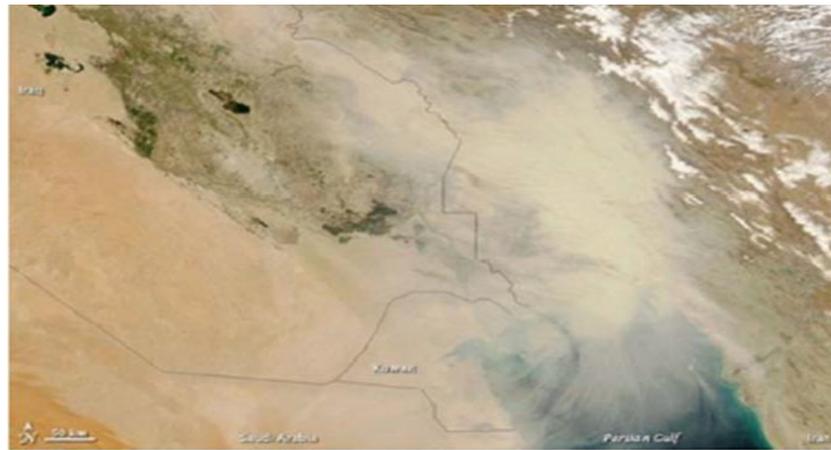




**THE GLOBAL
MECHANISM**
United Nations Convention
to Combat Desertification

**Republic of Iraq
Ministry of Agriculture**

**Land Degradation Neutrality Target Setting
National Report**



Baghdad – 2017



This report summarizes the key outcomes of the national efforts carried out in 2016 and 2017 towards putting in practice the land degradation neutrality concept. The LDN project, which was sponsored by the Republic of Iraq, was carried out with the support of the UNCCD Secretariat and implemented in partnership with ministry of agriculture and the institutional dealing with land degradation.

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The views and content expressed in this document are solely those of the authors of this document and do not necessarily represent the views of the LDN TSP or any of its partners.

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Foreword

Land degradation and food shortages are very important issues at local, regional and global scales. Integrated and appropriate policies and actions must be established to reduce their effects. Optimizing natural resources should be maintained and land productivity increased in order to meet rising food demand. Rehabilitating and making land productive again have become priorities to obtain a more stable, self-sufficient country. In September 2015, the United Nations General Assembly adopted the 2030 Sustainable Development Goals (SDGs), which includes 17 goals and 169 targets. Goal 15 urges countries to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss, and seek a land degradation-neutral world” by 2030.

Iraq joined the land degradation neutrality (LDN) Target Setting Programme (TSP), established by the Global Mechanism of the UNCCD and its international partners, to minimize the effects of land degradation, combat desertification and conserve land resource productivity to meet food demands and to adopt the concept of LDN as part its sustainable development agenda for 2030.

Our Ministry formed a scientific working team to oversee the LDN target setting process, including specialists from different Iraqi ministries, to identify the degraded areas using the three biophysical indicators established by the UNCCD to monitor progress towards SDG target 15.3 (land productivity, land cover, and soil organic carbon), and to establish nationally-relevant complementary indicators on soil salinity and erosion and dust storms. The national LDN report was developed by the working group, with details on the types and locations of degraded lands (with geo-referenced maps) and the LDN baseline and targets, which are as follows:

- 1) Improve productivity and SOC stocks in 80,000 ha of annual crops and plantation lands by 2035 as compared to 2017.
- 2) Increase the current SOC levels by 2035: for shrubs and grasslands; crop land.
- 3) Conversion of bare land to pasture lands in 100,000 ha by 2035 as compared to 2017.
- 4) Reduce salinization rate by improving productivity and SOC stocks in cropland and plantation lands 10,000 ha. by 2035 as compared to 2017.
- 5) Conversion of sand dune land to grasslands in 150,000 ha by 2035 as compared to 2017.

The LDN target setting national report was sent to the secretariat of the UNCCD to support the development of future projects to reduce land degradation and improve the state of ecosystems and the conditions of people affected by desertification in Iraq. I would like to express my thanks and gratitude to all those who contributed to the development and finalisation of this national report, which was completed by our Ministry in cooperation with other ministries and in the spirit of working together in one team for a whole year. I also thank the secretariat of the UNCCD for supporting the establishment of practical workshops on this subject. We hope that this document will contribute to further progress in the agricultural sector to achieve the Sustainable Development Goals by 2030, with minimum degraded lands and stability for all societies in our beloved country.

Engineer Falah Hassan Zidan Al – Lahibi
Minister of Agriculture

1. Introduction

1.1 Interest of the country to commit to LDN

Iraq suffers from severe land deterioration due to the effects of anthropogenic factors, such as unsustainable and marginal agricultural practices and the improper use of natural resources, and natural factors, such as soil salinity, sand dune movement and sand and dust storms.

Soil salinity, sand dune movement and sand and dust storms (SDS) are the most common active phenomena causing land degradation and soil erosion in Iraq. The frequency of SDS in Iraq and neighbouring countries has increased drastically in the last decade and is projected to continue increasing, due to climate change, the decrease in annual rainfall, drought, desertification, mismanagement of land and water resources and conflict (Sissakian et al., 2013). These factors have together caused a decline in the quality and quantity of natural vegetation, the removal of topsoil, and a decline in land productivity and food production in Iraq. Upstream dam construction has also led to decreased water flows, which causes marshes and lakes to dry up and creates sediments that are the source of dust in the region.

