricultural lands, which has led to losses in crops;
4. Unsustainable management of and non-recycled wastes;
5. Insufficiently protected coastal resources; and
6. Inefficient production and use of energy and non-use of renewable energies.

Estimated costs of environmental damages are classified in accordance with environmental categories where costs of damages to health and quality of life are 3.7% of GDP (56% of total losses) while costs of damages to natural resources are 2.9% of GDP (44% of total losses).

Major adverse impacts are those resulting from polluted water, especially surface water; lack of access to drinking water and sanitation; and inadequate household, personal or food hygiene (3.5% of GDP). In the second place comes air pollution in the cities of Baghdad, Basrah, Babel, Nineveh, Najaf, Kirkuk, Maysan, Sulaymaniyah, Duhok and Erbil with an estimated cost of 1.5% of GDP.

Most of the estimated costs (1% of GDP) of deteriorated natural resources result from the loss of agricultural productivity and pastures for many reasons, in addition to non-exploitation of part of them due to mines and unexploded ordnance.

Waste, whether municipal, industrial, or medical, has potential impacts on health because they are not disposed of safely. In addition, their appearance reflects on the

quality of life. Costs of poor waste management are estimated at 0.14% of GDP.

Furthermore, losses of fisheries and facilities in coastal areas are estimated at 0.02% of GDP.

Green economy

The past few years have witnessed continuous progress in developing the basics of 'green economy' based on some successful models and experiments applied in many advanced and developing countries, especially after the global economic crisis in 2008 which alerted the world to the need to include sustainability in economic policies and not to allow market powers and globalization to control them entirely.

During 2009-2012, several international organizations, especially UNEP, have developed guidelines and integrated proposals for green economy in many developmental and economic sectors, including energy, water management, agriculture, transportation, tourism, sustainable construction, etc.

Green economy was one of the most important themes discussed during the UN Conference on Sustainable Development (Rio+20) which was held in Brazil in June 2012. The outcome document entitled "The future we want" includes the following recommendations on green economy at a global level:

1. Green economy should eradicate poverty, enhance social inclusion, realize economic growth, improve human well-being, create opportunities of decent work, and

ensure that ecological systems continue performing their duties properly;

2. Green economy policies should consider developing countries' needs, sovereignty, rights and special conditions; and
3. Green economy policies should bridge the technological gap between advanced and developing countries.

Even though there is no national study on the horizons of green economy in Iraq, some opportunities and potentials provided by green economy in the Arab World can be explored through the results of the 4th annual report of the Arab Forum for Environment and Development, which was issued in October 2011, most importantly are as follows:

1. Transition into sustainable agricultural practices could save 5-6% (US\$ 114 billion) of GDP due to increased productivity of water, improved public health, and protected environmental resources. Revival of agricultural sector through proper investments, research and development would reduce imports over the next five years by 30%, which means saving US\$ 45 billion.
2. The Arab countries need to employ at least 1.5% (US\$ 28 billion annually) of their GDP each year in the fields of sanitation, water infrastructures, innovations of water use efficiency, and recycling technologies to meet the growing demand for water.
3. Energy demand by industrial operations can be reduced where improvements in energy efficiency in cement industry decrease consumption by 20-40% for each

tonne of cement. In addition, the consumption of industrial operations can be reduced by 150 trillion KVA annually through improving energy efficiency by 30% (US\$ 12.3 billion).

4. 280 billion KVA can be saved annually in the transport sector through using hybrid cars and also energy efficiency can be improved by 40% in rail transport.
5. Transforming traditional buildings into green ones can contribute to addressing of unemployment problems in urban areas, create new cadres of workers in the field of renewable energy, and improve energy efficiency and techniques of sustainable construction. Furthermore, US\$ 100 billion can be spent to transform 20% of buildings currently existing in Arab countries into green ones, which creates 4 million job opportunities in those fields.

It's hoped that Iraq becomes able to develop a special strategy to turn into green economy based on this Strategy.

Responses at the level of environmental policies, legislations and information

Developing strategies and action plans to address different environmental issues is a basic pillar to stop environmental deterioration. However, to be fruitful, these strategies and plans should be supported by a legal, legislative and executive framework; a binding judicial authority; and law enforcement procedures.

Clearly, political leadership and decision makers are increasingly giving attention to Iraq environment as environmental issues presently assume priority and greater

attention by state institutions as well as wide social categories.

Over the past decades, Iraq has deeply suffered from the impact of incorrect policies and negligence of environmental issues in general. Inevitably, Iraq is facing dangerous environmental problems. To face such challenges, Iraq has implemented some direct responses over the recent years.

On the level of institutional and legislative responses, Gol has identified and included environmental issues and considerations and ways to address them in NDP priorities to satisfy international commitments and ensure that human and economic development plans take into consideration the important environmental dimension for local and international SD.

On the level of environmental information and data availability, current information is notably of good quality and conditions. MoE has adopted a clear approach to secure environmental information all over the country since 2004, sought to make such information and data on the required scientific and technical level, and preserved transparency as a standard for information and data collection and communication, especially in relation to environment pollutants in Iraq.

MoE issued a series of annual reports on the Iraqi environment (2004-2010), and has actively contributed in activating scientific and technical participation of international organizations and some CSOs operating in Iraq. In addition, some actors have issued periodic publications and technical environmental reports, including the WHO environmental reports of 2010; environmental survey of 2005 by COSIT;

2008 environmental survey of medical services by COSIT; 2010 environmental survey (water, wastewater and municipal services) by COSIT supported by the UNICEF and in cooperation with MMPW, MoB, KRISO and counterparts in Kurdistan; and WB report which diagnoses key environmental problems in Iraq and proposes relevant solutions.

Institutional performance and EPI policies

The Iraqi institutional system hierarchy (MoE, HEC, EPIC, EPIA and EPICs) is directly responsible for promoting the environmental conditions in the country. From a strategic perspective, this institutional hierarchy seeks to achieve many goals, including sustainable utilization of natural resources and strict enforcement of the technical conditions and specifications of environmental activities under a semi-integrated umbrella of modern environment laws and regulations.

The actual situation on the ground, however, suggests that such positive perspective has been achieved on a limited and probably minimum scale like project licensing, implementation follow-up and control over operation and over current environmental activities.

It seems that the way is long and hard and may require imposing strict environmental control over different activities without any exceptions, full adherence to laws and regulations and serious participation of both public and private sector institutions. The desired control activities should be effective and ongoing starting from developing the activity idea to assessing possible project

alternatives and selecting engineering designs and technologies.

Undoubtedly, Iraq's openness to the world – achieved by virtue of the democratic transformations – the emergence of political opposition under a pluralistic system and the progress towards achieving market economy constitute a significant boost to the success and consolidation of the roles of environmental institutions as a part of the overall progress of society. Probably, media openness, which has enabled the population to become familiar with the development level of other countries and listen to the other, in addition to consultancies provided by environment-specialized international organizations has had a solid impact on preparing and educating Iraqi citizens to start embracing strict environmental alternatives and respect relevant procedures which were until recently considered as unpersuasive and unviable in Iraq like the principles of “reuse”, “water preservation from loss”, “waste separation by the source”, “observing and respecting hunting laws”, “caution with pesticides”, etc.

Environmental policies planning and international community support

The democratic transformation in Iraq has improved cooperation with the international community in different development sectors on top of which is environment. Iraq has become an active partner in international environmental policies and the associated commitments and chances of international cooperation to support the goals of environment protection and sustainability by UN organizations.

UNDAF document (2011-2014) identifies 5 priorities clarifying the UN overall strategic trend to assist Iraq, as follows:

1. Improved governance, including protection of human rights;
2. Inclusive, more equitable and sustainable economic growth;
3. Environmental management and compliance with ratified international environmental treaties and obligations;
4. Increased access to quality essential services; and
5. Investment in human capital and empowerment of women, youth and children.

The third priority is very important as it makes conformity and harmonization with regional and international requirements then agreements and conventions possible. At the same time, adopting this recommendation promotes environmental performance on the local level in consistency with the environmental M&E standard requirements.

Certainly, the document is of a particular importance given that it has been issued by a UN agency; identifies environmental affairs as a strategic trend to be pursued to achieve development in Iraq; establishes strategic planning; and identifies environmental development visions aspects of SD, environment control, air & water protection from pollution, combating desertification, environmental capacity development, environmental awareness and regional and international cooperation.

The Strategy has been formulated to consider the achievement of the above-mentioned development visions. This has

been facilitated by adopting policies and principles basically based on modern environmental concepts prepared by developed nations and societies that have preceded Iraq in addressing environmental problems and requirements, which, in short, are:

- Sustainable natural resources;
- Green environment policy;
- Environmental auditing;
- Charging polluters with relevant costs;
- Public participation;
- Ecotourism;
- Redressed damages, and;
- Decreased cases of environment division.

International agreements and conventions

In order to achieve international partnership in the unified environmental work and to preserve environment under its global framework and perspective, Iraq has acceded, or is acceding, to following international agreements and conventions:

1. The Montreal Protocol and the Vienna Convention for the Protection of the Ozone Layer
2. United Nations Convention to combat Desertification (UNCCD)
3. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
4. The Convention on Biological Diversity
5. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
6. United Nations Framework Convention on Climate Change (UNFCCC)
7. The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
8. Stockholm Convention on Persistent Organic Pollutants
9. RAMSAR Convention on wetlands
10. Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines
11. The Convention on the Conservation of Migratory Species
12. Kyoto Protocol
13. International Union for Conservation of Nature (IUCN)
14. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction

Chapter III: Strategic Objectives

Introduction

This Chapter presents and analyzes the ten EPI Strategic Objectives covering different environmental themes and issues as a result of an in-depth analysis of environmental cases and priorities, active participation of different stakeholders and consultations made during Strategy development:

1. Protect and improve air quality
2. Protect and improve water quality
3. Control land degradation and combat desertification
4. Maintain marine and coastal environment
5. Protection and sustainable use of biodiversity
6. Develop and improve waste management
7. Reduction of oil pollution
8. Reduction of radioactive contamination
9. Integrated management of hazardous chemicals
10. Developed institutional and legal framework of environment sector

These Objectives are consistent with NDP goals (2010-2014) prepared by MoPDC. NDP includes all economic, social and environmental sectors representing sustainable development. Chapter (X-2) includes the environmental sustainability sector, while Chapter V covers the

agricultural sector challenges and dedicates a special part for biodiversity.

Chapter X of NDP contains the following components which are consistent with the Strategic Objectives in the following table.

Table 3-1: Comparisons between NDP environmental sustainability components and Strategic Objectives:

NDP environmental sustainability components	Strategic Objectives
Air pollution	I. Protect and improve air quality
Water pollution	II. Protect and improve water quality
Soil contamination	III. Control land degradation and combat desertification
Desertification	III. Control land degradation and combat desertification
Refuse and solid waste	VI. Develop and improve waste management
	IX. Integrated management of hazardous chemicals

The Iraqi environment strategic analysis report, prepared in collaboration among MoE, WHO and several ministries and stakeholders, was a major input for this document.

The main components of each Strategic Objective have been identified and each

component comprehends a number of relevant issues. These Objectives are overlapped, integrated and logically classified herein. They will be addressed through a unified and comprehensive approach.

The detailed programs and projects which came in response to the indicated components and issues are included in the Action Plan.

Strategic Objectives

I. Protect and improve air quality

Introduction

Pollution in general, and air pollution in particular, is associated with human activity because of the urgent need to provide

different services like drinking water, food, electricity, energy, industry and transportation as well as to disposing of both solid and liquid materials resulting from such activities.

Main sources of air pollution are:

- a. Natural sources: dust, dirt and fumes.
- b. Industrial sources: movable and fixed sources usually resulting from means of transport, fuel burning, power plants, industries and solid waste incineration. These sources contain sulfur and nitrogen oxides, hydrocarbons, carbon monoxide, suspended particulates, and gases causing greenhouse.

Air pollution affects directly and negatively the human health and environment through spread diseases and damaged environment.

Table 3-2: Components and issues of Strategic Objective I

Components	Issues
1. Air pollution from natural sources	1. Dust storms
	2. Weather and climate
	3. Landscape degradation
2. Air pollution from fixed industrial sources	1. Legislations and determinants of gas emissions
	2. Air pollution control and treatment units
	3. Spread of private generators
	4. Random incineration
	5. Use of poor quality fuel
	6. Inefficiency of energy use
	7. Overlap between industrial and residential areas

3. Air pollution from movable industrial sources	1. Inadequate public transport
	2. Random increase of vehicles
4. Noise	1. Spread of generators of different capacities
	2. Transport and industry
5. Check, measurement and monitoring	1. Air quality monitoring stations
	2. Databases
	3. National air pollution tolerance
	4. Air quality monitoring research
6. Clean energy	1. Use of clean fuel
	2. EFTs
	3. Use of renewable energy
	4. Production of energy from wastes

Relevant components and issues

Component I: Air pollution from natural sources

Issues and proposed solutions

1. Dust storms

The frequency and severity of sandstorms have increased in Iraq due to deteriorated vegetation and increased impact of desertification. This requires comprehensive planning, surveys to learn reasons, taking measures to address them and promoting relevant awareness.

2. Weather and climate

Change of weather, climate and geography of Iraq have led to expanded desert areas, high temperatures, low rainfall, increased rates of solar irradiance, low humidity and soil cover disintegration by movement of military vehicles which, in turn, generates dry dusty air. Accordingly, it is important to study and improve weather and climate changes and conditions.

3. Landscape degradation

There is clear deterioration of green spaces due to poor attention, insufficient irrigation and indiscriminate cutting of trees for security considerations, and fuel alternatives increases area of exposed land which is a main source for dust.

Component II: Air pollution from fixed industrial sources

Issues and proposed solutions

1. Legislations and determinants of gas emissions

Iraq lacks legislations and determinants of gas emissions. This calls for accelerating the enactment of the necessary laws to control and limit environment-polluting activities and install air quality monitoring stations with test and analysis labs in all governorates.

2. Air pollution control and treatment units

Lack of special units to treat air emitted from most factories and major industries in the country like cement, bricks, oils, glass, petrochemicals and power stations is a main source of pollution. Moreover, most available units are obsolete and work inefficiently. In addition, using black oil, which is considered the worst kind, as fuel by owners of stone ovens mostly located in densely populated residential areas inside cities have increased the concentrations of gaseous pollutants and aerosols in the ambient air. Therefore, an integrated plan should be developed to control movable and fixed industrial sources of air pollution, including the establishment of treatment units in factories and major industries.

3. Spread of private generators

The continuous shortage of electric power supply and use of electric generators to satisfy both domestic and commercial energy needs causes environmental damage which affects air quality due to burning large, unbalanced and uncalculated quantities of gasoline and, occasionally, black oil, in addition to the associated noise. This requires expanding central electric supply coverage and sustainability and reducing the use of private generators.

4. Random incineration

Random incineration of wastes takes place due to poor municipal services. Consequently, large amounts of air pollutants are discharged into the atmosphere, negatively affecting human health and environment. Addressing this problem requires developing an effective waste IM system, especially collection and disposal according to sound environmental principles which prevent incineration and its resulted air pollution.

Use of poor quality fuel

Heavy black oil resulting from oil refining is used to operate power stations and many other industrial fields, as well as stone ovens and generators in residential and commercial quarters.

5. Energy inefficiency

Iraq suffers from insufficient power production and shortage of fuel supply (Kerosene, gasoline, gasoil) causing the

importing of such products from multiple sources, some of which are of poor specifications, low efficiency and inconsistent with environmental standards. This requires gradual transformation to cleaner fuel and implementing strategies and initiatives to increase energy consumption efficiency.

6. Overlap between industrial and residential areas

Iraqi cities have industrial zones containing numerous air-polluting craft industries like metal melting, pottery, electric and gas welding, etc. Currently, the problem is of urgent importance due to residential and industrial areas overlapping. More precisely, residential areas have expanded over some industrial areas which were, at time of establishment, remote, outside city center and considered fit for industrial activities. Such areas, however, are undoubtedly unfit now for residence, and the persistent industrial air-polluting activities subject people to multiple types of pollution including noise. A transformational step shall be introduced in urban planning to face this problem by designating special locations for craft industries, providing proper infrastructure, transferring these industries to new locations, introducing strict conditions to prevent emissions and pollutants and developing a proper environmental monitoring program.

Component III: Air pollution from movable industrial sources

Issues and proposed solutions

1. Inadequate public transport

Population concentrates in governorate centers and cities. Thus, the increased rate of public transport use generates a continuous pressure on environment and quality of air. Transition into sustainable modes of transport requires expanding public transport range, efficiency and coverage of urban areas and developing the urban planning principles to increase the number and quality of transport services in the suburbs.

2. Random increase of vehicles

Vehicles have increased in a significant, yet dangerous, way over the recent years following the allowed importation without any controls. This abrupt increase along with traffic congestions has aggravated the deterioration of air quality. Moreover, most vehicles are old and require full maintenance. This, however, can't be currently enforced by law due to the economic conditions of the state and most individuals. Iraq suffers from fuel containing two toxic substances, tetraethyl lead and tetramethyl lead. Therefore, it's necessary to encourage replacing old vehicles with modern ones within suitable economic incentives, reducing imports of old cars, developing maintenance centers and adopting gradual transformation to fuel that generates after burning gas concentrations in line with the environmental requirements.

Component IV: Noise

Issues and proposed solutions

1. Spread of generators of different capacities

The continuous shortage of electric power supply and relying on private generators to satisfy domestic and commercial needs increase the level of noise in cities and residential areas. Addressing this problem requires expanding central electric supply coverage and sustainability and reducing the use of private generators.

2. Transport and industry

Cars have significantly increased over the recent years causing traffic congestion and increasing levels of noise. Therefore, transport planning in cities and suburbs should be developed so as to improve road networks in order to facilitate traffic flow, reduce congestion and build tunnels and bridges which contribute to traffic flow and reduce resulting pollution.

Component V: Check, measurement and monitoring

Issues and proposed solutions

1. Air quality monitoring stations

MoE has constructed and operated a number of fixed and mobile air quality measurement stations to acquire sufficient information about air quality in cities. These stations collect air samples and conduct relevant tests and measurements

(concentrations of PM10, CO, SO2, NOx, O3, Benzene, toluene, ethyl, lead and some heavy metals as well as the monthly average of dust fall). The station system shall be maintained and developed to cover larger areas, especially hot spots. It is also necessary to monitor air-polluting industrial activities and coordinate with the stakeholders to maintain existing particle settlers or gas washing units or construct them in lacking plants.

2. Databases

Lack of an integrated and updated database undermines decision makers, technical officials and professionals' ability to accurately diagnose air pollution problems and, thus, find proper solutions and responses. It therefore has been necessary to develop an environmental database and manage it in terms of information gathering and documentation or transfer, exchange and dissemination by all traditional and electronic means to access them generally and directly.

3. National air pollution standards

There are still no clear regulations of the national air pollution standards. These regulations should be enacted by virtue of a binding legislation in consistency with the best regional and international standards. Furthermore, measurement tools should be developed to gather results and information on such standards and indicators.

4. Air quality monitoring research

Iraqi scientific institutions fail to assume an effective role in conducting air quality monitoring tests, especially for some heavy metals like mercury and lead. Availability of similar academic information will help stakeholders respond scientifically to future problems.

Component VI: Clean Energy

Issues and proposed solutions

1. Use of clean fuel

Iraq uses fuel of high lead and sulfur concentrations which pollute air and harm human health and environment by emissions from vehicles and factories. Clean fuel must be used in fixed and mobile energy sources to reduce polluting emissions by designing proper mechanisms to dispose of leaded gasoline and reduce sulfur in diesel oil to protect public health and environment.

2. EFTs in the field of energy

Industrial and service facilities in Iraq use obsolete and NEFTs causing significant resource consumption and high or medium concentrations of air pollutants. This requires encouraging the EFTs use, especially in industrial and service sectors by adopting cleaner production techniques to reduce emissions of air-polluting gases resulting from fossil fuel; providing proper economic incentives to industrial activities

which use EFTs and rationalize resources; and building the technical capacities of these activities.