Poor irrigation practices and drainage systems, many of which were damaged during the wars, have contributed to rising groundwater tables, and has led to soil salinity-induced land degradation (Qureshi et al., 2013), with central and southern Iraq being the most affected regions. Soil salinity affects the production potential of roughly 70% of the total irrigated area of Iraq, with large areas no longer suitable for agricultural production (FAO, 2012). Ongoing soil salinity poses a major threat to food production and food security in Iraq.

Furthermore, rangelands, which occupy a greater proportion of the total area of Iraq than agricultural land and is a vital source of food and income in the country, have been severely degraded over the last decades due to overexploitation and the effects of recent wars, which resulted in the deterioration of vegetation and grass and fodder for animal feed. High livestock densities also negatively affect vegetation and the soil surface, making the topsoil further exposed to wind erosion and the creation of dust storms. As arable land and vegetation are likely to continue declining due to soil salinity and SDS, as well as other natural and anthropogenic factors, Iraq faces many challenges related to food production and environmental resources management.

Healthy and sustainable land is therefore of major importance for sustainable development in Iraq, as it contributes to food security, biodiversity and climate change mitigation and adaptation. Iraq joined the land degradation neutrality target setting programme (LDN TSP) to mitigate and reduce the effects of soil salinity and erosion, sand dune movement and sand and dust storms, to achieve Target 15 of the Sustainable Development Goals (SDGs) and to become land degradation neutral.

The incorporation of land degradation neutrality (LDN) into SDG Target 15.3 highlights the importance of land for the environment and conservation. LDN is strongly associated with the achievement of several SDGs, as it aims to integrate the management of land, water, biodiversity, and other environmental resources to meet human needs while sustaining ecosystem services and livelihoods. LDN therefore contributes to ending hunger, improving food and nutrition security and promoting sustainable agriculture.

With the support of the Global Mechanism of the UNCCD and under the guidance of the UNCCD National Focal Point, Iraq's LDN national working group established relevant LDN targets and measures and identified financing and leverage opportunities for LDN implementation and achievement. The translation of global goals into national targets such as LDN will help effectively and more efficiently

combat the interconnected challenges of desertification, land degradation and drought and will provide greater impetus towards more integrated responses to climate change and other major environmental crises in Iraq.

2. Leveraging LDN

2.1 National LDN leverage plan for Iraq

The main aim of the national LDN target setting process in Iraq is to help develop strategies to support land productivity and increase food production in general and sustainable land management in particular. Under the leadership of the National Focal Point, experts and information resources from Iraq's LDN target setting process will help leverage and tap into increased inter-ministerial collaboration and financing opportunities. The LDN leverage plan (Table 1) developed during the target setting process provides guidance on how this will be achieved.

Table 1: Framework for national LDN leverage plan

Leverage Opportunities	
Why does LDN matter?	
1- Creating multiple benefits	<ul style="list-style-type: none"> • Increase of soil productivity especially agricultural lands. • Recovery of land cover and biodiversity. • Improve rangelands. • Reduce local sand and dust. • Sustainable use of soil, ground water, rainwater, vegetation. • Support the food security and enhancement • Improve livelihoods • Solve the problem of salinity in the soil. • Drought mitigation and climate change adaptation. • Increase above- and below-ground carbon stocks.
2- Fostering policy coherence	LDN will be considered in the policy of the main sectors including agriculture, environment, land use and all related institutional processes.
3- Advancing climate action	Implementation of 25-year program for drought mitigation climate change adaptation and mitigation.
4- Tapping financing opportunities	Financial mobilization and support by the government and international institutions including GEF, GCF, Kuwait Fund and other sources.
What to leverage?	
5- National development programs priorities objectives	High priority for LDN program and national action programme (NAP) parallel to sustainable land use plan, afforestation, land reclamation, actions on soil salinity and sand and dust storms (SDS) and improvement of rangelands in the desert.
6- Country commitment and engagements	<ul style="list-style-type: none"> • Incorporate LDN into SDS actions and NAP • Political, technical and financial support of the government.
Who to engage to create leverage?	
7- Government	Ministry of agriculture; Ministry of health and environment; Ministry of Industry and Minerals; Ministry of Water Resources; Ministry of planning; municipalities.
8- Academia	University of Baghdad; University of Anbar; University of Muthana.
9- International development partners	UNCCD/GM; UNEP; FAO; UNFCCC, UNDP.
10- National non-government stakeholders	Agriculture organizations such as Al-Aqsan foundation for agriculture and environment; Agriculture engineering associations; communities.

2.2 LDN leverage opportunities in Iraq

In addition to the leverage plan, Iraq has several ongoing initiatives and activities that can benefit from and create synergies with the national LDN strategy. Many of these initiatives are being implemented with international and national partners, including FAO, ICARDA, the Arab Center for the Studies of Dry Areas and Arid Lands / Arab / League (ACSAD) and public and private sector institutions and focus on the challenges mentioned above, notably SDS and sand dune movement, improving rangeland and agricultural production, and improving irrigation systems (to reduce soil salinity). The most prominent initiatives where leverage opportunities could be identified include:

- **Dust storms and sand dune movement**

Through the Department of Forestry and Combating Desertification, the Ministry of Agriculture is continuing its work on the treatment of creeping *Atrmella* dunes, which are distributed in central and southern Iraq. So far, more than 300,000 ha of land has been transformed from sand land to agricultural lands.

- **Water resources management**

The Ministry of Water Resources is responsible for water resources management, including irrigation and drainage projects to eliminate soil salinity and reclaim agricultural land; construction of dams and reservoirs to store water for agricultural production during the dry seasons; and water provision in the desert areas for public and agricultural use. Also, the Ministry of Agriculture is providing modern irrigation on approximately 750,000 ha of agricultural land, including desert lands, with the aim of increasing agricultural productivity.

- **Management of rangelands**

To restore natural vegetation in rangelands, the Ministry of Agriculture is working on the establishment of desert oases and water wells, pastures in grazing areas, and the use of drought-tolerant plants using modern irrigation methods to avoid overgrazing. Several projects on water harvesting have also been established to improve water management (especially during times of droughts and low rainfall) and reduce run-off.

- **Forest management**

The Ministry of Agriculture's current initiatives focus on improved forest management and forest production through the establishment of tree nurseries and the distribution of tree seedlings. Increased tree coverage serves to create windbreaks and green belts to prevent wind erosion.

In recent years, the environmental role of the municipalities has increased, and many have taken the initiative to protect natural sites within their jurisdiction to avoid further deterioration of their environment. Municipal departments are directly responsible for improving the environment in areas under their duties through the application of the required laws, including the reestablishment of green belts around the cities. Activities carried out by municipalities include reforestation and afforestation involving participatory approaches that emphasize the role of communities, in partnership with ministries, non-governmental organizations and private donors.

2.3 LDN national working group – issues discussed and agreed upon

The LDN national working group was established by the Ministry of Agriculture to work on the LDN target setting process in Iraq. Members of the working group included representatives from the ministries and institutions dealing directly and indirectly with land degradation. During the target setting process, the following issues were discussed and agreed upon by the group:

- Land degradation trends and drivers and current land degradation status in Iraq;
- Selection of hot spots;
- Global and national LDN indicators;
- Formulation of LDN targets and measures;
- Roles and responsibilities for the achievement of the LDN targets in Iraq.

A list of members of the LDN working group, as well as details of the meetings and issues discussed and agreed upon, are provided in the Annexes.

3. Assessing LDN

3.1 LDN baseline

The global indicators for LDN monitoring (land use/land cover change, land productivity dynamics and soil organic carbon (SOC)) and national indicators on soil salinity, sand dunes and dust storms are used to assess and monitor land degradation in Iraq. Global default data provided by UNCCD through the LDN Target Setting Programme were used to determine the baseline values and changes in the three global indicators between 2000 and 2010 (as shown in Tables 2 and 3).

The following main observations from the analysis of these data are:

- Forests and shrubs, grasslands and sparsely vegetated lands showed some variations (declines) in land use/land cover change.
- Net land productivity dynamics shows that most land cover categories are in stable but stressed or stable not stressed conditions. Roughly 6% is declining. However, no data was available for a majority of the land cover categories (54%).
- SOC values ranged from a high of 61.8 ton/ha in forests to a low of 5.7 ton/ha in bare land.
- The data presented in Table 3 shows a decrease in the amount of SOC of 405 tons between 2000 and 2010 due to land cover changes, i.e., conversion of forest land to other land uses.

Following analysis of the data, default data provided by the UNCCD was adopted to set the baseline for Iraq.

Table 2: 2000-2010 baseline data for the three LDN indicators. Source: UNCCD Default Data.

Land Use/Cover Category	Area (2000)	Area (2010)	Net area change (2000-2010)	Net land productivity dynamics (NetLPD)** (sq km)						Soil organic carbon (2000)**
	sq km*	sq km	sq km	Declining	Early signs of decline	Stable but stressed	Stable not stressed	Increasing	No Data***	ton/ha
Forest	544	538	-6	5	6	10	203	45	269	61.8
Shrubs, grasslands and sparsely vegetated areas	94561	94567	6	9479	8472	32929	37198	1266	5223	25.3
Croplands	39395	39396	0	1499	1581	4698	29764	1549	305	47.5
Wetlands*****	128	128	0	8	4	12	50	11	44	25.7
Artificial areas	3580	3580	0	362	244	1068	563	10	1332	22.7
Bare land and other areas	293636	293636	0	15805	12865	23485	15112	142	226228	5.7
SOC average (ton/ha)										14.0
Percent of total land area				6%	5%	14%	19%	1%	54%	
Total (sq km)	431845	431845	0	27158	23170	62202	82890	3023	233401	

Table 3: 2000-2010 baseline data for SOC stocks by land use/cover category. Source: UNCCD default Data