3. Use of renewable energy

Excessive production and consumption of traditional energy sources cause a steady increase in emissions from power stations and other energy utilities. This requires using renewable energy like solar, wind, hydroelectric and biomass energy to reduce emissions.

4. Production of energy from wastes

Currently, the potential to generate electric power from wastes, which contribute in reducing and transforming accumulated waste into sustainable resources, isn't utilized. This requires sound environmental management of solid waste starting from separation and treatment to final disposal and linkage to organic gas production utilities using plasma converters to produce clean fuel.

II. Protect and improve water quality

Introduction

Water resources in Iraq come from three main resources: surface water – the Euphrates and the Tigris – which constitute most of these resources, underground water and rainwater. Water level changes seasonally according to rainfall and snow melting rates. Water resources face a number of problems and challenges which

affect water quality and quantity like riverheads locations outside Iraq; riparian countries monopolizing water without any relevant agreements or conventions; deteriorated water quality as a result of incorrect practices and lack of efficient water treatment systems; and lack of integrated water resources management accompanied by an increased water demand due to population growth, climate change, industrial needs and the Marshland recovery needs.

Underground water is available in different areas in Iraq. Utilized underground water quantity is estimated at 1.9 billion m³ a year and expected to increase slightly. Storage capacity is estimated at 4 billion m³ a year. Underground water in several middle and northern areas including Nineveh and Salah al-Din suffer from increased nitrate concentrations while other areas suffer from high salinity.

Table 3-3: Components and issues of Strategic Objective II

Components	Issues
1. Regional dimension of water shortage in Iraq	1. Riparian rights and water quality agreements
	2. Sharing hydraulic and operational information with riparian countries
2. Water demands	1. Climate change
	2. Poor water quality of water resources
3. Integrated and sustainable water resources management	1. R&D and capacity building
	2. Demand management
4. Marshlands	1. Reduced quantity and deteriorated quality of the Marshlands water
	2. Marshlands recovery
	3. International and regional support
5. Wastewater	1. Wastewater treatment
	2. Industrial, agricultural and municipal wastewater treatment
	3. Downstream estuary

Relevant components and issues

Water sector is a main component of Iraqi environment as it directly affects population life. There has been a significant decline in the quality and quantity of water used in Iraq.

Component I: Regional dimension of water shortage in Iraq

Issues and proposed solutions

1. Riparian rights and water quality agreements

There's an urgent need to sign fair agreements governing riparian rights with the neighboring countries (Turkey, Syria and Iran) to identify water shares entering Iraq in terms of quantity and quality to cover current and future needs especially after these countries appropriated shared river water by building dams and establishing irrigation projects and, thus, decreasing the quantity and quality of water reaching Iraq.

2. Sharing hydraulic and operational information with riparian countries

Joint cooperation among riparian countries in the field of exchanging operational and hydraulic information and concluding agreements to implement joint hydraulic projects leads to understanding the hydraulic needs of these countries presently and in the future by dividing up shares of these projects between all water sectors

without prejudicing environmental and scientific aspects.

Component II: Water demands

Issues and proposed solutions

1. Climate change

Compared to 2002, salinity rates in rivers in 2006 increased by 50% as a result of high temperatures and drought, low rainfall to less than normal by 50%, and high evaporation rates which usually increase in summer. While climate change is expected to continue in Iraq and the region; it is necessary to study possible measures to adapt to its impact on water sector in the near future. The impacts of climate change are accompanied by the fact that the highest percentage of water consumption (around 80%) is for agricultural purposes. To sustain water, methods of irrigations and cultivation should be developed to achieve the highest efficiency and the least rate of loss. Furthermore, we should focus on using untraditional water, such as gray water, rainwater harvesting, industrial wastewater, wastewater, and treated water.

Drought and low rainfall due to global climate changes have decreased water quantities feeding rivers. As a result, several wells, springs and irrigation channels have dried out and a number of waterways has become shallow water pans affected by several pollution sources like industrial wastewater or water resulting from irrigation of agricultural lands, which carry

contaminated organic materials or solid wastes. It is, therefore, important to increase multi-use water allotments to compensate natural water scarcity.

2. Poor water quality of water resources

Current water scarcity affects its quality as greatly increased salinity concentrations have been recorded in several locations in the south, while no significant changes in the quality of water entering the borders have been noticed. This is attributed to the decline of water quantities entering Iraq for the aforementioned reasons and its inability to absorb internal and external pollutants resulting from the saline tide of the Arab Gulf water. Groundwater is also polluted by untreated industrial wastewater leaking to the neighboring lands and surface water. Lack of efficient IWPTs increases chances of pollution (industrial, agricultural, oil municipal, etc.).

Reasons of Shatt al-Arab pollution with oil materials include the obsolescence of transport equipment and some shipping boats, as well as oil leakage.

Pollution and poor quality are a result of stored water in dams and outdated water systems or being close to sewer pipes, which may make both types of water mix.

Component III: Integrated and sustainable water resources management

Issues and proposed solutions

1. R&D and capacity building

There is a lack of advanced scientific research for SMWR and IWRM, mismanagement of irrigation networks and a need for capacity building and using modern methods for water resource management. Therefore, research and academic institutions as well as university professors shall be contracted to design advanced mathematical models to help understand the new system of water sustainability and management. In addition, specialized trainers shall also be contracted. There's a need to develop practical methods to improve the performance of irrigation networks and address its problems, build capacities to improve knowledge of modern water resource management techniques and its application methods, introduce special applications of SD principles and their uses in different fields, and incorporate water governance concept in the integrated management of water resources in Iraq.

2. Demand management

There's a need to apply modern techniques like IWRM and establish water consumer associations to identify water demands of different uses; give attention to capacity building; and implement preliminary programs to pave the way before implementation and adoption of modern techniques. Therefore, the principles of optimal use (i.e. efficient use of water to minimize loss without prejudicing or affecting the objective and purpose of use) shall be applied in all water use related

practices in addition to developing knowledge in this field for sectors benefiting from or using water.

Component IV: Marshlands

Issues and proposed solutions

1. Scarcity and quality of the Marshlands water

It's noticed that salinity concentrations have increased in the Marshlands as a result of weak inputs. There's a need to introduce and use modern and new techniques to improve water quality and quantity, decrease salinity and increase water flow from the Iranian side in Huwaiza Marsh and the Karkha River.

2. Marshlands recovery

Despite growing interest in the Marshlands' environment, it has been noted that there is no integrated strategy for the Marshland recovery requires conducting field studies to identify potentials and inputs in the Marshlands water which can be used on the short and long term as a key source for the recovery process without relying on other major water resources while developing unified strategies in this regard.

3. International and regional support

There's a need for regional and international support and to declare as many Marshlands as possible as nature reserves or wetlands under RAMSAR

Convention. Also gather support to provide the necessary water shares from riparian countries to revive them.

Component V: Wastewater

Issues and proposed solutions

1. Wastewater treatment

Generally speaking, wastewater in Iraq suffers from high concentrations of organic materials represented in BOD, according to laboratory results. Existing WWTPs are obsolete, inefficient and rarely maintained; lack chemical treatment; and have limited capacity leading to discharging part of untreated water directly into the river. Moreover, rainwater networks are transferred to non-formal junctions discharged directly into rivers without treatment. Cracks in sewer systems cause wastewater transferred into the WWTPs to mix with drinking water which negatively affects on public health and increases morbidity, especially among children.

2. Industrial, agricultural and municipal wastewater treatment

The quality of industrial wastewater and the nature of its pollutants differ by type of production. Pollutants include suspended and dissolved solid materials, sulfates, chlorides, phosphate, nitrate and different heavy elements, etc. negatively affecting the environment and water quality.

It shall also be noted that most industrial, agricultural and service projects lack treatment stations, and even if available, such stations are inefficient and obsolete with incomplete treatment cycles, repeated mechanical failures and frequent chances of breakdown. This consequently leads to discharging untreated liquid industrial wastewater into rivers causing pollution by large quantities of dangerous chemicals and heavy elements.

III. Control land degradation and combat desertification

Introduction

Soil in Iraq was exposed to different negative effects causing a gradual degradation reflected on the agricultural, economic and social conditions in the country. The most pressing problem affecting soil environment, which is the source of the other problems, is the deteriorated vegetation and desertification. This deterioration can be attributed to low rainfall rates, water scarcity and mismanagement, and poor distribution and

usage techniques. Approximately, 50% of Iraq's area is dry where rainfall rate is no more than 150 mm/year. Nevertheless, rainfall rates reach 1,000 mm/year in few north eastern mountain areas.

According to MoPDC report/statistical bulletin of 2006, 27% of Iraq area is arable land, 9% prairies, 3% forests, 1.5% barren mountain land, 33% steppes and 26.5% water bodies and residential land. This indicates that the total vegetation area (prairies & forests) doesn't exceed 12% while deserts and barren lands constitute one third of the total area.

The main purposes of this Objective are:

1. Inclusive planning of soil resources;
2. Pollution control;
3. Rationalized fertilizers and pesticides;
4. Minimized expansion of sand dunes;
5. Expanded green belts around cities;
6. Addressed desertification;
7. Attended prairies;
8. Created oases;
9. Reviewed and updated agricultural and environmental laws, and;
10. Stopped urban sprawl.

Table 3-4: Components and issues of Strategic Objective III

Components	Issues
1. Land use	1. Plan for land management and use and for the identification of degraded locations
	2. Sustainable development of oases in northern and western steppes (Badia)
	3. Urbanization of agricultural lands
2. Desertification	1. Extension of sand dunes

	2. Green belts around cities and regions affected by desertification
	3. Inefficient use of irrigation water
	4. Blowing dust storms
	5. Soil erosion
3. Soil contamination	1. Lands contaminated with mines and unexploded bombs
	2. Salinization and waterlogging due to surface irrigation and wasted water
	3. Soils contaminated with chemicals and oil products
4. Natural vegetation	1. Natural environments within the urban environment
	2. Natural pastures and deserts
	3. Forest and woodland SM

Components and relevant issues

Iraq urgently needs comprehensive planning of soil resources and land use; identification of damaged soil locations, creation of oases in desert areas and achievement of tangible increase in vegetation area. Desertification and soil pollutants from different sources like mines, salinity and chemicals are major national problems threatening different areas. Soil disintegration and erosion cause severe dust storms in many areas.

Component I: Land use

Issues and proposed solutions

1. Land use

A clear and specific land use plan should be developed in different areas taking the

comprehensive local and national interests into consideration to describe the actual use of each area/sector as well as the expected future uses based on different natural characteristics of each area and its capacity to address different developmental and urban activities.

2. Sustainable development of oases in northern and western steppes (Badia)

Lack of clear programs and plans for the oases SM in the northern and western steppes requires identifying environmental factors which ensure the sustainability of those oases, creating sustainable oases to satisfy local needs and reviving desert areas vulnerable to drought and lack of green spaces. Preferably, oases locations shall be identified based on sustainability and links with other oases within the same sector.

3. Urbanization of agricultural lands

Quick urban sprawl affects agricultural land uses and increase constructed land to agricultural land ratio. This phenomenon requires developing compensation programs for areas to prevent the increase of that ratio in each sector or group of close small areas.

Component II: Desertification

Issues and proposed solutions

1. Extension of sand dunes

It's important to address the problem of sand dune formation and identify their locations and movement by designing specialized maps, presenting their properties, following-up variation, and identify priorities of areas to be addressed and the suitable techniques in each case.

2. Green belts around desertified cities and regions

Green belts should be created around cities and regions mostly affected by harsh desert conditions. Spaces and types of plants used in each case should be identified.

3. Inefficient use of irrigation water

Use of irrigation water is inefficient and irrationalized. Therefore, identifying and rationalizing water quantities would ensure delivering required water shares to different areas as needed using proper techniques.

4. Dust storms formation

The frequency and severity of dust storms have increased. Therefore, the place of origin, environmental characteristics and the conditions conducive to such storms shall be identified. It is recommended to use satellite imagery and GIS.

5. Soil erosion

Soil is eroded at cliffs and foothills or slopes; therefore, appropriate measures to address this phenomenon shall be identified. These mainly include cultivating certain types of local plants or reusing some residual construction materials as necessary, while observing the adverse environmental effects of the content of these materials.

Component III: Soil contamination

Issues and proposed solutions

1. Salinization and waterlogging due to surface irrigation and wasted water

There is a need to develop the existing irrigation methods by preparing maps and information identifying irrigation type and waterlogged and salinized lands in different areas. It is important to introduce an evaluation of the different irrigation methods to be efficient in rationalizing water consumption.

2. Soils contaminated with chemicals and oil products

It's critical to identify areas contaminated with chemicals and oil products (near oil fields) to learn about the severity of the problem and select appropriate measures to address it on an area-specific basis.

3. Lands contaminated with mines and unexploded bombs

It's necessary to map these areas and prepare a priority timeline to demine them. The final destination of mines and unexploded bombs shall also be identified.

Component IV: Natural vegetation

Issues and proposed solutions

1. Natural environments within the urban environment

It's necessary to provide green areas for different living organisms within the urban environment by adopting the green environment policy through exploiting the abandoned areas, public parks and private yards as natural habitats in order to enable different creatures to live in urban environments.

2. Natural pastures and deserts

There is a need to implement natural pastures rehabilitation and development projects, organize grazing and realize land SD, especially in desert areas.

3. Forest and woodland SM

The deteriorating forests and woodlands shall be addressed by implementing projects to develop and rehabilitate forests, woodlands and orchards.

IV. Maintain marine and costal environment

Introduction

Iraq overlooks a small part of the Arab Gulf which is extremely important for oil economics in particular. Coasts are also important for development purposes and as a source of marine fisheries but are subject to continuous misuse and environmental pollution, especially that Iraq is a member of ROPME.

The deterioration of the coastal environment and seawater in Iraq can be attributed to a number of complicated reasons. ROPME statistics indicate that the Arab Gulf water is polluted by at least 50,000 oil barrels a day, which is due to oil supply, loading, unloading, transport and shipping as well as naval mines. Discharging ballast water of international oil tankers and commercial ships into the Gulf contributes to transferring alien species to the area. However, the problems of Iraq marine environment don't end here since inland environmental activities often have significant impact on coasts and seawater and may extend further beyond.

Table 3-5: Components and issues of Strategic Objective IV

Components	Issues
1. Pollution of the coastal waters	1. Oil pollution
	2. Non-oil pollution
	3. Indicators of water quality and sea sediments
2. Marine fisheries	1. Marine fishery SM
	2. Indicator of pollutants in tissues of marine fish
	3. Methods of fishing, storing and marketing
3. Marine biodiversity	1. Marine and coastal reserves
	2. Marine organisms used to detect pollution
4. Coastal areas	1. Coastal area use planning
	2. Rehabilitation of deteriorated coastal environments
	3. Extended area of mixed waters
	4. Quality of inland water flowing into the sea

Components and relevant issues

Given Iraq’s geographical location at the Arab Gulf and the activities carried out by different local, regional and international partners as well as by the private and public sectors in developing the coastal areas, marine pollution is a major environmental problem due to the nature of pollutants associated with oil activities. Fisheries in Iraq and the Arab Gulf in general are an important source of protein and provide significant job opportunities for the local population in southern Iraq. Therefore, it is necessary to preserve biological species inside Iraq’s coastal areas and seawater and identify endangered species and those under sever ecological pressure.

Component I: Polluted coastal waters

Issues and proposed solutions

1. Oil pollution

Lack of programs to monitor oil pollution sources, estimate how they reach the marine environment and determine ways to prevent and reduce the associated risks causes incorrect decisions on oil pollution management. Therefore, capacities should be built in the field of monitoring and disposal and such programs should be developed and implemented effectively to protect marine environment.

2. Non-oil pollution

Lack of programs to monitor non-oil pollution sources (other industrial or domestic sources, etc.), learn how they reach the marine environment and determine ways to prevent and reduce its associated risks causes incorrect decisions on non-oil pollution management. Therefore, it's necessary to develop and implement such programs, build a database on such sources, and accurately register the amounts of oil pollutants.

3. Indicators of water quality and sea sediments

It's necessary to identify these indicators to conduct the necessary comparisons and approaches with similar cases in the Arab Gulf and control possible changes.

Component II: Marine fisheries

Issues and proposed solutions

1. Marine fishery SM

It's necessary to activate fishery SM by identifying marine fish species in the region and estimate fish stock in order to protect this wealth, rationalize fishing and identify fishing techniques and equipment as well as times during the year when fishing causes only minimum environmental damage.

2. Indicator of pollutants in tissues of marine fish

There's no qualitative indicator or evidence of coastal and marine environment

pollution in Iraq; therefore, such indicators should be developed to properly monitor organisms and environment by establishing certain modeling stations to detect the presence and severity of pollutants.

3. Methods of fishing, storing and marketing

Fishing techniques, tools and equipment should be identified and developed to dispose of unpermitted techniques which lack the required environmental standards.

Component III: Marine biodiversity

Issues and proposed solutions

1. Marine and coastal reserves

Coastal and marine areas should be declared and managed as nature reserves to preserve species and prevent pollution.

2. Marine organisms used to detect pollution

The best species of marine fish, invertebrates, plants and algae in Iraqi seawater, especially those sensitive ones which may be used to detect pollution, should be identified.

Component IV: Coastal areas

Issues and proposed solutions

1. Coastal area use planning

There are no modern environmental maps of coastal area use. It is, therefore, recommended to prepare such maps and provide recommendations about the optimal uses of the area sectors.

2. Rehabilitation of deteriorated coastal environments

Coastal environments are deteriorating and require rehabilitation by identifying sectors affected by environmental problems along the seashore and classifying them by priority and severity in order to clean the area and restore the natural ecosystem.

3. Extended area of mixed waters

The impact of seawater (tide) on freshwater environment isn't identified. It is recommended to study this impact and consider salinity level as an indicator of the area of mixed waters and its effect on living organisms in freshwater, especially with evidence of seawater organisms living in freshwater environment.

4. Quality of inland water flowing into the sea

Seawater is polluted because water flowing into the Gulf is polluted. Pollution shall be prevented at the source, especially organic materials and mud resulting from high ground runoff.

V. Protection and sustainable use of biodiversity

Introduction

Biodiversity, its sustainability and safety are themes under increasing environmental pressure and deterioration despite assuming priority in local and international environmental attention. Over recent years, MoE has adopted a clear policy to activate the sustainability of biodiversity as Iraq has become member no. 192 of the Convention on Biological Diversity. MoE also seeks to join other conventions like CITES and the Convention on the Conservation of Wildlife.

According to the National Report provided to the Secretary of the Convention on Biological Diversity in 2010, Iraq contains about 80 types of freshwater fish, 16 of which require special protection, in addition to more than 374 types of birds, 18 of which are threatened species according to the IUCN red list. According to "Iraq Plants" book, there are about 2,500 types of plants, 195 of which are endemic, in addition to 74 types of mammals of 24 families, 10 types of amphibians of 5 families, 97 types of reptiles of 19 families, more than 2,000 types of insects and 2,312 types of algae.

Iraq has several important habitats especially in the center, southern and northern part (Kurdistan) which is part of the environmental hot-spots and includes a number of natural heritage sites of international importance. Previously,

forests constituted 12% of Iraq’s area but have deteriorated to 4% in recent years, especially in Kirkuk and Mosul.

Many environmental practices cause deterioration of biodiversity like the deterioration of reserves protected under international conventions and agreements, disturbance of mating habitats and tracks of immigration, dividing of natural environments and habitats and introducing foreign blights or species into the country. Therefore, it is necessary to monitor and document the national progress towards achieving the objectives of biodiversity (2020) approved by Nagoya Convention on Biological Diversity in 2010.