Changing Land Use/Cover Category	Net area change (2000-2010)	Soil organic carbon 0 - 30 cm (2000-2010)				
	sq km	2000 ton/ha	2010 ton/ha	2000 total (ton)	2010 total (ton)****	2000-2010 loss (ton)
Forest to Cropland	0.4	63.7	52.5	2295	1890	-405
Forest to Shrubs, grasslands and sparsely vegetated areas	6	59.9	59.9	35568	35568	0
Total	6			37863	37458	-405
Percent loss total SOC stock (country)						-0.0001%

3.2 Additional national indicators used in LDN baseline/monitoring for Iraq

Soil Salinity

Salinization is a common problem in the dryland areas of Iraq and is one of the most serious degradation processes in central and southern Iraq. It has greatly affected land productivity and has caused cropland abandonment in these regions (Wu et al. 2014), due to inappropriate land management practices (e.g., over-irrigation and poor drainage) and natural factors (e.g., flooding, drought, and impermeability of the underlying soil and rock formations). This has led to a decline in agricultural production yields in these regions. While soil salinization is a serious issue, it is a dynamic phenomenon and can be changed over time with good soil, water and land management practices; Iraq has many ongoing national and local initiatives to reduce the presence and effects of soil salinity, which will be vital to monitor to better understand land degradation trends and status in the country.

Sand dune movement and dust storms

Sand dune movements and dust storms are extremely common active phenomena in Iraq due to the arid and semi-arid conditions, which cause a movement of surface soil material from one place to another. Iraq, like other countries in the MENA region, is affected by transboundary sand and dust storms due to similar dry climatic conditions, high temperatures, drought and large areas of desertification in the countries in this region (see photos in Annexes). Some studies indicate that around 1 million hectares of active sand dunes and sand sheets have been identified in central and southern Iraq and there is also the presence of newly formed sand dunes in the country.

3.3 Land degradation hot spots

Hot spots have been selected by the LDN national working group to measure and monitor Iraq's land degradation indicators (salinity level, land cover, SOC, land productivity, sand dune movement and dust storm activity). Some of the hot spot areas are also involved in ongoing project activities linked to improving land conditions and agricultural productivity.

- Dygila project, Wasit Governorate, central Iraq. The project area is located between the Tigris River (north) and the Gharraf River (southwest), and is around 99,000 ha, including irrigated and non-irrigated land, which can be further divided into three zones: reclaimed, semi-reclaimed and non-reclaimed. Most of the soil is salinized, and locally, strongly salinized.
- West Garraf, Thigaar and Mesaan Governorates, southern Iraq. The total area is about 70,000 ha with average to highly salty soils.
- Al Muthana irrigation project zone, Al Muthanna Governorate, southern Iraq. Salinity in this project zone (of around 10,000 ha) has a direct effect on crop productivity.
- Kateaa, Al Muthanna Governorate, southern Iraq. The hot spot area is around 50,000 ha and is highly affected by sand dune movements, which greatly affect agricultural and human activities.
- Alseneaa (Bagi), Salahalden Governorate, northern Iraq. The area (around 40,000 ha) is highly affected by sand sheets, sand dunes and dust storms to the extent that the soils of this area cannot be used for crop production.
- Besia region, Al muthana Governorate, southern Iraq. An area of 100,000 ha and has extensive rangelands which are highly degraded, with limited water and feed provision for livestock production. The area is also considered a source of dust storms.

The first three hot spots (Dygila, West Garraf and Al Muthana) were selected to monitor new and ongoing projects that aim to:

- Identify and monitor land degradation indicators for SOC, salinity, land cover;
- Improve soil properties which have a negative effect on crop production
- Maintain or increase soil organic matter;
- Maintain or improve the status of land cover;
- Maintain or minimize salinity levels;
- Increase productivity of common grain crops;

Alseneaa and Kateaa areas will be used to achieve the following aims related to sand and dust:

- To determine and monitor the status of sand dunes and their effect on land productivity;
- To monitor and determine the status of sand storms;
- To minimize the effects of sand and dust storms on the ecological systems.

Al Besia will be used to achieve the following aims related to rangelands:

- Improve environmental and economic situation for sheep breeders;
- Reduce wind erosion by improving natural vegetation.

A summary of the work plan of potential activities to quantify Iraq's LDN indicators was identified by the LDN national working group and is provided in the Annexes.

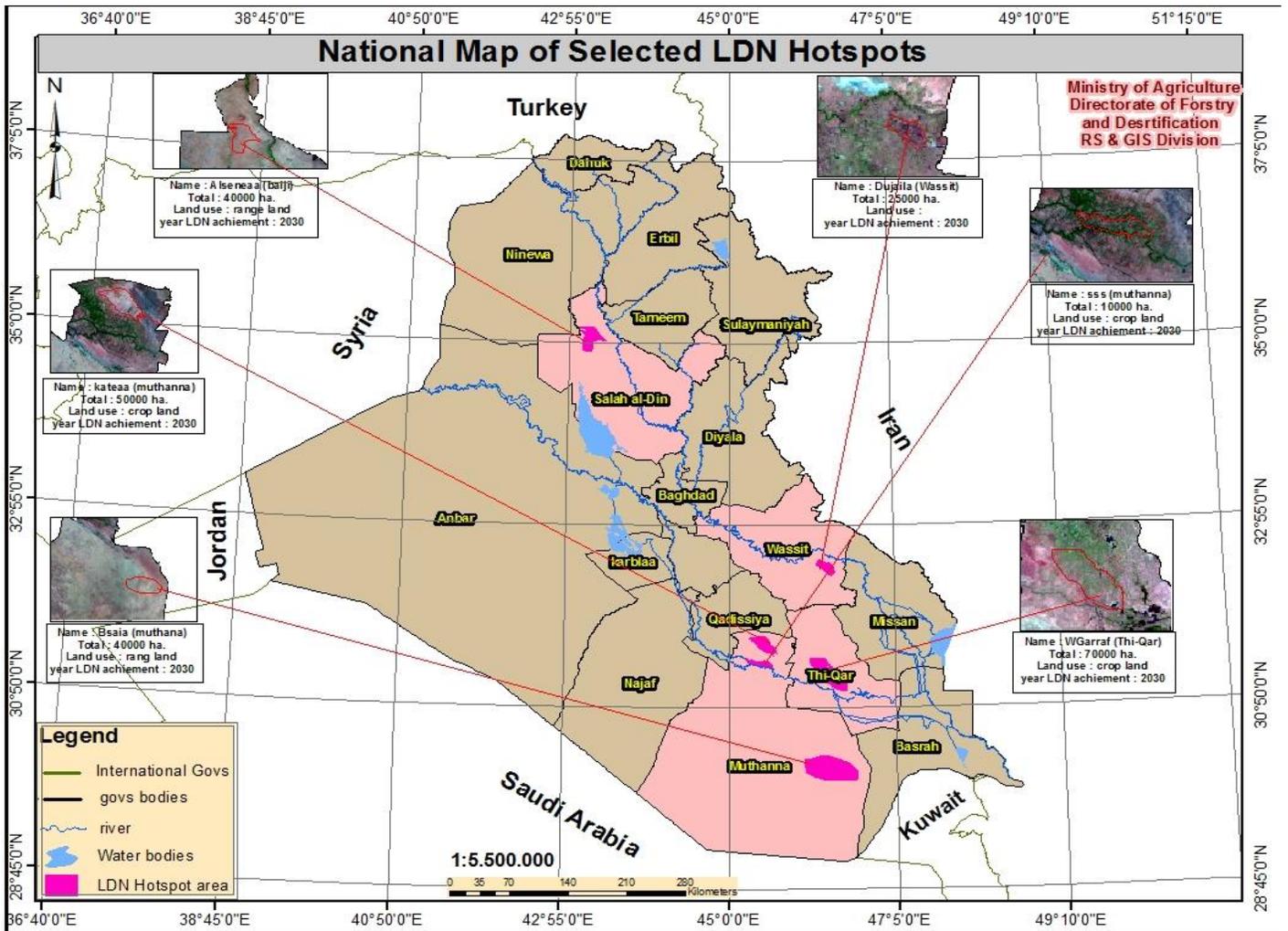


Figure 1: location of the hot spots in Iraq from Ministry of Agriculture, Directorate of Forestry and Desertification

4. Legal and institutional framework analysis

4.1 Overview of the legal and institutional environment

Iraq has a long history in regulating land and water resources use, with several laws on land tenure, land distribution and agrarian reform. There are laws and acts regulating land use, such as Law No. 35 of 1983 regulating the rent of agricultural partnerships and individuals; Law No. 112 of 1983 on the maintenance of irrigation and drainage networks and the protection of reclaimed land; the Coastal Exploitation Act No. 59 of 1987, and the Agricultural Land Settlement Act of 1987.

Iraq also has several laws on the protection of natural resources, and the conservation of habitats and biological diversity. This includes several old acts that led to the establishment of ministries dealing with forestry and natural resources management (including laws on forest protection and afforestation). The Natural Pasture and Combating Desertification Law includes the identification of areas required for natural pastures and the organization of grazing, the protection of natural vegetation and conservation of water resources in pasture areas and the provision of services for natural pastures.

Moreover, a number of environmental protection and improvement laws aim to protect natural resources through the establishment of nature reserves in Iraq. Several laws and executive decrees have been issued to preserve biological diversity and livestock, including a law to protect fish and aquatic organisms, birds and mammals from extinction, laws on hunting and smuggling prevention and the protection of wild animals.

4.2 SWOT Analysis

During the LDN target setting process, Iraq's LDN national working group conducted a Strengths, Weaknesses, Opportunities and Threat (SWOT) analysis of the legal and institutional environment, which was prepared and discussed in open sessions with the group (Table 4).

Table 4: Iraq's SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • The existence of national academic and other institutions across the country; • Government support to the agricultural sector as one of the priority sectors to achieve food security and sustainable development; • The existence of agricultural land that can be farmed and included into agricultural investment, which leads to increased agricultural production; • Existence of structures and infrastructure such as universities, extension centers, training centers and research centers; • The climate is suitable for cultivation of all crops; • Establishment of national action plan (NAP); 	<ul style="list-style-type: none"> • Low unit area productivity; • Reliance on traditional methods of agriculture; • Dependence on imported agricultural products; • Low coordination between government institutions; • Poor agricultural marketing policies that control quality and production standards; • Low water use efficiency and water mismanagement; • Use of traditional irrigation methods.