Generally, the environmental measures necessary to protect biodiversity require commitment and conformity with the

characteristics of ecosystems and comprehensive urban development plans. These plans shall consider the potential environmental risks associated with urban development so as not to exceed the capacity of the area in addition to observing the environmental performance determinants so that urban development isn’t implemented on the expense of biodiversity in the area.

Biodiversity preservation as a strategic objective aims at maintaining local endangered species and protecting sensitive and aesthetic ecosystems (such as the Marshlands and river banks) which have suffered from negligence and incorrect practices causing the deterioration of living organisms and the emergence of new animals and plants.

Table 3-6: Components and issues of Strategic Objective V

Components	Issues
1. Local species	1. Natural structures necessary to sustain natural biodiversity
	2. Field surveys of local species and reports on the status of important species
	3. Endangered species
	4. Local species within urban areas
	5. Biodiversity within agricultural environments
2. Keeping samples of Iraqi organisms	1. Gene bank for local species
	2. Keeping bio models and samples
	3. Reference categorization of organisms at global natural history museums
3. Bio safety and	1. Strange invasive species within Iraqi environments

security	<ol style="list-style-type: none"> 2. Management of genetically modified organisms and genetic products 3. Monitoring the migrant species and their movement
4. Sustainability of ecosystems	<ol style="list-style-type: none"> 1. Endangered natural ecosystems 2. National reserves, enclosures and parks 3. Ecotourism and use of volunteer services 4. International cooperation to protect specific ecosystems
5. Institutional and legal frameworks	<ol style="list-style-type: none"> 1. Encouraging scientific research to protect biodiversity 2. Promoting biodiversity in different education curricula 3. Updating the fishing laws and wildlife conservation instructions 4. Activating fines and redress with respect to damage to biodiversity 5. Capacity building
6. Environmental awareness and public participation	<ol style="list-style-type: none"> 1. Rewarding and honoring programs for individuals and institutions active in biodiversity protection 2. Identify, introduce and rationalize the environmental cultural heritage 3. Engage communities in biodiversity issues

Components and relevant issues

Sustainability of local species requires identifying different species, preparing scientific lists, identifying their natural habitats and introducing their scientific and economic importance. This may require positive intervention by breeding endangered species in captivity and using traditional, genetic and molecular techniques for growing and classification.

Promoting biological security is crucial to monitor and control invasive and migratory alien species. Identifying habitats of special importance helps accelerating the declaration of protected areas and national parks. Biodiversity preservation and sustainability is a public action in principle, and official institutions play a regulatory supportive role. Thus, sustainability of biodiversity requires strengthening the institutional and legal frameworks which promote the national effort to build a

society well aware of Iraq's biological heritage.

Component I: Local species

Issues and proposed solutions

1. Natural structures necessary to sustain natural biodiversity

No studies have been conducted to identify the components of environmental infrastructures which ensure the continuity and survival of natural species in their original habitats. These include main components like water resources, vegetation and locations of feeding, laying eggs, etc.

2. Field surveys of local species and reports on the status of important species

There's no plan in place to conduct a comprehensive field survey to identify and register local species using standard qualitative and quantitative methods and update lists of species to enable and facilitate monitoring and detect future changes. This includes fauna and flora, especially those occupying important positions in land and aquatic food chains.

3. Endangered species

Local endangered species of scientific and economic environmental priority aren't identified and require protection by implementing pilot projects in this field.

4. Local species within urban areas

Local species have been completely evacuated from urban areas with failure to provide factors for their survival in such areas due to lack of appropriate relevant environmental measures.

5. Biodiversity within agricultural environments

There is a need for environmental management techniques to alleviate damages affecting natural biodiversity in intensive agriculture lands, especially in case of producing a single crop over vast areas. There are no instructions to guide farmers on how to preserve original species in abandoned areas, field separators, river banks, waterways, canals, roadsides and field walkways.

Component II: Keeping samples of Iraqi organisms

Issues and proposed solutions

1. Gene bank for local species

It's necessary to create a gene bank for local species, document advanced information about their genetic structure and initiate a national project to register their genetic maps by environmental priority.

2. Keeping bio models and samples

It's important to activate the role of the Museum of National History and the National Herbarium in preserving, documenting, spreading and introducing

local species as well as organize environmental campaigns to collect and preserve models and register species appearance/disappearance and the associated reasons.

3. Reference categorization of organisms at global natural history museums

Relations with specialists in international universities and museums for natural history should be improved to receive scientific assistance, diagnose, classify or confirm the classification of local species as well as scientifically document their models, qualities, characteristics and images.

Component III: Bio safety and security

Issues and proposed solutions

1. Strange invasive species within Iraqi environments

It's critical to establish an operation room to control, monitor and register invasive species in Iraq, issue relevant identification brochures, and identify damages and ways to address them.

2. Management of genetically modified organisms and genetic products

Biological control at border outlets should be tightened to detect foreign species entering the country. In addition, the role of means of transport and the imported containers, materials and goods should be monitored.

3. Monitoring the migrant species and their movement

It's important to identify and monitor seasonal migration paths of migrant species and their locations and study their movement in the country and the factors affecting them.

Component IV: Sustainability of ecosystems

Issues and proposed solutions

1. Endangered natural ecosystems

Endangered ecosystems which require special attention (the Marshlands, rivers, coasts, etc) should be identified and declared by organizing relevant national days and activating introducing scientific forums to mobilize scientific efforts and collect funds to protect and control them and follow-up their changes with local stakeholders (e.g. universities).

2. National reserves, enclosures and parks

Locations of enclosures and national reserves and their environmental objectives (species to be protected) should be identified using international experiences in this field.

3. Ecotourism and use of volunteer services

Areas fit for ecotourism should be identified and developed by encouraging voluntary work to serve them and organizing their hunting rights. Economic management of

such locations may be handled through the private sector investments regulated under legal frameworks to ensure the sustainability of natural resources and ecosystems.

4. International cooperation to protect specific ecosystems

It's necessary to receive assistance from UN agencies and global environmental organizations in terms of funding, experience and co-management of important ecosystems like the Marshlands by submitting an assistance application that secures international media support which is essential for environmental sustainability.

Component V: Institutional and legal frameworks

Issues and proposed solutions

1. Encouraging scientific research to protect biodiversity

Weak role of the scientific research in protecting biodiversity, therefore, renowned scientific and research institutions shall undertake research projects to participate in achieving specific biodiversity protection objectives.

2. Promoting biodiversity in different education curricula

Education curricula are inefficient and shall be reconsidered in different stages to educate students in order to preserve

biodiversity, give attention to natural ecosystems and bring natural activities closer to the comprehension of children and youth.

3. Updating the fishing laws and wildlife conservation instructions

Laws and regulations governing wildlife and protection of natural species are inefficient and shall be reviewed and enforced in consistency with the current conditions.

4. Activating fines and redress with respect to damage to biodiversity

The negative impact of environmental activities on natural species, which may qualify as environmental crimes, should be minimized while establishing the concepts of compensation and redress as part of the fine system in place.

5. Capacity building

Ongoing specialized training for employees working in the field of species protection is necessary in addition to capacity building in line with the actual work requirements. Studies of postgraduates contracted to work in this field may also be financed.

Component VI: Environmental awareness and public participation

Issues and proposed solutions

1. Rewarding and honoring programs for individuals and institutions active in biodiversity protection

Individuals and institutions should be incited and encouraged by honoring them and granting them rewards, titles and service shields, as well as designing scientific slogans from images of local species as means of encouragement and awareness promotion in national and environmental occasions.

2. Identify, introduce and rationalize the environmental cultural heritage

There are no museums to document the environmental cultural heritage and spread of social beliefs, myths and superstitions negatively affecting biodiversity. It's necessary, therefore, to document this heritage of habits; traditions; ways of living; and tools and ways of hunting, preserving seeds and fruits; ways of combating pests; ways of farming; methods of traditional irrigation and genetic hybridization; local boating industry; aviculture, especially hawks and pigeons; feeding on wild birds; using plants for medical purposes and manufacturing furniture and tools, etc.

It's also important to establish museums as a system for introducing, documenting and rationalizing this heritage to dispose of such social beliefs, myths and superstitions negatively affecting biodiversity like believing that some species represent bad omen (e.g. owls, geckos, wolves, ravens, black cats, etc) in addition to beliefs related to mythic creatures like succubus, the two-headed snake, etc.

3. Engage communities in biodiversity issues

The participation of individuals, associations and clubs in biodiversity conservation decision-making discussions is weak. Therefore, local communities shall be encouraged to participate in issues and activities of their concern and form specialized groups of volunteers to participate in different relevant fields.

VI. Develop and improve waste management

Introduction

Hazardous and non-hazardous solid waste should be managed in a way that ensures the safety and health of human and environment through an integrated system of multiple interrelated aspects and components. Hence, it is necessary to use proper means consistent with the current conditions, available resources and determinants, i.e. adopting the best options to meet environmental standards at the least possible costs and higher recovery rate of available resources in full compliance with the effective laws and regulations.

Solid waste may be classified in many ways: decomposable and non-decomposable, flammable and not flammable and hazardous and non-hazardous. Lack of waste IM causes environmental problems negatively affecting man and nature, e.g.

spread of diseases and epidemics and damaged city aesthetic standards.

Table 3-7: Components and issues of Strategic Objective VI

Components	Issues
1. Non-hazardous wastes	1. Integrated management of Non-hazardous waste
	2. Private sector investments
	3. Scientific research and projects
	4. Monitoring and control
2. Hazardous wastes	1. Integrated management of hazardous waste
	2. Landfills
	3. Legislations and determinants

Components and relevant issues

Waste management has become a key challenge facing many countries and societies, including Iraq, due to population growth and technological development.

Component I: Non-hazardous wastes

Issues and proposed solutions

1. Non-hazardous waste IM

The poor non-hazardous waste IM has caused refuse accumulation in most governorates at random collection sites in the streets, sidewalks and open spaces, which has increased the spread of diseases and epidemics and negatively affected the

aesthetic standards of cities and residential areas. This requires developing clear relevant IM strategies and plans and considering the utilization of such wastes as a useful resource.

2. Private sector investments

Proper waste management isn't limited to the public sector. Therefore, the private sector shall be allowed to invest in waste management projects like municipal waste recycling, utilizing organic waste to generate electric power and refuse collection and transport.

3. Scientific research and projects

Weak waste management can be attributed to several reasons like limited relevant studies and lack of a detailed database covering the sector, which require the development of a research roadmap by contracting university professors and assigning research projects to MS.c. and Ph.D. students.

4. Monitoring and control

Inadequate provisions of environmental monitoring and control and unclear executive control roles cause responsibility overlap and create unjustified routine in the monitoring and control performance. Therefore, the control system and its environmental monitoring procedures should be combined within a single institutional framework with the presence of an executive authority to support control

and executive aspects while ensuring the enforcement of applicable regulations.

Component II: Hazardous wastes

Issues and proposed solutions

1. Hazardous waste IM

Successful management of hazardous waste requires an institutional and administrative system supporting the technical and technological side of waste management process. This system shall be highly efficient and effective in enacting the necessary laws and legislations to support hazardous waste management in line with international standards. This entails knowledge of international laws and successful institutional and administrative mechanisms and updating and promoting the applicable laws and regulations to unacceptable performance levels.

2. Landfills

Currently, there are no landfills for hazardous wastes that leading to random handling of these wastes of whatever sources. This requires conducting an in-depth field study and survey to construct landfills that satisfy site and environmental

requirements and introduce technical and technological factors in their treatment units in consistency with technological developments.

3. Legislations and determinants

There are no environmental legislations, mechanisms or determinants to handle hazardous wastes at different stages.

VII. Reduction of oil pollution

Introduction

Oil pollution is a major problem of top priority in the Iraqi environment due to the harmful effects caused by crude oil and petroleum derivative spill into the water, affecting biological species like fish and birds as well as agricultural land, soil, orchards and drinking water purification stations causing mechanical problems and clogged filters. Oil pollution can be attributed to several operations and practices near coasts and shores like direct discharge (without treatment) of ballast water by ships and boats, industrial discharges from power stations and production plants and oil tankers sinking when colliding with shipwrecks or due to lack of safety or durability requirements.

Table 3-8: Components and issues of Strategic Objective VII

Components	Issues
1. Institutional legislative frameworks	1. Enacting deterrent legal procedures
	2. Technical requirements
	3. Capacity building

	4. Strengthen the regulatory system
	5. Public participation
	6. International and regional water agreements
2. Technological tools	1. Loading and unloading crude oil from tankers
	2. Shipwrecks
	3. On-site treatment equipment for rehabilitation purposes
3. Emergency response	1. Environmental monitoring and early warning
	2. Information sharing
	3. Contingency and safety plans

Components and relevant issues

Oil and derivative pollution due to incorrect practices by workers in shipbuilding and maintenance activities, smuggling oil derivative and incorrect transport of crude oil leads to great damages to environment.

Component I: Institutional and legislative frameworks

Issues and proposed solutions

1. Deterrent legal procedures

There's a need for an integrated institutional and legislative system to develop deterrent procedures in cases of deliberate oil spill (caused by acts of sabotage or for the purpose of stealing oil products) to minimize these phenomena and support the legal framework by engaging international legal experts to brief local experts on legal and procedural interactions in this regard.

2. Technical requirements

It's necessary to provide logistic and financial support as well as technological means and equipment to the directorates responsible of oil spill control.

3. Capacity building

It's important to train specialized technical and engineering cadres on how to control oil spill and pollution and use modern relevant technologies. Alleviating the environmental impact of oil spill begins by detecting different types of similar cases as quick as possible in addition to the availability of highly qualified and specialized cadres with efficient early warning systems. This includes engaging technicians in practical workshops and practices to adapt to any similar case that tankers, pipelines or oil products may experience. On the technical side, it is necessary to adopt marine tracing systems

to track oil tankers and loading and unloading operations in Iraqi ports.

4. Strengthen the regulatory system

The current control system is weak and there's a need for a more comprehensive one to monitor different cases and abuses that might cause increased oil spills and pollution of marine and coastal environment by oil products which exacerbate pollution in the regional waters and prejudice biodiversity in the area through the spread of hydrocarbons which threaten fisheries.

Obsolescence of transport equipment and sabotage of oil products and pipelines constitute direct reasons for oil pollution. It is crucial to develop an active control deterrent to reduce pollution spread like an interrelated and integrated technical, legislative and executive system that would consequently decrease oil spill rates from different sources.

Moreover, shipwrecks in Shatt al-Arab and the continuous erosion of their iron skeleton constitutes an additional burden to oil pollution because some shipwrecks still retain their content of hydrocarbons, oil and fuel which spread from time to time and increase levels of pollution and oil spill.

5. Public participation

It's necessary to engage as much citizens and CSOs as possible in promoting awareness regarding the negative health

and environmental impact of oil spill and benefitting from the experiences of neighboring countries in public participation/volunteering to control and address such impacts. Furthermore, media should be engaged in promoting citizen awareness and education level through joint workshops with specialists and using the citizens' patriotism to urge them to preserve this wealth especially that a large percentage of oil spills result from sabotage aiming at destabilizing security or stealing oil products.

6. International and regional water agreements

Concerned bodies should enforce the international and regional conventions governing oil products control and transport in order to control cases of regional oil spill.

Component II: Technological tools

Issues and proposed solutions

1. Loading and unloading crude oil from tankers

Leakages from crude oil pipelines due to spills after loading should be reduced. Pipelines are damaged because of their poor quality, obsolescence and corrosion of insulation layers, which causes spills over large areas of the loading docks.

2. Shipwrecks

Shipwrecks constitute an essential factor of oil spill as ships passing Shatt al-Arab collide with them causing these ships to sink.

3. On-site treatment equipment for rehabilitation purposes

It's necessary to provide anti oil pollution equipment like rubber barriers, mechanical sweepers, chemical derivatives and special pumps to help control spilled oil immediately and prevent leakage or spread to other aquatic areas.

Component III: Emergency response

Issues and proposed solutions

1. Environmental monitoring and early warning

It's necessary to strengthen environmental monitoring and early warning of urgent cases via modern technologies.

2. Information sharing

Creating an information bank in cooperation with the Gulf States would strengthen the role and participation of these countries in the field of information

consolidation and exchange relevant experiences.

3. Contingency and safety plans

It's crucial to develop contingency systems and plans to face any actions or incidents that may cause environmental problems as a result of oil spill. The civil defense and coast guard in addition to MoE efforts should be engaged to strengthen the procedural and executive role to implement safety and contingency plans.

VIII. Reduction of radioactive contamination

Introduction

Ionizing radiation exists in environment either in a natural form within the Earth geological structure or through industrial radioactive sources which has been used in different applications of medicine, – diagnosis or treatment – industry, oil, agriculture, research, fire alarms, lightning arresters, military, etc. Protecting the environment and humans from pollution and radiation constitute a top priority in this field, which isn't an easy task due to the large number of radioactive sources of different kinds.

Table 3-9: Components and issues of Strategic Objective VIII

Components	Issues
1. Knowledge and communication management	1. Databases on radiation sources
	2. Capacity building and training
	3. Awareness raising and education
2. Radioactively	1. Evaluating and monitoring radioactively

contaminated areas	contaminated locations
	2. Identifying radioactive waste landfills and treatment locations
3. Transfer of radioactive materials and wastes	1. Licensing
	2. Technical systems and control system on border crossings
	3. Monitoring of individual exposure
4. Depleted uranium	1. Radioactive surveying of contaminated areas
	2. Removing radioactive contamination from affected vehicles and areas
5. Radioactive contamination contingency plans	1. Setting radioactive determinants
	2. Viable contingency plan
	3. Organizing public participation guidelines

Components and relevant issues

Component I: Knowledge and communication management

Issues and proposed solutions

1. Databases on radiation sources

There is a need to complete the databases on radiation sources in Iraq by collecting information about each source; entering information into systems, programs and digital and satellite maps; and utilizing accumulated experiences of other ministries to update the available information and maps. It's worth mentioning that there is an environmental monitoring system for radionuclides through the early warning system installed in all governorates.

2. Capacity building and training

It's necessary to design training programs action plan to promote the efficiency of technical cadres in implementing radiation surveys, detection and evaluation and to introduce the latest developments in the field of protection against radiation and environmental tests and measures through specialized programs inside and outside Iraq.

3. Awareness raising and education

There is a need to promote environmental awareness in the field of radiation and protection. This requires employing all audiovisual and printed media to promote environmental awareness and organize educational campaigns, awareness raising seminars and regular courses for different social categories to introduce the risks of radiation and ways of handling radioactive waste and materials.

Component II: Radioactively contaminated areas

Issues and proposed solutions

1. Evaluating and monitoring radioactively contaminated locations

It's necessary to regularly and intensively conduct surveys of contaminated locations and testing samples of soil, water and grass to measure radioactivity, collect information and map locations contaminated with depleted uranium or any other isotope depending on the international navigation system.

2. Identifying radioactive waste landfills and treatment locations

It's crucial to identify proper landfills and treatment locations; develop relevant technology; promote public awareness and participation to handle radioactive waste, especially the military equipment or scrap iron; and update the related legislations to organize treatment operations.

Component III: Transfer of radioactive materials and wastes

Issues and proposed solutions

1. Licensing

Movement of radiation sources inside Iraq should be controlled by licensing the radiation sources' disposal activities and following up proper channels during the process to prevent any possible radioactive leak.

2. Technical systems and control system over border crossings

Control over border crossings should be increased to reduce logistic and technical problems, and it's necessary to secure technical equipment and devices and highly trained cadres to ensure the effectiveness of the radioactive materials control system.

3. Monitoring of individual exposure

Radioactive materials are of multiuse; thus, it requires monitoring the individual exposure of those working in the radiation field through providing protection requirements while observing scientific and basic rules and highlighting the importance of conducting medical tests to follow-up future effects.