<ul style="list-style-type: none"> • Establishment of national programs for combating desertification and sand and dust storms; • Support plan to protect local production through the provision of financial and technical supports to farmers. 	
<p>Opportunities</p> <ul style="list-style-type: none"> • The possibility of horizontal and vertical expansion of crop cultivation to increase production and productivity; • Variety of climate zones, leading to production at different times of the year; • The possibility of expanding the use of modern agricultural irrigation methods to irrigate the land and raise the efficiency of irrigation; • The possibility of close linkages between the agricultural and industrial sectors; • Possibility of high planning of securing the requirements of agricultural production. 	<p>Threats</p> <ul style="list-style-type: none"> • Deteriorating security situation; • Low water revenues from neighboring countries; • Continuous deterioration in water quality and agriculture land; • Weak urban planning and fragmentation of agricultural sector; • High prices of agricultural production inputs (seeds, fertilizers, fighting materials and fuel.); • Uncontrolled imports of agricultural products; • Limited profit margins in agricultural sector; • Climate fluctuations, repeated years of drought, low rainfall high temperature which leads to land degradation; • Lack of financing in the state budget due to economic crisis.

5. LDN targets and measures

5.1 Iraq's LDN targets

The following LDN targets were discussed by the national working group, taking into consideration the extent of land degradation in Iraq and their related causes, such as sand and dust storms and sand dune movements;

- 1) Improve productivity and SOC stocks in 80,000 ha of annual crops and plantation lands by 2035 as compared to 2017.
- 2) Increase the current SOC levels by 2035: for shrubs and grasslands; crop land
- 3) Conversion of bare land to pasture lands in 100,000 ha by 2035 as compared to 2017.
- 4) Reduce salinization rate by improving productivity and SOC stocks in cropland and plantation lands 10,000 ha. by 2035 as compared to 2017.
- 5) Conversion of sand dune land to grasslands in 150,000 ha by 2035 as compared to 2017.

5.2 Key policy and technical measures to achieve LDN in Iraq

Negative Trend	Drivers		Measures	Area ha.	Cost (million USD, estimate)	Timeline
	Direct	Indirect				
Declining productivity or early stages of declining productivity of crop lands	- Inadequate land and fertility management practices, especially in plantation lands -Private agriculture ventures	- Population growth - Lack of law enforcement - Poor coordination among institutions responsible for land management - Regularization of encroachment	- Prepare and implement National Physical Plan and National Land Use Plan -Encourage institutions to coordinate land management activities.	80,000 ha	35	2035
Degradation of crop and plantation lands due to salinization	- Cultivation without adequate soil conservation measures - Poor drainage and irrigation systems - Defective water irrigation systems	-Low productivity and poverty, leading to poor investment on land - Low investment on soil and water conservation due to unavailability of land rights - Poor biophysical soil conditions	- Apply soil and water conservation measures - Complete the amendment to the Soil Conservation Act as early as possible - Provide incentives for sound land and fertility management practices	10,000 ha.	100	2035
Land degradation due to sand dune movement	- Dry climatic conditions - Poor vegetation cover	- Poor soil physical properties	- Apply soil and water conservation measures - Apply suitable sand dunes fixation practices	150,000 ha.	60	2035

Degradation of crop and plantation lands due to soil erosion	- Cultivation under dry climatic conditions without adequate soil conservation measures - Inadequate land and fertility management practices, especially in plantation lands	-Low productivity and poverty, leading to poor investment on land - Low investment on soil and water conservation due to unavailability of land rights	- Apply soil and water conservation measures - Complete the amendment to the Soil Conservation Act as early as possible - Provide incentives for sound land and fertility management practices - Resolve land ownership issues - Agroforestry	250,000 ha.	75	2035
Severe deterioration of natural vegetation	- Dry climate - Overgrazing - Cutting of shrubs	- Sources of dust storms - Poor pasture	- Rehabilitation of natural vegetation - Water harvesting - Stop overgrazing - Provide water for sheep breeders	100,000 ha.	50	2035
					Total estimate: 320 million USD	

5.3 Roles and Responsibilities in the implementation of the national LDN strategy

The Ministry of Agriculture (MoA) is the Ministry leading the implementation of the national LDN strategy in Iraq. The MoA will work in close collaboration with other ministries dealing directly or indirectly with land-related issues, including:

- Ministry of Agriculture;
- Ministry of Water Resources;
- Ministry of Industry and Minerals;
- Ministry of Health, Environment and local administrations;
- Ministries dealing with land use, management and planning;
- Related educational and research institutions and ministries, e.g., Ministry of Higher Education.

LDN activities will be implemented country-wide; this would require the engagement and support of other stakeholders including Iraqi universities, civil society organizations, academic and research institutes, etc.

6. Conclusion

Iraq is severely affected by land degradation caused by sand and dust storms, sand dune movements and soil salinization. Conflicts, poor land and water management practices and climate change have further aggravated this, and the direct consequence has been reduced agricultural and rangeland and food production, which directly affects national food security and the socio-economic wellbeing of the country's citizens. Iraq has been working with the support of the international community to resolve the problem of desertification, land degradation and drought, and appreciates the role of the GM and the secretariat of the UNCCD in launching the LDN Target Setting Programme to restore land to a healthy state and support food security.

The overall achievements and lessons learned by the working group during the LDN target setting process in Iraq are as follows:

- The main goals of LDN in Iraq are to minimize the effects the global and local drivers of land degradation and to improve land productivity and increase food production.
- Salinity, SDS and sand dune movements are recognized as very serious factors affecting land in Iraq, and they should be used with the global LDN indicators to monitor land degradation.
- Six hot spots were selected by the working group to monitor the selected land degradation indicators in Iraq.

7. Annexes

List of LDN working group members

Name of organisation	Name of representative	Sector
Ministry of Agriculture	Dr.Mahdia Al-Kaisey	Government
Ministry of Health and Environment	Dr. Jassim Al- Falahy	Government
Ministry of Water Resources, Land Reclamation Directorate	Bushra Ganeem	Government
Ministry of Water Resources	Ayad Alanbary	Government
Ministry of Agriculture, Agricultural Research Directorate	Dr Ali Hasan Faraj	Government
Ministry of Agriculture, National program for wheat development in Iraq	Dr. Abdelkareem Hamad Hassan	Government
Ministry of Industry and Minerals, Iraqi Geological Survey	Ahmed T Shihab	Government
Ministry of Health & Environment Department	Yousif Muayad Yousif	Government
University of Alanbar, College of Science	Pro.Dr. Abed Salih Fayyadh	Academia
University of Alanbar, Center of Desert Studies, Desertification Dept.	Prof. Dr. Saifuldeen Abdlrzaq Salim	Academia
Baghdad University, College of Agriculture	Prof. Dr Ahmed S. Muhaimed	Academia
Ministry of Agriculture, National Focal Point	Rawia Al- Aazawy	Government
Ministry of Agriculture	Hanan Ghalib Mohammed	Government
Ministry of Agriculture	Waleed M. Al-shafie	Government
Ministry of Agriculture, Meteorological Centre	Shawkat Saib	Government
Ministry of Agriculture	Dr.Iman Sahib Salman	Government
Ministry of Agriculture, National program for wheat development in Iraq	Sana Abd-Aljabbar Yousif	Government
Ministry of Health & Environment Department	Anees Hatam Hassan	Government
Ministry of Water Resources	Alaa Turki	Government
Ministry of Agriculture	Dr.Ahmed Hussein Taly	Government
Ministry of Planning	Ahmed Tarak Shalal	Government

LDN national working group meetings

Date	Objectives
August 2016	Selection of LDN national working group members in consultation with the deputy minister of Agriculture.

January 2017	<ul style="list-style-type: none"> • First brainstorming meeting with the LDN national working group and the deputy minister of Agriculture • Inception workshop and establishment of the LDN national working group
February 2017	SWOT Analysis
June 2017	Identification of critical processes
July, 2017	Setting LDN targets
July, 2017	Circulation of the draft documents for feedback and comments from the stakeholders.
August, 2017	LDN targets validation workshop

Photos of sand and dust storms



Figure 2: a dust storm moving across Egypt, Saudi Arabia and Iraq (top right). Source: Sissakian et al., (2013).

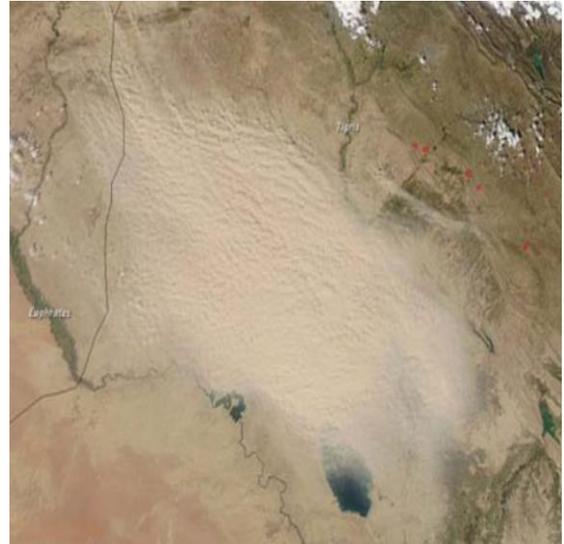


Figure 3: Aerial view of a dust storm which started in the northwestern borders of Iraq. Source: Sissakian et al., (2013).