Component IV: Depleted uranium

Issues and proposed solutions

1. Radioactive surveying of contaminated areas

Some areas were hit by depleted uranium shells; therefore, the principle of integrated radioactive surveying of affected areas and vehicles should be adopted while designing special mechanisms to identify these sites.

2. Removing radioactive contamination from affected vehicles and areas

Radioactive contamination with depleted uranium should be removed from affected vehicles and areas using modern techniques and technologies, and specialized technical and engineering cadres should be trained to conduct similar operations. This shall be combined with maximum utilization of CSOs and media in addition to specialized environmental awareness and information

regarding the risks of tampering with those vehicles or presence within those sites.

Component V: Radioactive contamination contingency plans

Issues and proposed solutions

1. Setting radioactive determinants

Cases of radioactive contamination are hard to evaluate due to lack of national radioactive environmental determinants and dependence only on international determinants as a legislative reference to identify infringements and ways to address them.

2. Viable contingency plan

There is no national contingency plan to face radioactive-related emergencies in Iraq from internal or external sources. This requires forming specialized committee(s) with representatives from different ministries, including MoI, MoH, MoST and MMPW to develop a viable plan of highlighted technical and applied aspects to be implemented as soon as possible by all stakeholders.

3. Organizing public participation guidelines

CSOs and volunteers should participate in implementing the contingency plan so as to create a direct workspace for all age groups to prevent and control the danger by providing a technical and moral media base for this purpose. This includes briefing students from different education stages about the scenarios of radioactive contamination of unidentified (regional) dimensions, the associated risks and

experiences of other countries in the field of prevention, control and mitigation of their environmental and health effects.

IX. Integrated management of hazardous chemicals

Introduction

Hazardous and toxic chemicals attract international attention because chemicals are used in different fields of life and have been the reason for several environmental accidents and risks resulting from their use, circulation, transport and waste disposal. Hazardous chemicals may affect the life of humans and other living organisms through the food chain and exceeds it to natural ecosystems like seas, rivers, wetlands, forests and soil in addition to the ozone layer and climate change in general.

International attention is evident through the large number of concluded international conventions and agreements, including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Stockholm Convention on Persistent Organic Pollutants, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Montreal Protocol for the Protection of the Ozone Layer.

Iraq became a signatory of Basel Convention in 2011 and of Montreal Protocol in 2008 and seeks to accede to the other environmental conventions on chemicals.

Hazardous chemical of direct toxic effects on health and environment spread in Iraq as a result of industrial and production

operations, storage, trading, transfer, uncontrolled use or random destruction of chemicals.

Table 3-20: Components and issues of Strategic Objective IX

Components	Issues
1. Identify and evaluate hazardous chemicals	1. Spread of chemicals in the environment
	2. Locally made toxic and hazardous chemicals
	3. Imported toxic and hazardous chemicals
2. Identify and dispose of chemical residues resulted from different activities	1. Industrial activity
	2. Hospitals and health centers
	3. Agricultural activity
	4. Military activity
	5. Scientific and research activity
	6. Sound management to dispose of hazardous chemicals
3. Control the circulation of toxic and hazardous chemicals	1. Manufacturing of toxic and hazardous chemicals locally
	2. Commercially traded toxic and hazardous chemicals
	3. Imported toxic and hazardous chemicals
4. Transfer of toxic and hazardous chemicals	1. International transfer of toxic and hazardous chemicals to and across Iraq
	2. Local transfer of toxic and hazardous chemicals within Iraq

Components and relevant issues

There’s an urgent need to identify the gravity of chemical spread and circulation as well as the associated contamination by conducting a comprehensive evaluation of the situation of hazardous and toxic chemicals in Iraq. Chemical wastes

constitute an important aspect of the problem and ways of safe disposal shall be identified. Chemical safety plans and systems shall be developed comprehending safe ways to manage chemicals’ circulation, transfer, storage, disposal or recycling based on sound scientific principles to

reduce the associated health and environmental risks.

Component I: Identify and evaluate hazardous chemicals

Issues and proposed solutions

1. Spread of chemicals in the environment

This spread should be periodically measured in soil, water, air and living organisms using standard scientific methods.

2. Locally made toxic and hazardous chemicals

It's necessary to learn the use and purpose of locally manufactured chemicals with the associated risk and operations of circulation, storage and marketing. Moreover, to collect and document data about hazardous and toxic waste used in or produced by local industries.

3. Imported toxic and hazardous chemicals

It's necessary to identify the use and purpose of imported chemicals, the associated risk and operations of circulation, storage and marketing. This requires conducting a qualitative and quantitative assessment of these imported chemicals, adding it to data storage and conducting a comprehensive survey of their use and locations.

Component II: Inventory and dispose of chemical residues resulted from different activities

Issues and proposed solutions

1. Industrial activity

A unified qualitative and quantitative description of hazardous and toxic chemical wastes resulting from industrial activity should be prepared, updated periodically and added to databases.

2. Hospitals and health centers

A unified qualitative and quantitative description of hazardous and toxic chemical wastes resulting from hospitals, health centers and labs should be prepared, updated periodically using comprehensive statistical forms and added to databases.

3. Agricultural activity

A unified qualitative and quantitative description and sources of hazardous and toxic chemical wastes resulting from agricultural and domestic activities, such as fertilizers, pesticides for agricultural and domestic-use, should be prepared, updated periodically and entered into databases.

4. Military activity

A qualitative and quantitative description of hazardous and toxic chemical wastes resulting from military operations and of their time and place of spread should be prepared and entered into databases.

5. Scientific and research activity

A qualitative and quantitative description of hazardous, toxic chemical wastes resulting from scientific and research activities at universities and research centers and their collection sites should be prepared,

updated periodically and entered into databases.

6. Sound management to dispose of hazardous chemicals

Sound and standard principles should be developed to dispose of hazardous chemical waste, and their observance by stakeholders should be ensured.

Component III: Control the circulation of toxic and hazardous chemicals

Issues and proposed solutions

1. Manufacturing of toxic and hazardous chemicals locally

There is a need to develop an ongoing strict environmental monitoring mechanism over local industries which use, produce or cause the emission of hazardous or toxic chemicals, ensure they operate under the relevant laws and regulations and prepare periodic reports covering law compliance.

2. Commercially traded toxic and hazardous chemicals

A sound cooperation mechanism among different bodies should be developed to monitor these chemicals traded in Iraq by the public and private sector. It is important to ensure that bodies handling them observe the relevant laws and regulations.

3. Imported toxic and hazardous chemicals

It's necessary to lay down a mechanism for continuous monitoring of the movement of imported and transited hazardous and toxic chemicals across the borders. Moreover to ensure that their transfer operations to and from the country are subject to the relevant Iraqi laws and regulations.

Component IV: Transfer of toxic and hazardous chemicals

Issues and proposed solutions

1. International transfer of toxic and hazardous chemicals to and across Iraq

A mechanism should be developed to enforce the provisions of Basel Convention.

2. Local transfer of toxic and hazardous chemicals within Iraq

Controls and instructions should be laid down for the transfer of hazardous and toxic chemicals inside Iraq. For example, special vehicles shall be used to transfer chemicals and carefully load/unload containers by trained workers to prevent any leakage. Moreover, warning signs shall also be put on the chemicals vehicles, containers and tanks, especially dangerous ones, by factories producing, importing and handling such materials.

X. Developed institutional and legal framework of environment sector

Introduction

Environment is a multi-knowledge sector encompassing several scientific, economic, social and political cases and issues. By law, MoE is the sectoral authority concerned with EPI on the national and international level. Nevertheless, other relevant institutions affect the environment directly or indirectly and their active contribution is considered a necessary requirement and precondition for reaching the Strategic Objectives. The environment sector in Iraq is institutionalized by a number of laws, regulations and instructions affecting the environment directly or indirectly.

Over the last three decades, Iraq has witnessed a significant environmental deterioration for several reasons addressed in Chapter II. This has been a significant challenge which requires the concerted efforts of different stakeholders and building active institutions under a proper legal framework. Even though the beginning of environmental institutions and institutional work started in the 1950s, achievements on the ground are at best modest. Currently, Iraq still lacks the elements and requirements of environmental security and suffers from a

clear marginalization in enforcing the national and international EPI legislations and covenants.

Several institutions handle environmental issues in Iraq whether directly or indirectly. Created in 2003, MoE is responsible for developing and supervising the Strategy and following-up its implementation with the following stakeholders:

- ✓ Health and Environment Committee (HEC)
- ✓ Ministries and institutions represented in EPIC
- ✓ Stakeholders from Kurdistan
- ✓ Environment Protection and Improvement Councils in the governorates (EPICs)
- ✓ Environment-concerned CSOs and NGOs
- ✓ Private sector institutions
- ✓ UN organizations and international and regional financing institutions
- ✓ Academic and university organizations and scientific research centers

Articles 33 and 114 and of the 2005 Constitution include a paragraph on ensuring environment preservation and protection against pollution. MoE Law and EPIC Law were issued in 2008 and 2009 consecutively followed by a number of environment-related articles in other laws, regulations and instructions. The following table contains a list of Iraqi environmental legislations.

Table 3-31: Environmental legislations

No.	Legislation	Issuance year	Subject
1	Law	27 of 2009	EPI
2	Law	37 of 2008	MoE
3	Law	99 of 1980	Prevention of Ionizing Radiation
4	Regulation	2 of 2001	Preservation of Water Resources
5	Regulation	1 of 2011	Bylaw of MoE Formations
6	Instructions	1990	Environmental Instructions for Industrial, Agricultural and Service Projects
7	Instructions	1 of 2002	Using Asbestos Safely
8	Instructions	1 of 2010	Prevention of Non-Ionizing Radiations of Mobile Phone Systems
9	Instructions	1 of 2011	Licensing Requirements for Consulting Offices and Laboratories in Fields of Environment Protection
10	Instructions	2 of 2011	Environment License Requirements for Radio and TV Broadcast Stations

Table 3-42: Components and issues of Strategic Objective X

Components	Issues
1. Legislations and policies	1. Integrating environmental concepts in development activities
	2. Lack and inadequacy of existing legislations and policies
	3. Commitment and enforcement capacity implementation
	4. Regional and international agreements and conventions
	5. Environmental judiciary and police
2. Institutional efficiency and effectiveness	1. EPIC
	2. Institutional structures
	3. Work requirements and environment
	4. Centralism and decision-making mechanism
	5. Accountability and empowerment

		6. Environmental databases and indicators
		7. M&E activities
		8. Financial and administrative systems
3. HR		1. Human capacities
		2. HR qualification and training plan
4. Environmental and education awareness		1. Activities and institutions related to environmental awareness
		2. Environmental awareness and education programs
		3. Modern techniques of communication and social networking
		4. Environmental citizenship and sustainability as a human right

Components and relevant issues

In order to provide the proper environment to achieve the Strategic Objectives, the performance of institutions working in the field of environment shall be improved and developed. This comprehends harmonizing the legal and political framework regulating environmental work, improving the capacities and efficiency of the institutions and restructuring them to best achieve their tasks and goals. This necessarily requires developing human capital and manpower and improving and increasing environmental awareness activities. In this context, four components have been identified with each component having a group of issues to be addressed and taken into consideration during the next phase as the basis and reference to develop the Action Plan.

Component I: Legislations and policies

Issues and proposed solutions

1. Integrating environmental concepts in development activities

Socioeconomic development in Iraq didn't consider the environmental dimensions of development activities which caused significant damage to the fragile ecosystems. Therefore, environmental effects of each activity/project shall be studied and identified to achieve balanced SD ensuring the rights of future generations.

2. Lack and inadequacy of existing legislations and policies

Legislations, policies and strategies constitute a direct interpretation of the

Strategic Objectives and of the environment sector needs to respond to the requirements and conditions of international conventions, agreements and covenants. These legislations and policies should be reviewed, updated or rephrased.

3. Commitment and enforcement capacity implementation

Issuing legislations, policies and strategies isn't enough unless associated with clear commitment and enforcement capacity by different stakeholders, whether institutions or individuals. This requires a group of financial and technical factors, awareness, commitment and concerted efforts of different stakeholders.

4. Regional and international agreements and conventions

Iraq shares coastal lines, natural resources, environmental problems and issues with the neighboring countries, which requires active cooperation among these countries by observing bilateral, regional and international conventions, agreements and charters and concluding bilateral or multilateral environmental conventions.

5. Environmental judiciary and police

A qualified and active environmental judiciary and specialized police constitute a main pillar in preserving the environment and ensuring its continuity and reflect the attention the state gives to this vital sector.

Component II: Institutional efficiency and effectiveness

Issues and proposed solutions

1. Environment Protection and Improvement Council (EPIC)

EPIC was created by virtue of EPI Law of 2009 which stipulates its tasks and membership. However, the tasks of EPIC and EPICs shall be reconsidered in order to develop and follow-up the implementation of policies, strategies and plans and enforce the recommendations provided to the Cabinet.

2. Institutional structures

It's necessary to reconsider current structures inside MoE and environment units at the relevant ministries and institutions in the center and the governorates to harmonize them with the Strategy requirements to reach active institutions.

3. Work environment

Attractive and appropriate work environment is a key factor to improve the institution's efficiency, effectiveness and image among clients in terms of appropriate location and provision of equipment, devices and interpersonal skills.

4. Centralism and decision-making mechanism

Financial and administrative powers should be delegated to deliver services, implement

tasks and improve the quality of decisions taken. Accurate monitoring systems and transparent accountability structures shall also be available.

5. Accountability and empowerment

Whereas man is the means and the purpose of a healthy and sustainable environment, enabling him to practice his right to hold accountable those damaging the environment, and public services' acceptance of accountability values are a basic right in order to achieve environmental citizenship and ensure proper prioritization and good implementation.

6. Environmental databases and indicators

Accurate and correct information is the basis of good decision making. The provision of information, data and performance indicators in a transparent way and updating them on a periodical basis to reflect different environment components and progress in a timely manner are imperative to support the decision making process. In this context, all environmental databases should be made available to public opinion, scholars and those interested in such issues to identify the size of risks and benefits of each existing activity or project.

7. M&E activities

M&E systems for different environmental activities on all levels shall be available to

identify the progress made in achieving goals and judging environmental improvement/deterioration. This requires the preparation of realistic and measurable indicators based on studying and identifying environmental conditions during base years.

8. Financial and administrative systems

Institutional performance level is directly connected with the nature of financial and administrative systems and their implementation mechanisms. Most ministries and government institutions operate under unified financial and administrative systems; however, application methods, flexibility and transparency differ between institutions and officials.

Component III: HR

Issues and proposed solutions

1. Human capacities

Identification of human capacities in terms of number, specialization, experience, age, etc. in addition to the identification of future training needs in light of reconsidering organizational structures constitutes the most important issues, challenges and requirements of institutional development, taking into consideration that change management, especially when it has to do with individuals and job titles, isn't an easy task and requires active participation, clarity and transparency.

2. HR qualification and training plan

Re-qualifying and training workers at MoE and relevant institutions require an integrated plan for internal and external training and qualification. This requires close and continuous cooperation with the universities and specialized training centers inside and outside Iraq.

Component IV: Environmental awareness and education

Issues and proposed solutions

1. Activities and institutions related environmental awareness

All environmental awareness activities practiced by audiovisual and printed media using traditional or electronic means should be inclusively surveyed.

2. Environmental awareness and education programs

In light of the aforementioned survey, it's necessary to develop an integrated plan for environmental awareness and education

programs, identify executing bodies and coordinate their tasks, roles and fields of work.

3. Modern techniques of communication and social networking

In light of the information and communication revolution, these modern techniques in addition to the traditional means shall be used and utilized given their low cost and easy and quick access to target bodies.

4. Environmental citizenship and sustainability as a human right

Protecting the natural resources from pollution and depletion is a right of future generations. This is a collective responsibility and a religious and moral right stipulated by the Holy Books and international conventions and agreements. Enabling and inciting citizens to protect the environment, achieve environmental sustainability and actively participate in decision making are prerequisites and essential conditions.

Chapter IV: M&E Techniques

Introduction

M&E is a major tool in reviewing NESAP because it includes technical and administrative indicators that provide a logical answer about implementation success by comparing indicators. In this context, a separation shall be made between two main terms “monitoring” and “evaluation”. Monitoring is a planned and organized process to follow activities closely and compare the current situation with the one anticipated under NESAP. Continuous monitoring pushes towards successful Strategy implementation by documenting

the progress made and identifying delay factors which may be addressed during an early phase of implementation.

Evaluation is organized in the middle or after the end of the implementation process. It aims at studying the level of success in achieving the Strategic Objectives. The most important benefit of evaluation is identifying the level of achievement consistency (outputs, outcomes and results) with the set objective. It may also be used to identify lessons learned to develop later stages of environmental strategies.

Table 4-5: Main differences between monitoring and evaluation:

Monitoring	Evaluation
Methodological and ongoing	Methodological and periodical
During strategy implementation	During and after strategy implementation
Follow-up activities and progress made	Judge successful implementation of objectives
According to the annual action plan	Compared to basic evaluation indicators
Short-term corrective action	Strategic options for amendment and improvement
Accountability according to implementation	Accountability according to results
Performed by executing local bodies	Carried out through self- or external-evaluation

Monitoring shall be charged to the body responsible for the Strategy implementation, i.e. MoE which will implement the monitoring program through its specialized directorates and institutional units and provide them with information

and data collection methods to follow-up work progress. Evaluation will be implemented by external bodies in 2014 and 2017.

M&E indicators have been identified on two levels of the Strategic Objectives and the Action Plan to ensure selecting the correct indicators which serve different levels of implementation. Strategic indicators are connected with the Strategic Objectives while technical and sectoral indicators concentrate on programs included in the Action Plan. Indicators were selected through consultation channeled by MoE and the consultative team responsible for

Strategy preparation to ensure reflecting the environmental priorities and the institutional and technical capacities of MoE at the same time. It's worth mentioning that these indicators are indicative. More specific numeric indicators will be chosen in following plans and strategies, so as to be linked to national specifications and determinants as well technical capability of measurement and review.

Table 4-2: Full matrix of the Strategy evaluation indicators 2013 – 2017

Strategic Objective	Proposed indicative indicators
Protect and improve air quality	<ul style="list-style-type: none"> - Number of air monitoring stations in urban areas - Air quality improvement rate (sulfur oxides, nitrogen oxides and suspended particulates) - Number of air pollution databases - Number of plants using cleaner production tools - Respiratory disease rates decreased
Protect and improve water quality	<ul style="list-style-type: none"> - Number of operating WWTPs - Success rate of water quality indicators for WWTP - Groundwater depletion rate (pumping against natural replenishment) - Water resources rehabilitation rate in the Marshlands - Number of efficiently operating IWTPs - Number of riparian right agreements signed with neighboring countries - Number of people serviced with systems of drinking water and wastewater
Control land degradation and combat desertification	<ul style="list-style-type: none"> - Maps of deteriorated and contaminated soil locations prepared - Number of revived desert oases - Percentage of green areas to built areas - Annual increase rate of woodlands - Annual number and severity of dust storms
Maintain marine and coastal environment – Protect and sustainably use	<ul style="list-style-type: none"> - Marine fish species and fisheries identified and recorded - Decrease in using fishing NEFTs - Percentage of coastal areas covered with maps of environmentally sound usages - Quality indicators of freshwater flowing into the sea identified - Number of shipwrecks picked up annually

biodiversity	- Percentage of oil, chemical, etc. Pollutants
Protection and sustainable use of biodiversity	- Number of reports on the status of important species - Number of species bred in captivity - Number of pilot ecotourism projects - Number of nature reserves under construction
Develop and improve waste management	- Integrated system for waste management in place - Percentage of collected and sorted solid, paper and plastic wastes - Number of environmentally sound landfills - Percentage of hazardous wastes treated in an environmentally sound manner
Reduction of oil pollution	- Percentage of institutions related to oil pollution management under training and capacity building - Comprehensive control system effectively monitoring the violations in place - Number of prepared contingency and safety plans
Reduction of radioactive contamination	- Study of locations qualified for treating and burying radioactive wastes conducted - Percentage of border crossings controlling the transfer of radioactive wastes - Identification of areas exposed to depleted uranium prepared - Environmental radioactive determinants based on the global determinants prepared
Integrated management of hazardous chemicals	- Comprehensive maps and surveys on the spread of chemicals in the environment components - Sources of producing, transferring and removing locally-made hazardous chemicals identified and documented - No. of border crossings prepared for monitoring the illegal transfer of hazardous chemicals - Percentage of hazardous chemicals disposed of in environmentally sound ways
Develop institutional and legal framework of environment sector	- Number of reviewed, amended, updated and officially enacted legislations - Number of prepared and approved environmental strategies and plans - Number of international agreements and conventions acceded to by Iraq - Number of institutions integrating the environmental dimension in their own policies - Number of studies and researches affecting decision-making process

Chapter V: Action Plan for implementation of the National Plan for Environmental Protection

Introduction

This Plan constitutes a program to implement the ten Objectives of the Environment Strategy 2013 – 2017. Each Objective has a set of components with each one of them having a set of issues discussed in detail in the Strategy document. Figure (5-1) illustrates the relationship among the key components necessary to implement the Strategy. Accordingly, this Plan determines EPI programs and projects in Iraq.