Summary of the national LDN work plan to quantify Iraq's LDN indicators

i. Quantifying and Monitoring the Spatial Distribution of SOC

Activity 1: Documentation and collection of existing data and maps on SOC

Specific objectives	Collecting data from previous work on the content and the spatial distribution of SOC in the soils of the project areas
Methodology	1. Documentation and collection of data on SOC and other soil properties 2. Digitizing existing non-digital maps
Expected output	Documents and digital maps of SOC

Activity 2: Field sampling and mapping

Specific objectives	To obtain real-time data on SOC, chemical composition and spectral features in the project areas for local scale mapping and serving as ground-truth data for calibrating high resolution remote sensing signatures.
Methodology	1. Sampling design according to the strategy - to know where to sample 2. Field sampling to measure SOC, and other soil properties 3. Laboratory chemical analysis of the soil samples 4. These steps should be repeated annually during the project period
Expected output	Spectral features in the project areas. Local scale SOC map (GIS layers)
Training	Soil sampling and mapping

Activity 3: Build up remote sensing models to develop Iraqi SOC map

Specific objectives	To develop Iraqi SOC map
Methodology	Linking remote sensing signatures (reflectance, all kinds of indices and coefficients) with field measured salinity and spectral features
Expected output	Map showing spatial distribution of SOC in Iraq
Training	Training on RS modelling

ii. Quantifying and monitoring the spatial distribution of salinity levels

Activity 1: Documentation and collection of existing data and maps on soil salinity

Specific objectives	To understand salinization processes in the project areas based on the results of recent work on salinity mapping and research documents on salinity in the study areas which can be used as base lines
Methodology	1. Documentation and collection Data about salinity and other soil properties 2. Digitizing existing non-digital maps
Expected output	Documents and digital maps in GIS layers (salinity, soil types, irrigation channel and so on)
Training needs	Training in GIS & RS

Activity: 2: Field sampling and mapping of salinity

Specific objectives	To obtain real-time data on salinity, chemical composition and spectral features in the project areas for local scale mapping and serving as ground-truth data for calibrating high resolution remote sensing signatures.
Methodology	1. Sampling design according to the strategy - to know where to sample 2. Field sampling to measure soil electric conductivity, and other soil properties 3. Laboratory chemical analysis of the soil samples (about 60). 4. This step should be repeated annually during the project period

Expected output	Spectral features in the project areas. Local scale salinity map (GIS layers)
Training	Modelling on salinity prediction

Activity 3: Remote sensing model development to predict salinity levels in each area

Specific objectives	To develop remote sensing models to monitor and assess salinization
Methodology	Linking remote sensing signatures (reflectance, all kinds of indices and coefficients) with field measured salinity and spectral features
Expected output	Remote sensing models mostly sensitive to salinity and creating spatial distribution of salinity in each area

Activity 4: Using salt affected soil for crops production and increasing land productivity

Specific objectives	To reduce salt accumulation and improve soil conditions
Methodology	Plantation of salt affected soils with some wheat genotype tolerant to salinity with different type of forage crops
Expected output	Improve soil conditions and increase land productivity and biomass

iii. Land use/cover classification and mapping

Activity 1: producing land use and land cover map

Specific objectives	To produce land use and land cover map to serve the project
Methodology	Supervised classification approach will be conducted to produce land use/cover map for the selected areas. This should be repeated annually during the project period
Expected output	Land use and land cover map of the selected areas

iv. Quantify, Monitoring and mapping of land productivity for the selected areas

Activity 1: Documentation and collection of existing data and maps on land productivity

Specific objectives	To produce land productivity map using RS & GIS
Methodology	Use some soil properties, land features, climatic condition data and RS
Expected output	Maps showing the spatial distribution for land productivity classes with in each hot spot
Training	Estimation and mapping of land productivity

Activity 2: Field sampling and mapping of land productivity

Specific objectives	To collect and analysis field soil information data, metrological and RS data
Methodology	Select systematic some represented sites within each hotspot to collect soil samples representing all land variation.
Expected output	Get a more suitable and representing soil data for each hot spot

v. Quantifying, monitoring and mapping sand dune movement in selected areas

Activity 1: Documentation and collection of existing data and maps on sand dunes movement

Specific objectives	Collecting data on sand sheets and sand dunes from previous works in order to select some hot spots
Methodology	Using RS data and ground truth data about
Expected output	Spatial distribution of sand areas

Activity 2: Monitoring and measuring sand dunes movement

Specific objectives	To measure the annual rate of sand dunes movement and its direction
Methodology	Using RS and GID to monitor and measure the annual rate of sand dunes
Expected output	Maps showing the movement and the direction of sand dunes within each hot spot
Training	Monitoring on sand dunes movement

Activity 3: Sand dune fixation

Specific objectives	Fixation of sand dune movement and reduce the chances of dust storms
Methodology	Sand dune fixation using both mechanical and biological methods
Expected output	Protect the highway road from sand movement Protect main drainage canal from sand movement

vi. Quantifying, monitoring and mapping dust storms in selected areas

Activity 1: Documentation and collection of existing data and maps on dust Storms

Specific objectives	To collect of existing data about the main sources for dust storms in Iraq
Methodology	Using the collected data and RS to produce maps showing the location of the main dust storm sources
Expected output	Producing maps showing the spatial distribution of sources of dust storms in Iraq

vii. Rehabilitation of natural vegetation and improving ecosystem

Activity 1: water harvesting

Project name	Water harvesting
Specific objectives	Water storage and improving natural vegetation
Methodology	Implement of small dams on the valley and pits along contour lines
Expected output	Improve environment and economic situation for the sheep breeder Recharge of ground water

8. References

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