Programs and Projects Matrix includes the programs and projects for each Strategic Objective (67 programs covering 170 projects).

While developing the Plan, the projects and programs of NDP 2010 - 2014, which are currently underway or will be implemented until the end of 2014 (referred to in the matrix of programs and projects, see Annex

(5-1)) were taken into consideration and new projects needed to achieve the Strategic Objectives during the three years of the Plan were suggested. The Plan covers the first phase of Strategy implementation and will be followed by future plan(s) in line of future NDPs. Total costs will be estimated through developing an operational plan that details implementation phases, time frame, required human and technical resources and the responsibility of implementation.

It should be noted that a number of ministries, governmental, non governmental and private institutions will participate in implementing this Plan. MoE will undertake coordination, follow-up and evaluation of the Plan programs and projects, in addition to the implementation of other projects that do not fall within the competence and responsibility of other stakeholders.

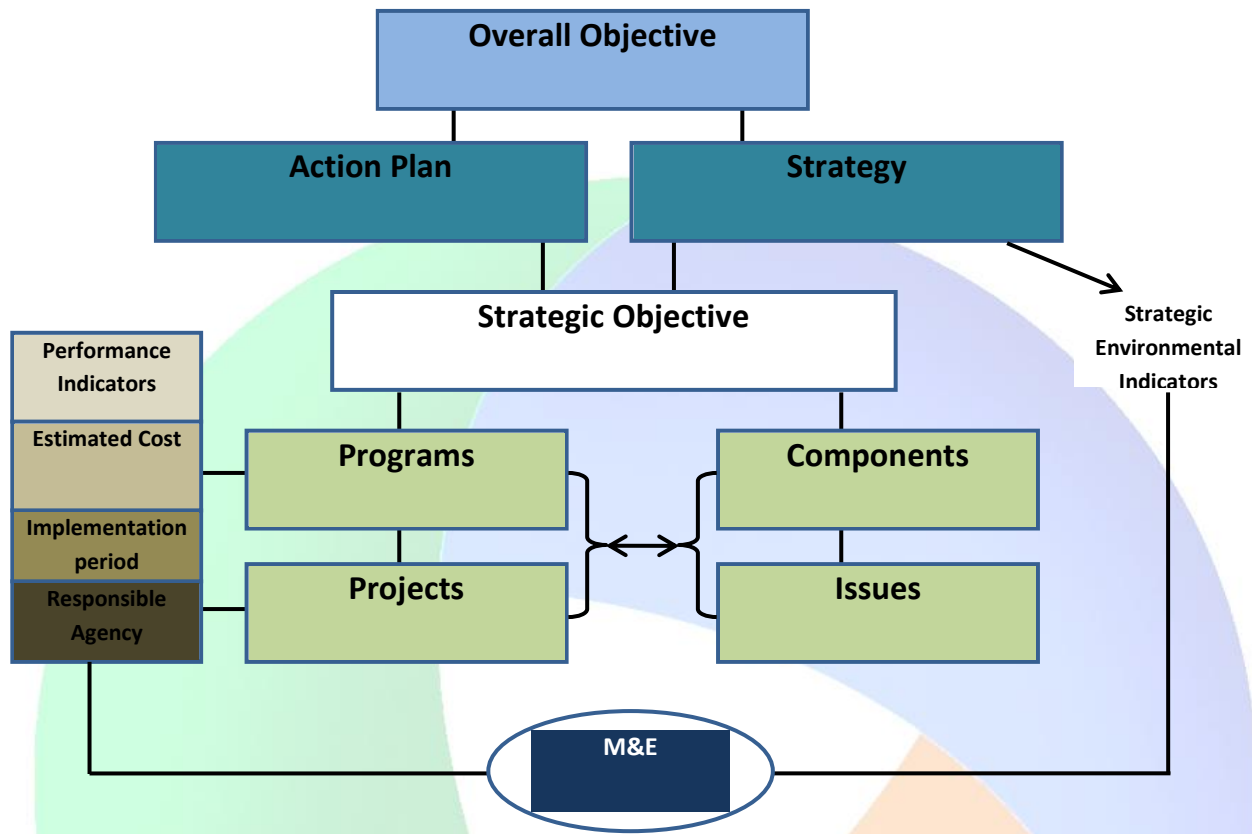


Figure 5-1: NESAP structure

Programs & Projects Matrix

Strategic Objective I: Protect and improve air quality

Indicators:

- Number of air monitoring stations in urban areas
- Air quality improvement rate (sulfur oxides, nitrogen oxides and suspended particulates)
- Number of air pollution databases
- Number of plants using cleaner production tools
- Respiratory disease rates decreased

Components/Issues	Programs	Performance Indicators	Projects
Component I: Air pollution from natural sources Issues <ul style="list-style-type: none"> • Dust storms • Weather and climate • Landscape degradation 	1.1 Reduction of dust storms	<ul style="list-style-type: none"> • Rates, frequency and periods of dust and sand storms decreased • Plans and emergencies to face the dust storms • Area of arable lands increased • A national plan to combat desertification and to predict the future. • Number of relevant regional and international agreements approved. 	1.1.1 Land Reclamation in Iraq. 1.1.2 Sand dune stabilization and development of natural vegetation 1.1.3 Monitoring and control of desertification
	1.2 Assessment of the impacts of climate change and adaptation to it	<ul style="list-style-type: none"> • The state representation level in regional and environmental institutions and relevant departments increased • Number of relevant scientific researches • Effective systems for monitoring and control • Programs and a national plan to handle climate change • Environmental awareness of citizens and their contribution to minimizing the effects of climate change increased 	1-2-1 Overall assessment of climate change for priority sectors 1.2.2 Development of a national strategy to adapt to climate change 1-2-3 Implementation of adaptation activities in the most fragile sectors, regions and ecosystems in partnership with civil society 1.2.4 Establishment of the national center for climate change.

	<p>1.3 Reduction of degradation of forests and green areas.</p>	<ul style="list-style-type: none"> • Green areas increased • Ecotourism increased • Air quality in governorates improved • Area of rehabilitated forest 	<p>1.3.1 Land restoration and rehabilitation of oases and palm groves.</p> <hr/> <p>1.3.2 Development and rehabilitation of parks and green belts in governorates.</p> <hr/> <p>1.3.3 Forests development.</p> <hr/> <p>1.3.4 Establishment of green belts in governorates</p>
<p>Component II: Air pollution from fixed (point) industrial sources</p> <p>Issues</p> <ul style="list-style-type: none"> • Legislations and determinants of gas emissions • Air pollution control and treatment units • Spread of private generators • Random incineration • Use of poor quality fuel • Inefficiency of energy use • Overlap between industrial and residential areas 	<p>1.4 Control, enforcement and compliance to reduce air pollution</p>	<ul style="list-style-type: none"> • A national updated database for greenhouse gas emissions and their determinants • Number of trained specialists • Air pollutants and noise in cities reduced 	<p>Fighting of sand dunes in Baiji</p> <hr/> <p>1.4.1 Enactment of laws, legislations and determinants of gas emissions</p> <hr/> <p>1.4.2 The national project to help industries comply with laws and legislation (National Center for Cleaner Production)</p> <hr/> <p>1.4.3 The private sector partnerships in controlling the emissions</p> <hr/> <p>1.4.4 Installing of air control quality stations in northern governorates and develop an environmental plan for the most polluted areas in cities and governorates' centers.</p>
	<p>1.5 Rehabilitation of facilities not meeting environmental requirements</p>	<ul style="list-style-type: none"> • Use of alternative and clean energy • Use of LPG and LNG • Improve the specifications of oil products (MoO) 	<p>1.5.1 Rehabilitation of MoIM companies</p> <hr/> <p>1.5.2 Rehabilitation of oil sector companies</p> <hr/> <p>1.5.3 Adding of supplementary units (hydrogenation, isomerization, FCC, etc.)</p>

			<p>1.5.4 Establishment of new refineries according to international specifications</p> <p>1.5.5 Rehabilitation of power plants</p>
	<p>1.6 Promotion the use of renewable energies (<i>See also Component VI</i>)</p>	<ul style="list-style-type: none"> • Number of private generators replaced and the amount of energy produced from solar or wind energy modules • Percentage of renewable energy uses to the total energy uses 	<p>1.6.1 Preparation of wind and solar energy Atlas for Iraq</p> <p>1.6.2 Using solar and wind energy to generate electricity and link to the national network</p> <p>1.6.3 Using solar and wind energy to generate electricity in public buildings and facilities</p> <p>1.6.4 Development of local technological industries of solar and wind energy technology</p>
	<p>1.7 Improvement of energy efficiency</p>	<ul style="list-style-type: none"> • Demand on appliances and equipment of high efficiency increased • Increased number of factories relying on clean fuel • Reduction of carbon (gases) emissions per unit of energy used or produced reduced 	<p>1.7.1 National Project for energy efficiency in different sectors</p> <p>1.7.2 Modernizing the technology used in electric power production</p> <p>1.7.3 Cleaner fuel and its necessary specifications and legislations</p>
	<p>1.8 Reduction of random incineration</p>	<ul style="list-style-type: none"> • Rates of emissions of dioxins and gaseous pollutants reduced 	<p>1.8.1 Environmental awareness of the harm caused by random incineration</p> <p>1.8.2 Enactment of laws to reduce and prevent the phenomenon of random incineration inside urban areas</p>
	<p>1.9 Development of craft industries in Iraq</p>	<ul style="list-style-type: none"> • Demand on conventional fuels reduced • Emissions of black smoke and associated pollutant gases decreased 	<p>1.9.1 Building a database on craft industries in Iraq</p> <p>1.9.2 Promoting the use of clean energies in craft industries</p>
<p>Component III: Air pollution from nonpoint industrial sources Issues</p>	<p>1.10 Sustainable program for public transport</p>	<ul style="list-style-type: none"> • Levels of congestion in streets and squares reduced • Levels of lead and suspended particulates decreased • Lower noise • Demand on private cars 	<p>1.10.1 Development of an integrated plan for public transport in major cities</p> <p>1.10.2 Replacement of public transport buses and using gas or biofuel</p> <p>1.10.3 Using electric public</p>

<ul style="list-style-type: none"> Inadequate public transport Random increase of vehicles 	<p>import decreased</p> <p>1.11 Reduction of the random import of cars</p>	<ul style="list-style-type: none"> Percentage of new cars to the total number of cars 	<p>transport means</p> <p>1.11.1 Identification of import controls for types of cars in line with environmental standards</p>
<p>Component IV: Noise</p> <p>Issues</p> <ul style="list-style-type: none"> Spread of generators of different capacities Transport and industry 	<p>1.12 Noise levels reduction</p>	<ul style="list-style-type: none"> Noise rates reduced 	<p>1.12.1 Mapping and monitoring noise levels in Iraq</p> <p>1.12.2 Laying down determinants and controls of noise levels</p> <p>1.12.3 Introducing technologies to reduce noise levels of most prevalent and affecting noise sources</p>
<p>Component V: Check, measurement and monitoring</p> <p>Issues</p> <ul style="list-style-type: none"> Air quality monitoring stations Databases National air quality standards Air quality monitoring research 	<p>1.13 The national network to monitor air quality</p>	<ul style="list-style-type: none"> Data, information and technologies for decision makers and the public about emissions types and quantities Studies illustrating the relation between air quality and public health 	<p>1.13.1 Identifying the national air pollutants standards</p> <p>1.13.2 Linking air quality monitoring units (establish a monitoring network)</p> <p>1.13.3 Conducting studies and research on air quality monitoring</p> <p>1.13.4 Assessing the environmental damages caused by the brick factories polluting air in Nahrawan area</p> <p>1.13.5 Establishing air quality control system in Baghdad and the governorates</p>
<p>Component VI: Clean energy</p> <p>Issues</p> <ul style="list-style-type: none"> Use of clean fuel EFTs Use of renewable energy Production of energy from 	<p>1.14 Use of clean fuel</p>	<ul style="list-style-type: none"> Rates of greenhouse gases emissions reduced Spending on fuel imports decreased 	<p>1.14.1 Using CNG, LNG, LPG in means of transport</p> <p>1.14.2 Establishing stations to fill cars with LPG and CNG</p>

wastes

1.15 Use of renewable energies (*see Component II*)

- Gaseous emissions decreased
- Solar energy technology localized

1.15.1 Using solar energy to support the electricity system

1.15.2 Promoting the use of solar energy in public buildings and facilities

1.15.3 Using wind energy for electric power generation in agricultural and desert areas

1.16 Energy production from waste

- Rates of gaseous emissions decreased
- Environment surrounding dumps improved
- Waste management improved
- Significant economic return

1.16.1 Using biogas for domestic use

1.16.2 Electric power production from waste for residential use

Strategic Objective II: Protect and improve water quality

Indicators:

- Number of operating WWTPs
- Success rate of water quality indicators for WWTP
- Groundwater depletion rate (pumping against natural replenishment)
- Water resources rehabilitation rate in the Marshlands
- Number of efficiently operating IWTPs
- Number of riparian right agreements signed with neighboring countries
- Number of people serviced with systems of drinking water and wastewater

Components/Issues	Programs	Performance Indicators	Projects
Component I: Regional dimension of water resources scarcity in Iraq Issues <ul style="list-style-type: none"> • Riparian rights and water quality agreements • Sharing hydraulic and operational information with riparian countries 	2.1 Cooperation with neighboring countries to ensure water quality and quantity	<ul style="list-style-type: none"> • Hydrological database • Agreement with neighboring countries drafted 	2.1.1 Establishing a national database to monitor water quantity and quality in shared rivers 2.1.2 Drafting quality agreement with riparian countries
	2.2 Sharing hydraulic and operational information with riparian countries	<ul style="list-style-type: none"> • Data necessary for developing contingency plans and strategies • Hydraulic and operational database 	2.2.1 Construction of water information bank with riparian countries
Component II: Water demands Issues <ul style="list-style-type: none"> • Climate change • Poor water quality of water resources 	2.3 Study on the impacts of climate change on water demands	<ul style="list-style-type: none"> • Results of mathematical models to study the impact of climate change on water resources 	2.3.1 Studying the effects of drought and higher temperature on water quotas
	2.4 Water quality improvement	<ul style="list-style-type: none"> • Improvement of the water quality indicators for WWTP • Improvement of surface water quality indicators (such as low organic loads and salinity, and higher rates of dissolved oxygen, etc.) • Number of rehabilitated WWTPs 	2.4.1 Developing a program for monitoring and control of different water resources and sources of pollution 2.4.2 Rehabilitation of WWTPs 2.4.3 Rehabilitating rivers banks 2.4.4 Remote sensing project (investment) to monitor the water quality of the Euphrates, Habbaniyah Lake and discharges flown into them (Anbar Environment Directorate) 2.4.5 Operational project to

			<p>implement quality systems in Baghdad Directorate</p> <p>2.4.6 Development of environmental monitoring and early warning systems</p> <p>2.4.7 Improvement of quality of water resources in northern governorates through developing monitoring and install remote sensing systems</p>
<p>Component III: Integrated and sustainable water resources management</p> <p>Issues</p> <ul style="list-style-type: none"> • R&D and capacity building • Demand management 	2.5 R&D and capacity building	<ul style="list-style-type: none"> • A plan for optimal utilization of water resources • A database of the different water resources • Results of mathematical models 	<p>2.5.1 Using mathematical models for SMWR</p> <p>2.5.2 Establishing a water resources information bank</p> <p>2.5.3 Development of national environmental database and atlases</p>
	2.6 Demand management planning	<ul style="list-style-type: none"> • Water demand management strategy • Indicators of water use efficiency improved 	<p>2.6.1 Mapping future water needs of different sectors</p> <p>2.6.2 Water use rationalization in different sectors</p>
	<p>Component IV: Marshlands</p> <p>Issues</p> <ul style="list-style-type: none"> • Reduced quantity and deteriorated quality of the Marshlands water • Marshlands recovery • International and regional support 	2.7 Reduction of the Marshlands water scarcity and deterioration	<ul style="list-style-type: none"> • A national plan for the Marshlands development • Improvement of the Marshes' water quality indicators compared to standards limits • Joint action plans with relevant departments • Flow of water to the Marshlands increased
2.8 Restoration of the Marshlands and mobilization of international and regional support		<ul style="list-style-type: none"> • Number of new jobs • Lower rates of immigration from the Marshlands to the cities • Higher rates of household income • Investment rates in the Marshlands environment increased 	<p>2.8.1 National plan for rehabilitation and development of the Marshlands' villages (economic development - supply villages with electricity)</p> <p>2.8.2 Taking advantage of recycling water and materials in the Marshlands communities</p> <p>2.8.3 Including the Marshlands in the international and regional agreements</p>
2.9 Sewage and agricultural		<ul style="list-style-type: none"> • Percentage of population connected to sewage 	<p>2.9.1 WWTPs Rehabilitation and using modern technologies (impermeable</p>
<p>Component V: wastewater</p>			

Issues <ul style="list-style-type: none"> Wastewater treatment Industrial, agricultural and municipal wastewater treatment Downstream estuary 	wastewater treatment	<p>system increased</p> <ul style="list-style-type: none"> Number of WWTPs operating efficiently Re-used amount of wastewater increased Quality indicators of WWTPs water compared to the allowable limits improved 	<p>membrane technology)</p> <p>2.9.2 Re-using sludge resulted from WWTPs for agriculture purpose</p> <p>2.9.3 Establishing a program to monitor and locate sewage disposal in rivers (to be included within the sewage systems development plan)</p> <p>2.9.4 Rehabilitating sewage networks</p> <p>2.9.5 Issuance of instructions on the use of treated wastewater for the purposes of irrigation</p>
	2.10 Industrial wastewater treatment	<ul style="list-style-type: none"> Number of IWTPs operating efficiently Samples of industrial wastewater conformed to the recommended standards Increased number of plants having a preliminary treatment units Increased number of companies using wastewater treatment units 	<p>2.10.1 Rehabilitation of IWTPs within MoIM companies</p> <p>2.10.2 Rehabilitation of IWTPs within MoO companies</p> <p>2.10.3 Rehabilitation of IWTPs</p> <p>2.10.4 Establishment of new IWTPs in large refineries</p> <p>2.10.5 Establishment of WWTPs for the residential areas affiliated with the oil sector</p>
			<p>2.10.6 Rehabilitation of IWTPs within MoElc companies</p> <p>2.10.7 Using magnetic systems and techniques for industrial wastewater treatment for preserving the environment</p> <p>2.10.8 Encouragement of programs of cleaner production and recycling in plants and facilities to stop discharging wastes</p>
	2.11 Monitor water quality in the downstream estuary	<ul style="list-style-type: none"> Statistical information and data on pollution indicators Improved water quality indicators compared to the standards in the downstream estuary 	<p>2.11.1 Monitoring and control of water quality in the downstream estuary</p>

Strategic Objective III: Control land degradation and combat desertification

Indicators:

- Maps of deteriorated and contaminated soil locations prepared
- Number of revived desert oases
- Percentage of green areas to built areas
- Annual increase rate of woodlands
- Annual number and severity of dust storms

Components/Issues	Programs	Performance Indicators	Projects
Component I: Land use Issues: <ul style="list-style-type: none"> • Plan for land management and use and for the identification of degraded locations • Sustainable development of oases in northern and western steppes (Badia) • Urbanization of agricultural lands 	3.1 Planning the best use of land	<ul style="list-style-type: none"> • A national plan for land, soil and resources management 	3.1.1 Management and use of soil and land and mapping of degraded soils (MDF) 3.1.2 Environmental management of wetlands in Iraq (MDF)
	3.2 Management and rehabilitation of desert oases	<ul style="list-style-type: none"> • Number of desert oases restored 	3.2.1 Removing the remnants of war (mines, warships, shipwrecks) from environment of the Marshlands and wetlands (MDF)
Component II: Desertification Issues <ul style="list-style-type: none"> • Expansion of the sand dunes • Green belts around cities and regions affected by desertification • Inefficient use of irrigation water • Blowing dust storms 	3.3 Combating desertification and treatment of degraded soils (see also the first Strategic Objective)	<ul style="list-style-type: none"> • Areas of green belts underway • Annual increase rate of woodlands • Area of greened lands • Pasture area managed and rehabilitated • Maps for locations of degraded and contaminated soils laid out • Identifying sites of 	3.3.1 Sand dune stabilization (178)
			3.3.2 Western Region Oases (223)
			3.3.3 Monitoring of desertification and land degradation using remote sensing (195)
			3.3.4 Mapping of desertification and vegetation at the national level (198)
			3.3.5 Establishment of a national center for capacity development to manage the anti-desertification and drought strategy (MDF)
			3.3.6 Environmental awareness in the fight against

<p>formation</p> <ul style="list-style-type: none"> • Soil erosion 		<p>sand dunes of priority and combating action plans drawn up</p> <ul style="list-style-type: none"> • Area of rehabilitated lands prone to soil erosion 	<p>desertification (MDF)</p> <p>3.3.7 Land reclamation projects</p> <p>3.3.8 Water harvesting, especially in undulating and western areas</p> <p>3.3.9 Monitoring of desertification and land degradation using remote sensing</p> <p>3.3.10 Combating desertification through establishing green belts and constant forestation inside cities</p>
<p>Component III: Soil contamination</p> <p>Issues</p> <ul style="list-style-type: none"> • Lands contaminated with mines and unexploded bombs • Salinization and water logging due to surface irrigation and wasted water • Solis contaminated with chemicals and oil products 	<p>3.4 Rehabilitation of lands contaminated with mines</p>	<ul style="list-style-type: none"> • Developed action plan to demine lands contaminated with mines 	<p>3.4.1 Reduction of soil contamination from chemicals and oil products (MDF)</p> <p>3.4.2 Rehabilitation of lands contaminated with mines</p>
<p>Component IV: Natural vegetation</p> <p>Issues</p> <ul style="list-style-type: none"> • Natural environments within the urban environment • Natural pastures and deserts • Forest and woodland SM 	<p>3.5 Conservation and sustainable use of natural vegetation</p>	<ul style="list-style-type: none"> • Percentage of green areas to built areas • Area of green belt projects in progress • Maps and data determining irrigation type of agricultural lands in different areas are available • Number of projects on rehabilitation and development of natural pasture and organization of grazing 	<p>3.5.1 Development and rehabilitation of parks and green areas in governorates (173)</p> <p>3.5.2 Development of natural vegetation (221)</p>

Strategic Objective IV: Maintain marine and coastal environment

Indicators:

- Marine fish species and fisheries identified and recorded
- Decrease in using fishing NEFTs
- Percentage of coastal areas covered with maps of environmentally sound usages
- Quality indicators of freshwater flowing into the sea identified
- Number of shipwrecks picked up annually
- Percentage of oil, chemical, etc. pollutants

Components/Issues	Programs	Performance Indicators	Projects
Component I: Polluted coastal waters Issues <ul style="list-style-type: none"> • Oil pollution • Non-oil pollution • Indicators of water quality and sea sediments 	4.1 Environmental monitoring of coastal waters	<ul style="list-style-type: none"> • Quality indicators of marine waters and sediments are improved • Quality indicators of fresh water flowing into the sea are improved • A database for all pollution resources 	4.1.1 National plan to study marine pollution sources (including land-based sources, etc.) 4.1.2 Development of a response plan for oil spill from crude oil exporting facilities in Basra, Khor Al Amaya Oil Terminal, Umm Qasr, and Khor Al Zubair (being prepared by JICA under the Japanese loan)
	4.2 Reduction of marine pollution	<ul style="list-style-type: none"> • Extent of response in case of emergency • Effectiveness of Iraq's membership in the Regional and International Maritime Organization • Number of joint projects with neighboring countries 	4.2.1 Capacity building to develop and implement contingency and anti-oil pollution plans 4.2.2 Strategic action for regional cooperation to reduce pollution and protect marine environment
Component II: Marine Fisheries Issues <ul style="list-style-type: none"> • Marine fishery SM • Indicator of pollutants in 	4.3 Marine Fish Conservation	<ul style="list-style-type: none"> • Fisheries identified and recorded • Decrease in using fishing NEFTs • Pollution indicator in fish tissues are 	4.3 .1 Assessment of fish stocks 4.3.2 Regulating fishing in Iraqi waters

tissues of marine fish • Methods of fishing, storing and marketing		improved	
Component III: Marine biodiversity Issues • Marine and coastal reserves • Marine organisms used to detect pollution	4.4 Preservation of biodiversity in the marine environment	• Number and size of protected areas or under special management	4.4 .1 Preservation of biodiversity in the marine environment (see Component of biodiversity)
Component IV: Coastal areas Issues • Coastal area use planning • Rehabilitation of deteriorated coastal environments • Extended area of mixed waters • Quality of inland water flowing into the sea	4.5 IM for Iraqi coast	• Number of tourism or investment projects for private sector • Percentage of coastal areas located in the maps of environmentally sound uses	4 .5.1 Iraqi coast IM 4.5.2 Developing the coastal environment 4.5 .3 Modernizing the marine and coastal environment laws and legislation

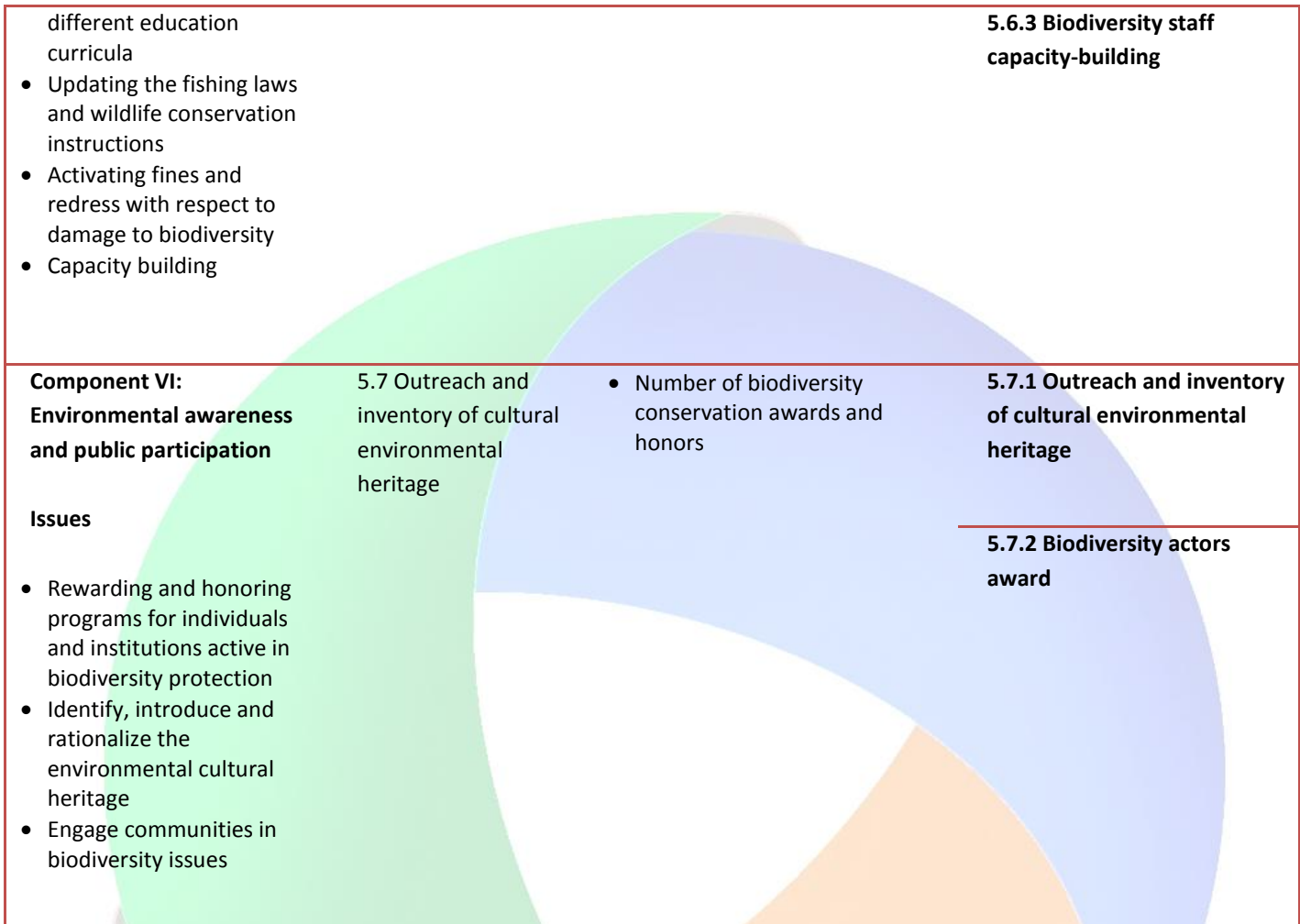
Strategic Objective V: Protection and sustainable use of biodiversity

Indicators:

- Number of reports on the status of important species
- Number of species bred in captivity
- Number of pilot ecotourism projects
- Number of natural reserves under construction

Components/Issues	Programs	Performance Indicators	Projects
<p>Component I: Local species</p> <p>Issues</p> <ul style="list-style-type: none"> • Natural structures necessary to sustain natural biodiversity • Field surveys of local species and reports on the status of important species • Endangered species • Local species within urban areas • Biodiversity within agricultural environments 	5.1 Biodiversity protection	<ul style="list-style-type: none"> • Number of reports on the status of important species • Number of agricultural best practices corresponding to biodiversity protection • Environments of special importance are identified and their SM plans are developed • Number / area of rehabilitated natural reserves • Number of preserved fauna and flora 	<p>5.1.1 Establishment of the national network of natural reserves</p> <p>5.1.2 Biodiversity protection in the Marshlands</p> <p>5.1.3 Maintaining areas of natural heritage</p> <p>5.1.4 The national strategy for biodiversity</p> <p>5.1.5 Mapping of the important areas of biodiversity and birds</p> <p>5.1.6 Inventory of biodiversity and lists of endemic and endangered species</p> <p>5.1.7 Strategy of invasive species control</p> <p>5.1.8 Natural pest control</p>
<p>Component II: Keeping samples of Iraqi organisms</p> <p>Issues</p> <ul style="list-style-type: none"> • Gene bank for local species • Keeping bio models and samples 	5.2 Saving genetic samples and germplasm	<ul style="list-style-type: none"> • A national bank of genetic information • Number of species bred in captivity • Preserved biological models and samples 	<p>5.2.1 Saving genetic germplasm of agriculture (palm groves)</p> <p>5.2.2 Establishment of stations for breeding of endangered Iraqi deer</p> <p>5.2.3 Establishment of nature reserves</p>

<ul style="list-style-type: none"> Reference categorization of organisms at global natural history museums 	5.2.4 Animal genetic resources	<hr/> 5.2.5 DNA Project	<hr/> 5.2.6 Museum of Natural History
<p>Component III: Bio safety and security</p> <p>Issues</p> <ul style="list-style-type: none"> Strange invasive species within Iraqi environments Management of genetically modified organisms and genetic products Monitoring the migrant species and their movement 	5.3 Bio-safety and Bio-security in Iraq	<ul style="list-style-type: none"> Database of genetically modified organisms and genetic products Laws regulating the entry of genetically modified organisms and genetic products Seasonal migration movements and locations of migratory organisms are identified 	5.3.1 The national framework for biological safety in accordance with Cartagena Protocol
<p>Component IV: Sustainability of ecosystems</p> <p>Issues</p> <ul style="list-style-type: none"> Endangered natural ecosystems National reserves, enclosures and parks Ecotourism and use of volunteer services International cooperation to protect specific ecosystems 	5.4 Biological diversity in curricula of research, education and training	<ul style="list-style-type: none"> Number of curricula updated to include biodiversity 	5.4.1 Integration of biodiversity in the curricula of research, education and training
<ul style="list-style-type: none"> Endangered natural ecosystems National reserves, enclosures and parks Ecotourism and use of volunteer services International cooperation to protect specific ecosystems 	5.5 Ecotourism	<ul style="list-style-type: none"> Environments of special importance are identified and their SM plans are developed Number of pilot ecotourism projects 	5.5.1 Activation of ecotourism
<p>Component V: Institutional and legal frameworks</p> <p>Issues</p> <ul style="list-style-type: none"> Encouraging scientific research to protect biodiversity Promoting biodiversity in 	5.6 Development and enforcement of biodiversity protection legislations	<ul style="list-style-type: none"> Number of biodiversity laws or legislation updated Number of cases of fines or redress related to biodiversity Number of training courses to raise capabilities of biodiversity staff 	5.6.1 Developing the institutional framework for biodiversity management
<ul style="list-style-type: none"> Encouraging scientific research to protect biodiversity Promoting biodiversity in 	<hr/> 5.6.2 Monitoring and activation of compliance with laws		



Strategic Objective VI: Develop and improve waste management

Indicators:

- Integrated system for waste management in place
- Percentage of collected and sorted solid, paper and plastic wastes
- Number of environmentally sound landfills
- Percentage of hazardous wastes treated in an environmentally sound manner

Components/Issues	Programs	Performance Indicators	Projects
Component I: Non-hazardous wastes Issues <ul style="list-style-type: none"> • Non-hazardous wastes IM • Private sector investments • Scientific research and projects • Monitoring and control 	6.1 Non-hazardous waste IM	<ul style="list-style-type: none"> • Percentage of separated and recycled solid waste increased • Percentage of houses, facilities and neighborhoods serviced in terms of solid waste collection increased • Increased number of manufacturing stations • Amount of data and number of waste types gradually introduced in the database 	6.1.1 The application of 4R principle in the management of non-hazardous waste 6.1.2 Establishing a database for quantities and types of solid waste 6.1.3 Environmental impacts of crafts in industrial and residential areas in Baghdad Governorate
	6.2 The private sector investment	<ul style="list-style-type: none"> • Number of houses whose resulting waste is recycled • Total private sector investment in recycling (million dollars) • Percentages of recycled paper, glass and metal waste • Waste collection cost incurred by the state reduced 	6.2.1 Solid waste recycling 6.2.2 Privatization of solid waste management sector
	6.3 Projects and Scientific research	<ul style="list-style-type: none"> • Speed of waste collection service increased • Number of days of the week when waste is not collected • Study on gas generation conducted • Biogas plant established 	6.3.1 Drafting a mathematical model to find the best way to transfer waste within residential areas 6.3.2 Study on biogas generation from waste treatment (see also the first Strategic Objective)

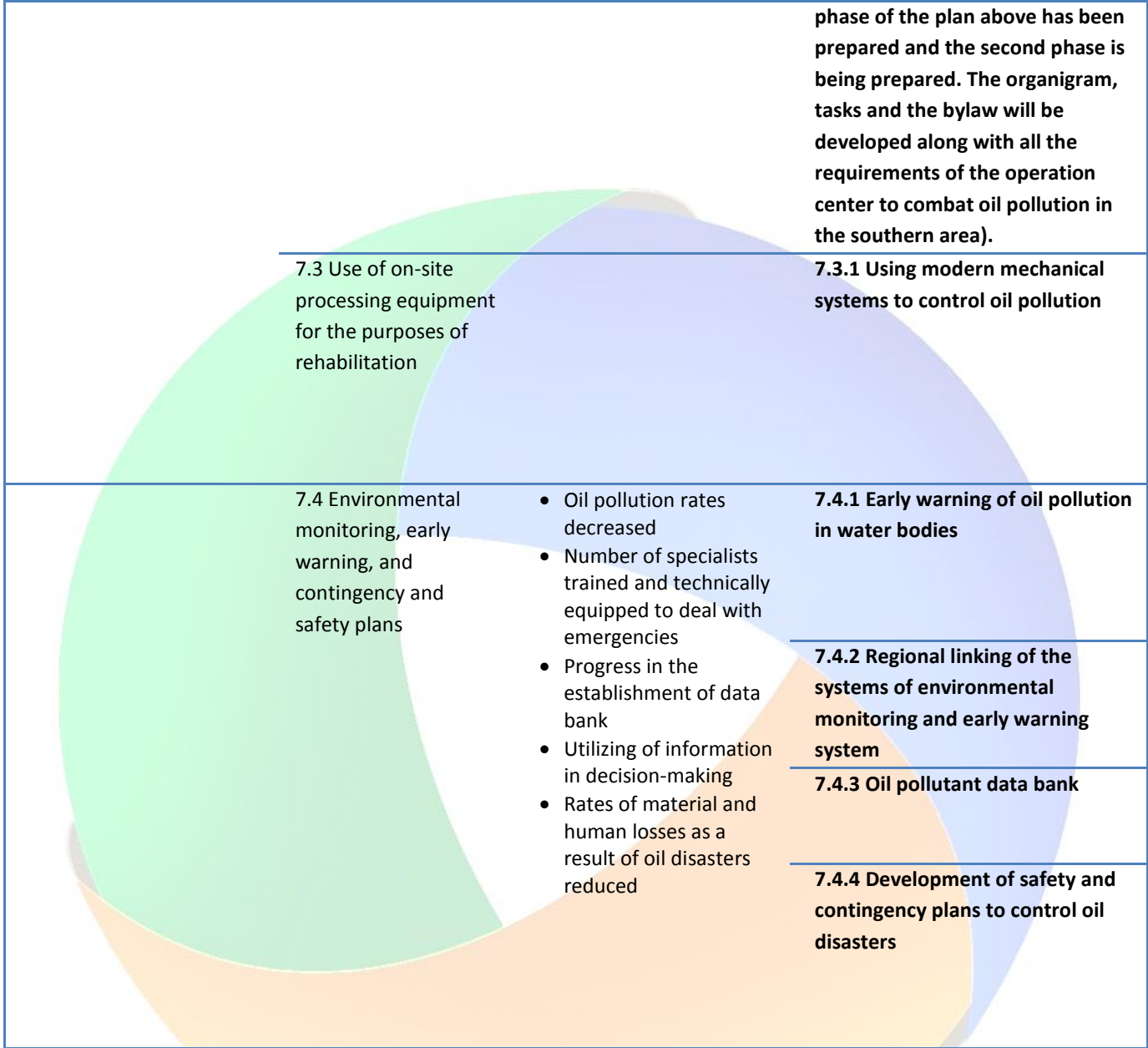
			<p>6.3.3 Introduction of environment-friendly technology in the industrial sector</p> <p>6.3.4 Building of a database for all contaminating activities in the northern governorates</p>
	6.4 Monitoring and surveillance	<ul style="list-style-type: none"> • Number of landfill sites operating in an environmentally sound manner • Change in concentrations percentage of major air pollutants resulting from landfills 	<p>6.4.1 Monitoring, inspection and testing of landfills</p> <p>6.4.2 Environmental assessment of military manufacturing facilities</p>
<p>Component II: Hazardous wastes</p> <p>Issues</p> <ul style="list-style-type: none"> • Hazardous wastes IM • Landfills • Legislation and determinants 	6.5 Inventory of hazardous waste	<ul style="list-style-type: none"> • Waste inventory established • Percentage of hazardous wastes treated in an environmentally sound manner 	<p>6.5.1 Inventory of hazardous waste (types and quantities) in Iraq</p>
			<p>6.5.2 Control and treatment of hazardous waste</p>
			<p>6.5.3 Treatment of sludge containing hazardous substances from tanneries</p>
			<p>6.5.4 Environmental assessment of contamination with mercury in Iraq</p>
			<p>6.5.5 Study on establishing landfills for hazardous waste</p>
	6.6 Landfills	<ul style="list-style-type: none"> • Number of landfills selected with technically sound ways • Relative progress in the establishment of hazardous waste landfills 	<p>6.6.1 Locating and establishing hazardous waste landfills using remote sensing technology</p>
	6.7 Issuance of legislation and determinants	<ul style="list-style-type: none"> • Number of hazardous waste management legislations (laws, regulations and instructions) issued 	<p>6.7.1 Issuing rules, regulations and determinants for the transfer, circulation, storage, processing and dumping of hazardous waste</p>

Strategic Objective VII: Reduction of oil pollution

Indicators:

- Percentage of institutions related to oil pollution management-that are under training and capacity building
- Comprehensive control system effectively monitoring the violations in place
- Number of prepared contingency and safety plans

Components/Issues	Programs	Performance Indicators	Projects
Component I: Institutional and legislative frameworks Issues: <ul style="list-style-type: none"> • Enacting deterrent legal procedures • Technical requirements • Capacity building • Strengthen the regulatory system • Public participation • International and regional water agreements 	7.1 Capacity building	<ul style="list-style-type: none"> • Concentrations of oil pollutants in aquatic environment decreased • Early control over oil incidents • Statistical and information cooperation at the regional and international level increased • Number of acceded oil agreements 	7.1.1 Modeling of oil pollution movement within coastal and aquatic environments and soil
			7.1.2 Introduction of remote sensing technology to control oil pollution
			7.1.3 Acceding to the international and regional oil agreements
			7.1.4 Minimize oil pollution incidents
Component II: technological tools Issues <ul style="list-style-type: none"> • Loading and unloading crude oil to and from tankers • Shipwrecks • On-site treatment equipment for rehabilitation purposes 	7.2 Control over crude oil loading and unloading from tankers	<ul style="list-style-type: none"> • Oil loss rates decreased • Environmental pollution rates decreased • Loading and unloading rates increased 	7.2.1 Rehabilitation and reconstruction of pumping stations and floating and fixed platforms
			7.2.2 Shipwreck rehabilitation and floating
			7.2.3 Wharf rehabilitation in conjunction with MoO
			7.2.4 Development of a response plan for oil spill from crude oil exporting facilities, prepared by JICA and the stakeholders of South Oil Company and the other concerned ministries (the first



Strategic Objective VIII: Reduction of radioactive contamination

Indicators:

- Study of locations qualified for treating and burying radioactive wastes conducted
- Percentage of border crossings controlling the transfer of radioactive wastes
- Identification of areas exposed to depleted uranium prepared
- Environmental radioactive determinants based on the global determinants

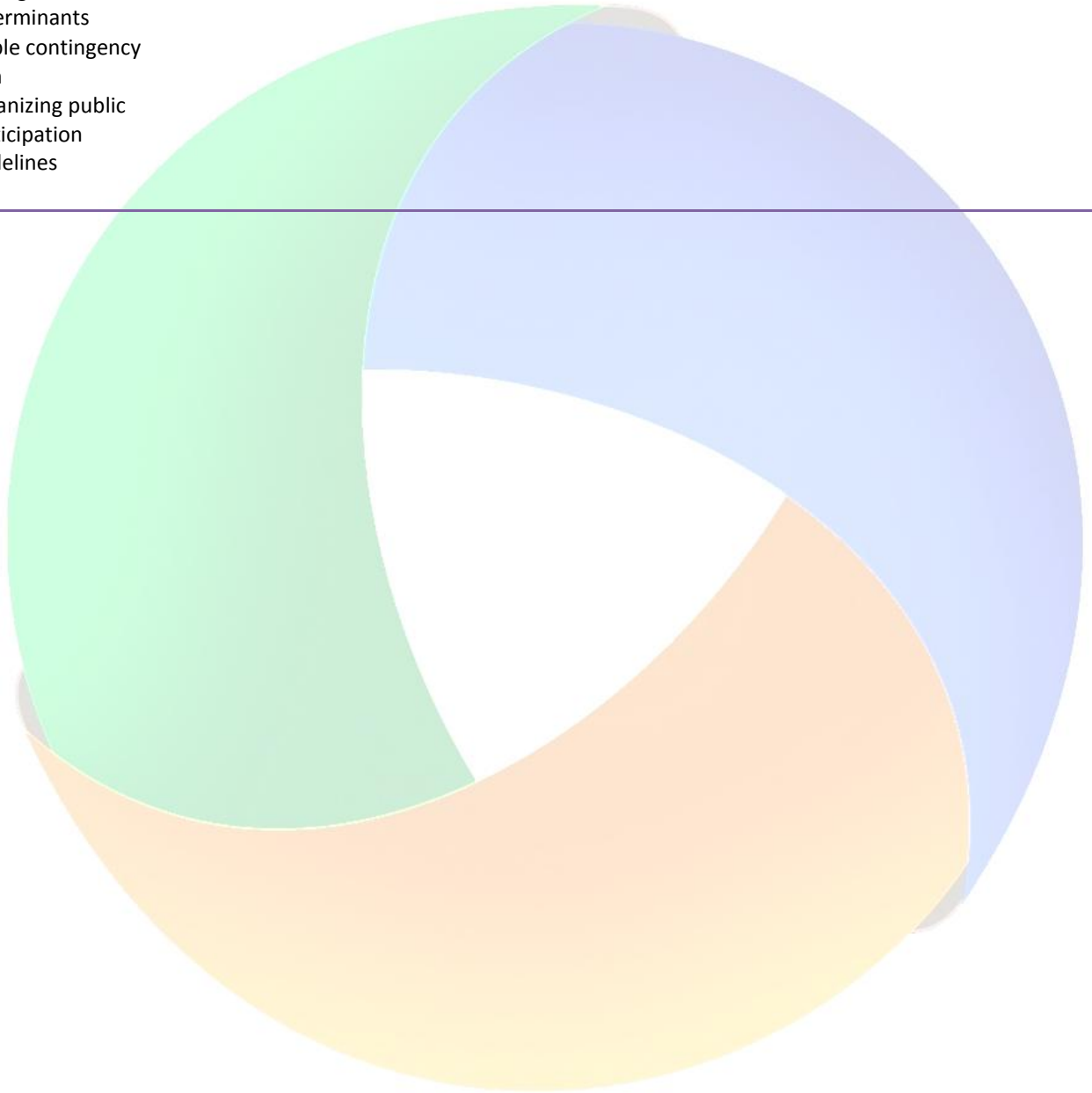
Components / Issues	Programs	Performance Indicators	Projects
Component I: Knowledge and communication management Issues: <ul style="list-style-type: none"> • Databases on radiation sources • Capacity building and training • Awareness raising and education 	8.1 Databases on radiation sources	<ul style="list-style-type: none"> • A database on radiation information available to officials and technical specialists • Increased numbers of personnel trained to deal with radioactive sources 	8.1.1 Preparing information on the radioactive materials circulated within the public and private sectors
			8.1.2 Training staff on radioactive sources M&E systems
			8.1.3 School awareness on radiation risks and handling ways
Component II: Radioactively contaminated areas Issues: <ul style="list-style-type: none"> • Evaluating and monitoring radioactively contaminated locations • Identifying radioactive waste landfills and treatment locations 	8.2 Assessment of radioactively contaminated sites	<ul style="list-style-type: none"> • A full inventory of these areas • Integrated database in place • Study of locations qualified for treating and burying radioactive waste conducted • Rates of families exposed to radiation decreased • Number of radioactive waste landfill projects 	8.2.1 Conducting comprehensive radiological surveys of radioactively contaminated sites
			8.2.2 Treatment of naturally occurring radioactive contaminants (NROM) resulting from gas isolation stations in southern oil fields, which are accumulated in special barrels in Khidr al-Maa location in southern Rumaila
			8.2.3 Removal of radioactive contamination from heavy truck repair plant in Mada'in, which is affiliated to the Oil Products Distribution Company
			8.2.4 Assessment of radiation effect of oil industry (radioactive survey to measure radon in all oil companies)
			8.2.5 Closing destroyed nuclear facilities and sites

			8.2.6 Radiological evaluation of military industrial facilities
			8.2.7 Building of a material base for treatment and storage of radioactive solid waste
			8.2.8 Construction of radioactive waste landfills
Component III: Transfer of radioactive materials and wastes Issues: <ul style="list-style-type: none"> • Licensing • Technical systems and control system on border crossings • Monitoring of individual exposure 	8.3 Licensing for the transfer, circulation and storage of radioactive materials	<ul style="list-style-type: none"> • Number of relevant licenses • Rate of border crossings controlling the transfer of radioactive wastes • Rates of personal exposure decreased • Control over radiation risks increased • An integrated radiation map developed 	8.3.1 Drafting a law on granting licenses for radioactive materials transfer, circulation and storage licensing
	8.4 Border crossings technical and regulatory systems		8.4.1 Conducting specialized radiological scans for goods at border crossings
	8.5 Personal exposure monitoring		8.5.1 Monitor the health of the workers exposed to radiation
			8.5.2 Monitoring of doses of radiation workers
			8.5.3 Protection of workers in the sites of dismantling destroyed nuclear facilities
	8.6 Radiation survey for contaminated sites		8.6.1 Radiation reality assessment of the Iraqi cities
			8.6.2 Radiation assessment of military manufacturing facilities
Component IV: Depleted uranium Issues <ul style="list-style-type: none"> • Radioactive surveying of contaminated areas • Removing radioactive contamination from affected vehicles and areas 			
Component V: Radioactive			

**contamination
contingency plans**

Issues

- Setting radioactive determinants
- Viable contingency plan
- Organizing public participation guidelines



Strategic Objective IX: Integrated management of hazardous chemicals

Indicators:

- Comprehensive maps and surveys on the spread of chemicals in the environment components
- Sources of producing, transferring and removing locally-made hazardous chemicals identified and documented
- No. of border crossings prepared for monitoring the illegal transfer of hazardous chemicals
- Percentage of hazardous chemicals disposed of in environmentally sound ways

Components/Issues	Programs	Performance Indicators	Projects
<p>Component I: Identify and evaluate hazardous chemicals</p> <p>Issues:</p> <ul style="list-style-type: none"> • Spread of chemicals in the environment • Locally made toxic and hazardous chemicals • Imported toxic and hazardous chemicals 	<p>9.1 Inventory of disposal of chemical residues resulting from various activities</p>	<ul style="list-style-type: none"> • Comprehensive maps and surveys of the spread of chemicals in the environment components 	<p>9.1.1 Treatment of waste released from the phosphate production units in order to protect environment (133)</p> <p>9.1.2. Impact of agricultural pesticides on the Marshlands environment (206)</p> <p>9.1.3. Environmental impacts resulting from the spread of craft industries in industrial and residential areas in Baghdad Governorate (MDF)</p>
<p>Component II: Inventory and dispose of chemical residues resulted from different activities</p> <p>Issues</p> <ul style="list-style-type: none"> • Industrial activity • Hospitals and health centers • Agricultural activity • Military activity • Scientific and research activity • Sound management to dispose of hazardous chemicals 	<p>9.2 IM of chemicals and their waste</p>	<ul style="list-style-type: none"> • Percentage of hazardous chemicals disposed of in environmentally sound ways • Percentage of industrial facilities having an initial unit of wastewater treatment increased • Information on the quantities, quality, and methods of use and disposal of hazardous materials 	<p>9.2.1 Enacting environmental legislation for use of the environmental inspection guide in cooperation with the Legal Department (MDF)</p>

		available	
<p>Component III: Control the circulation of toxic and hazardous chemicals</p> <p>Issues:</p> <ul style="list-style-type: none"> • Manufacturing of toxic and hazardous chemicals locally • Commercially traded toxic and hazardous chemicals • Imported toxic and hazardous chemicals 	9.3 Control of the transfer and circulation of chemicals	<ul style="list-style-type: none"> • Effective monitoring mechanism for chemicals movement developed 	9.3.1 Environmental assessment of mercury pollution in Iraq (203)
<p>Component IV: Transfer of toxic and hazardous chemicals</p> <p>Issues:</p> <ul style="list-style-type: none"> • International transfer of toxic and hazardous chemicals to and across Iraq • Local transfer of toxic and hazardous chemicals within Iraq 		<ul style="list-style-type: none"> • No. of border crossings prepared for monitoring the illegal transfer of hazardous chemicals • Sources of producing, transferring and removing locally-made hazardous chemicals are identified and documented 	

Strategic Objective X: Developed institutional and legal framework of environment sector

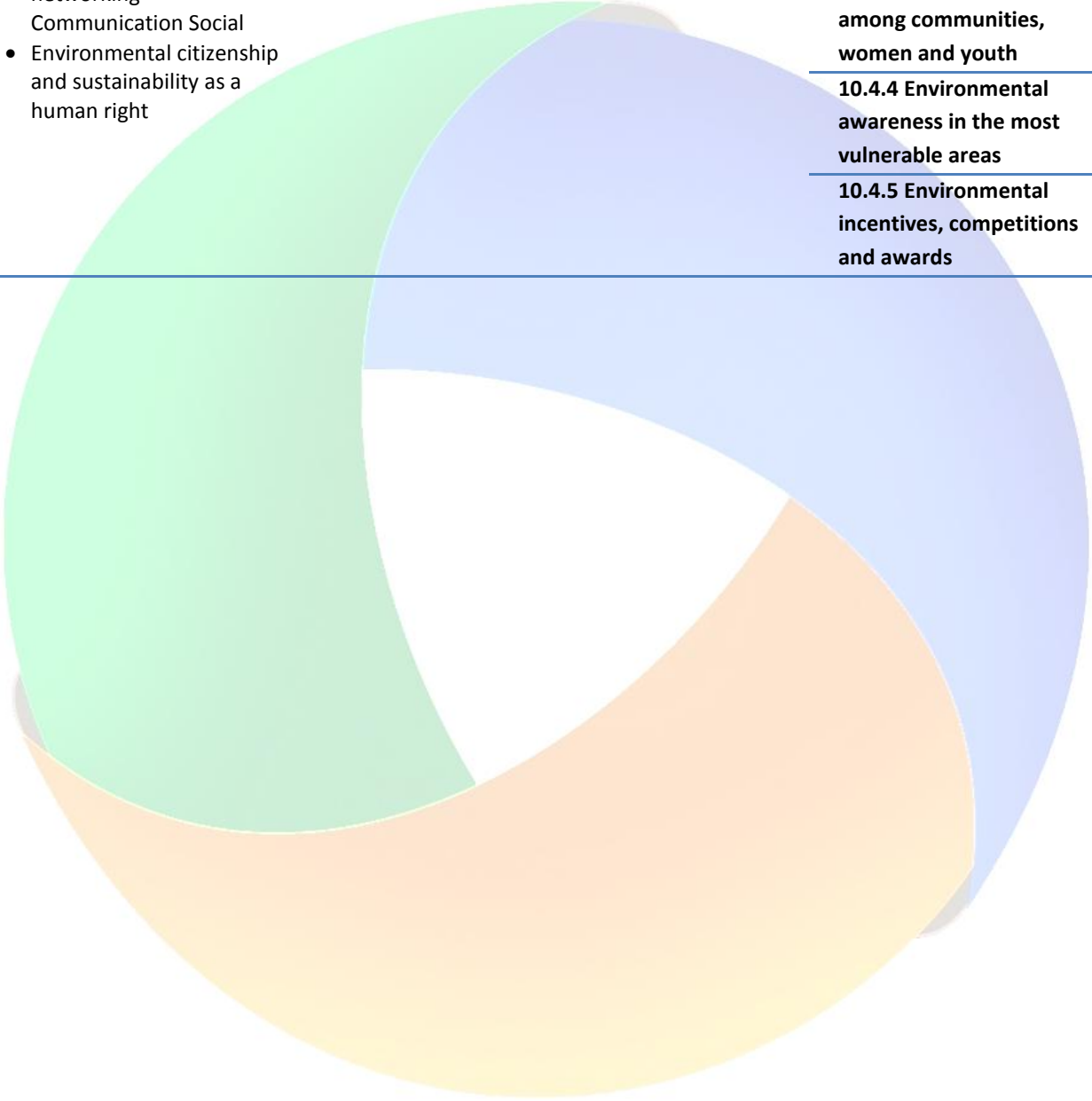
Indicators:

- Number of reviewed, amended, updated and officially enacted legislations
- Number of prepared and approved environmental strategies and plans
- Number of international agreements and conventions acceded to by Iraq
- Number of institutions integrating the environmental dimension in their own policies
- Number of the studies and researches affecting decision making

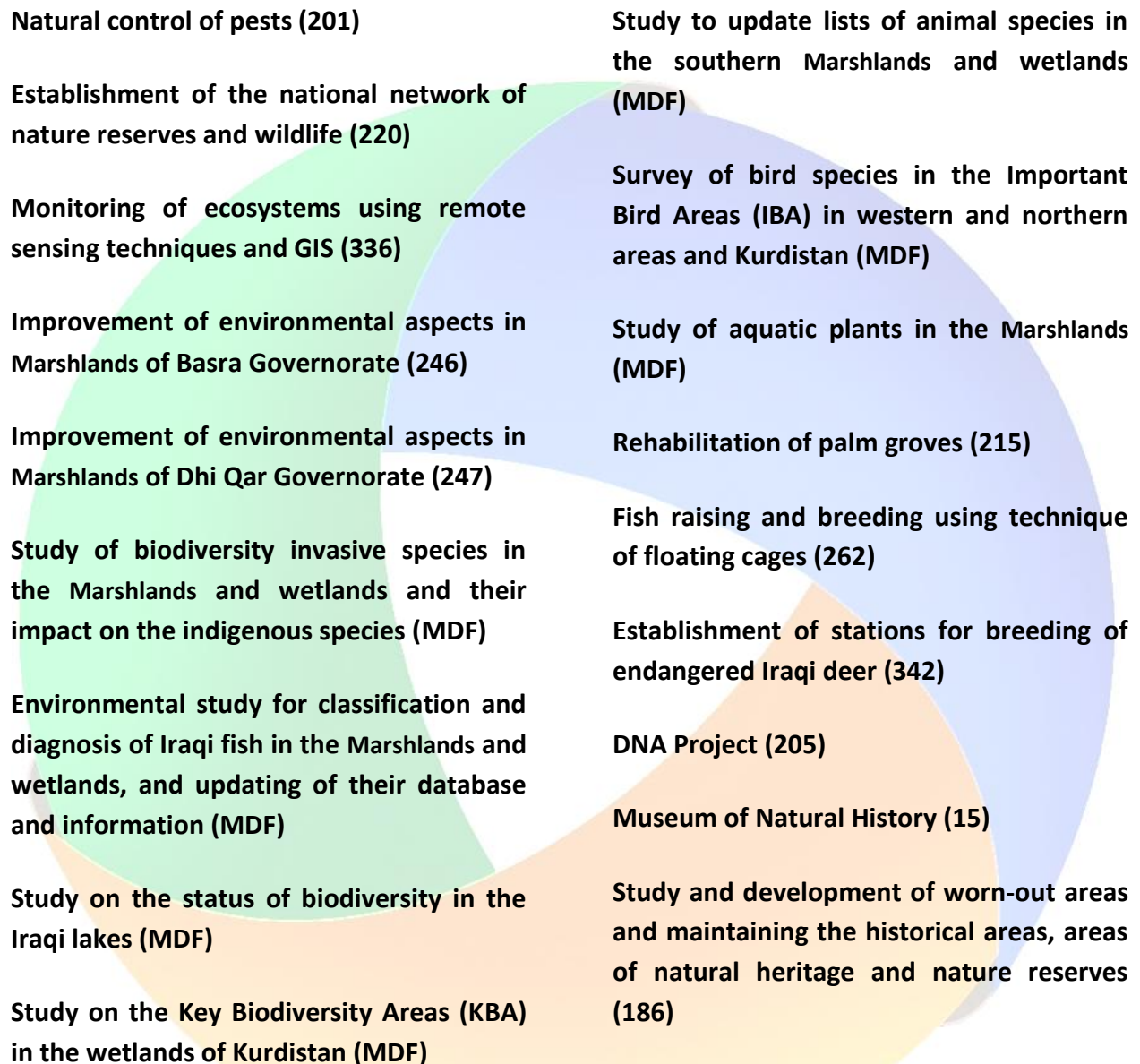
Components/Issues	Programs	Performance Indicators	Projects
Component I: Legislation and policies Issues: <ul style="list-style-type: none"> • Integrating environmental concepts in development activities • Lack and inadequacy of existing legislations and policies • Commitment and enforcement capacity implementation • Regional and international agreements and conventions • Environmental judiciary and police 	10.1 Improvement of legislation and institutional system	<ul style="list-style-type: none"> • Number of reviewed, amended, updated and officially enacted legislations • Number of reviewed and amended strategies • Number of developed and adopted environmental sub-strategies • Number of developed and approved environmental plans • Number of international agreements and conventions acceded to by Iraq 	10.1.1 Modernizing legal framework for the environment
			10.1.2 Enactment of environmental legislation to use the Environmental Inspection Guide in collaboration with the Legal Department
			10.1.3 Collaboration with academic bodies to conduct applied researches
			10.1.4 MoE institutional development
			10.1.5 Institutional support for the state ministries and institutions in respect of environment

<p>Component II: Institutional efficiency and effectiveness</p> <p>Issues:</p> <ul style="list-style-type: none"> • Environment Protection and Improvement Council (EPIC) • Institutional structures • Work requirements and environment • Centralism and decision-making mechanism • Accountability and empowerment • Environmental databases and indicators • M&E activities • Financial and administrative systems 	<p>10.2 Institutional development</p>	<ul style="list-style-type: none"> • MoE new structure and its directorates and staffs' job and professional descriptions issued • Number of institutions benefitting from institutional support (capacity building and establishment of specialized units) • Number of institutions integrating the environmental concepts in their own policies 	<p>10.2.1 Institutional support for CSOs and NGOs</p> <hr/> <p>10.2.2 Support and completion of Iraq's accession to regional and international conventions and agreements</p>
<p>Component III: HR</p> <p>Issues:</p> <ul style="list-style-type: none"> • Human capacities • HR qualification and training plan 	<p>10.3 HR Development</p>	<ul style="list-style-type: none"> • Number of employees and departments benefitting from the development program • Number of new skills in environmental issues management benefitted by MoE HR • Number of schools and universities participating in the program • Number of students, parliamentarians, religious leaders and opinion leaders benefited from the program • Number of communities benefiting from the use of modern education tools 	<p>10.3.1 Assessment of HR needs in the environment sector</p> <hr/> <p>10.3.2 Drafting of an environment HR development plan</p> <hr/> <p>10.3.3 Environment workers efficiency improvement</p>
<p>Component IV: Environmental awareness and education</p> <p>Issues:</p> <ul style="list-style-type: none"> • Activities and institutions 	<p>10.4 Developing environmental awareness and information (including the environmental award project)</p>		<p>10.4.1 Raising of environmental awareness among students in schools, institutes and universities</p> <hr/> <p>10.4.2 Environmental awareness and education</p>

<p>related to environmental awareness</p> <ul style="list-style-type: none"> • Environmental awareness and education programs • Modern techniques of communication and social networking Communication Social • Environmental citizenship and sustainability as a human right 	<p>among parliamentarians, decision makers, religious leaders and opinion leaders</p> <hr/> <p>10.4.3 Environmental awareness and education among communities, women and youth</p> <hr/> <p>10.4.4 Environmental awareness in the most vulnerable areas</p> <hr/> <p>10.4.5 Environmental incentives, competitions and awards</p>
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Annex (5-1): NDP Projects



Natural control of pests (201)	Study to update lists of animal species in the southern Marshlands and wetlands (MDF)
Establishment of the national network of nature reserves and wildlife (220)	Survey of bird species in the Important Bird Areas (IBA) in western and northern areas and Kurdistan (MDF)
Monitoring of ecosystems using remote sensing techniques and GIS (336)	Study of aquatic plants in the Marshlands (MDF)
Improvement of environmental aspects in Marshlands of Basra Governorate (246)	Rehabilitation of palm groves (215)
Improvement of environmental aspects in Marshlands of Dhi Qar Governorate (247)	Fish raising and breeding using technique of floating cages (262)
Study of biodiversity invasive species in the Marshlands and wetlands and their impact on the indigenous species (MDF)	Establishment of stations for breeding of endangered Iraqi deer (342)
Environmental study for classification and diagnosis of Iraqi fish in the Marshlands and wetlands, and updating of their database and information (MDF)	DNA Project (205)
Study on the status of biodiversity in the Iraqi lakes (MDF)	Museum of Natural History (15)
Study on the Key Biodiversity Areas (KBA) in the wetlands of Kurdistan (MDF)	Study and development of worn-out areas and maintaining the historical areas, areas of natural heritage and nature reserves (186)

NDP 2010 – 2014 projects on environment improvement

Agricultural sector projects

No.	Sectoral No.	Project Name	Implementation Period
1	45	Fallujah land reclamation	2010 - 2013
2	56	The Southern Al-Jazeera Irrigating / Nineveh	2010 - 2014
3	61	Delivery of water to Erbil agricultural lands	2010 - 2013
4	62	The Eastern Al-Jazeera Irrigating / Nineveh	2010 - 2014
5	64	Improvement of Zab lands irrigating Project/ Nineveh	2010 - 2014
6	66	Regulation of irrigation in Basra rivers	2010 - 2014
7	73	Removing aquatic weeds from rivers and streams	2010 - 2014
8	86	Reclamation of the remaining land of Saad River Project	2010 - 2012
9	89	Implementing works of Marshes Restoration Project	2010 - 2014
10	91	Hawija land reclamation	2010 - 2014
11	94	Diwaniya land reclamation	2010 - 2014
12	103	Badra – Jassan land restoration	2010 - 2014
14	178	Sand dune stabilization	2010 - 2014
15	201	Natural control of pests	2010 - 2014
16	205	DNA Project	2010 - 2012
17	215	Rehabilitation of palm groves	2010 - 2014
18	220	Nature reserves and wildlife	2010 - 2014
19	221	Development of the natural vegetation	2010 - 2011
20	223	Oases of the Western Region	2010 - 2014
21	262	Fish raising and breeding using technique of floating cages	2010 - 2012

Industrial sector projects

No.	Sectoral No.	Project Name	Implementation Period
31	127	Environmental projects of Middle Euphrates Company	2010 - 2011
34	133	Treatment of waste released from the phosphate production units in order to protect environment (133)	2010 - 2012
35	134	Rehabilitation of treatment units for resins and inks manufacturers	2010 - 2011

Proposed industrial sector projects to be implemented through investment

No.	Sectoral No.	Project Name	Implementation Period

Transport and communications sector projects

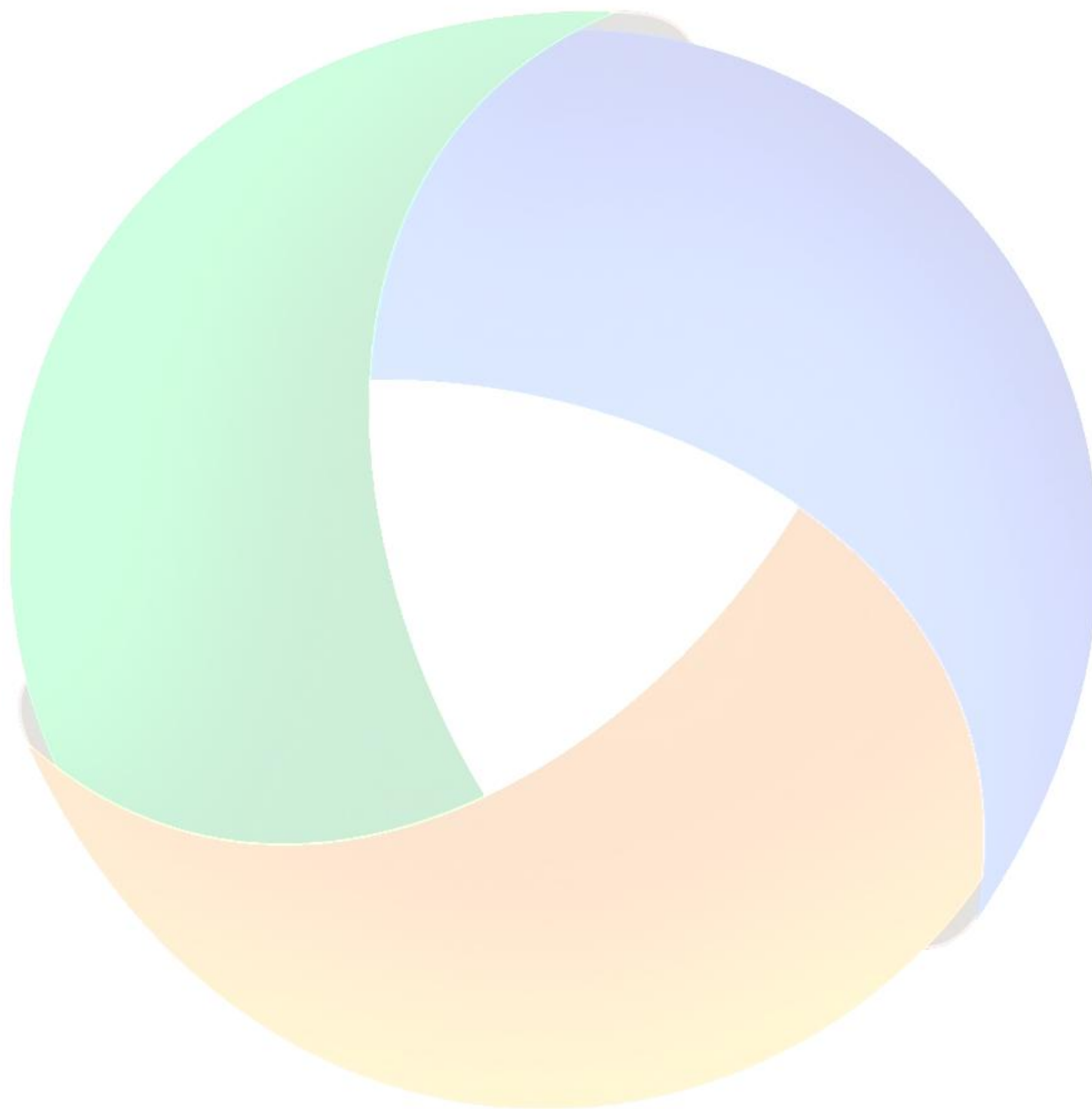
No.	Sectoral No.	Project Name	Implementation Period
2	262	Study and implementation of marine pollution control	2010 - 2011
8	336	Monitoring of ecosystems using remote sensing techniques and GIS	2011 - 2014

Buildings and services sector projects

No.	Sectoral No.	Project Name	Implementation Period
31	173	Development and rehabilitation of parks and green spaces in governorates	2010
32	186	Study and development of worn-out areas and maintaining the historical areas, areas of natural heritage and nature reserves	2011 - 2014
37*	195	Monitoring of desertification and land degradation using remote sensing	2011 - 2013
38*	198	Mapping of desertification and vegetation at the national level	2012 - 2013
40*	202	Early warning of oil pollution in water bodies	2010 - 2014
41*	203	Environmental assessment of mercury pollution in Iraq (203)	2010 - 2011
42*	205	Survey of wetlands (Muthana, Wasit and Najaf)	2012
43*	206	Impact of agricultural pesticides on the Marshlands environment	2011
46*	212	Remote sensing to monitor the sewage discharged into the Tigris and Diyala	2010 - 2012
54	246	Development of environmental aspects in Marshlands of Basra Governorate	2010
55	247	Development of environmental aspects in Marshlands of Dhi Qar Governorate	2010
56	304	Health projects in Marshlands of Basra Governorate	2010
57	305	Health projects in Marshlands of Dhi Qar Governorate	2010
58	307	Health projects in Marshlands of Maysan Governorate	2010
59*	339	A laboratory for research and studies on the means of transport-related air pollution	2010 - 2011
60*	342	Establishment of stations for breeding of endangered Iraqi deer	2011 - 2014

Education sector

No.	Sectoral No.	Project Name	Implementation Period
1	15	Natural History Museum	2010 - 2012

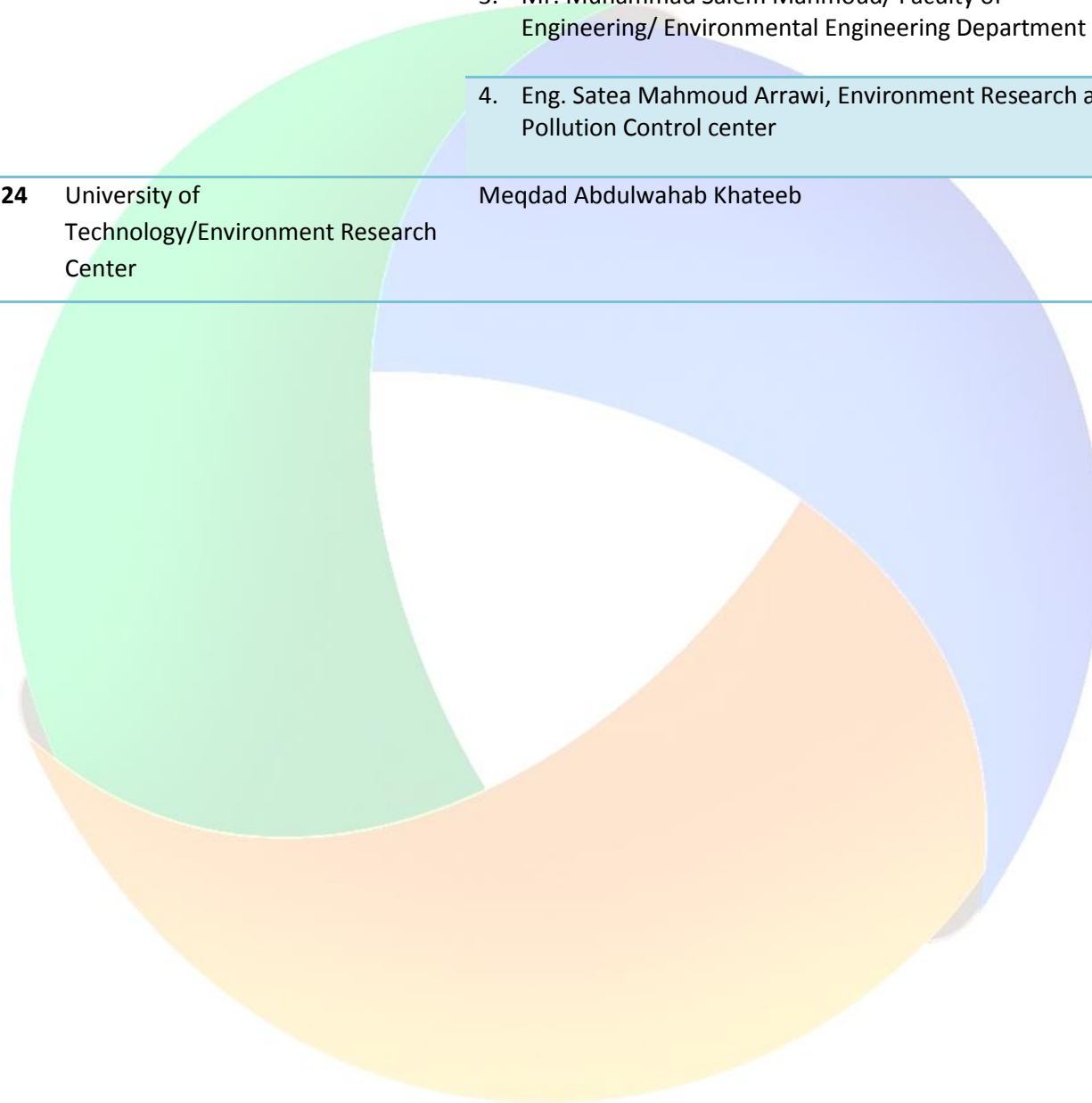


Acknowledgement to the experts who have contributed to enriching the draft Strategy through their observations and feedbacks

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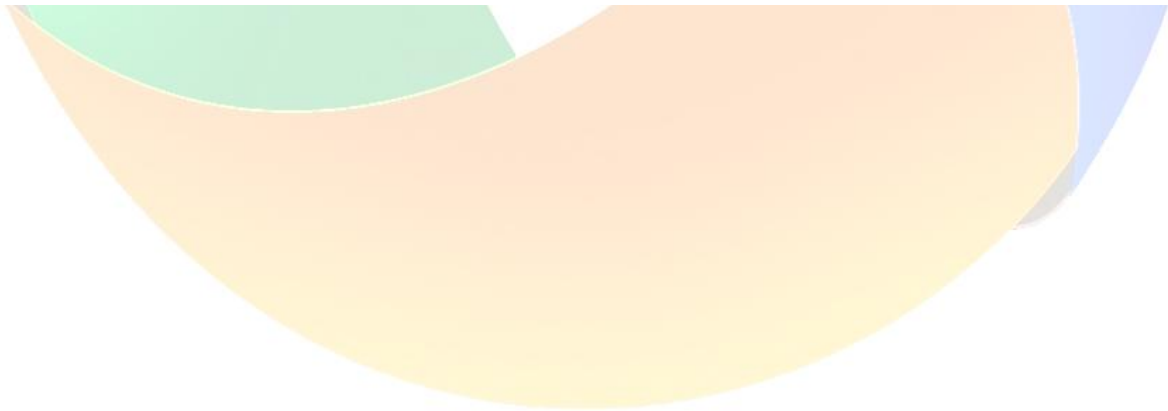


Collected Photos from the meetings and symposiums regarding the strategy preparation:

1. **The first meeting (or inception workshop):** the work on preparation this strategy has been launched during a workshop for the national team was held in Amman during the period 2-3 July 2011.







2. The second meeting in Amman – Jordan /28 to 29 September 2011 of the strategy developers.



3. **First symposium** in Baghdad – Iraq /October 24 ,2011 , for showing the stages of developing the Strategy to all staff of MoE.



4. **The third meeting** in Amman – Jordan /15 to 16 November 2011, of the strategy developers.



5. **The fourth meeting** in Beirut – Lebanon /20 to 23 January 2012, of the strategy developers.





6. **Second symposium** in Baghdad – Iraq /25 April 2012 , it was attended by the strategy developers and employees of the Ministry of Environment of all departments and sections.





7. **Third symposium** in Baghdad – Iraq /20 June 2012 it was attended by the strategy authors and representatives of all ministries.



8. **Fourth symposium** in Baghdad – Iraq, 7 November, 2012, For showing the strategy to the Parliament Council / Health and Environment Committee.

