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to Combat Desertification

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Desert Research Center

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List of Acronyms

ARC	Agricultural Research Center
CBD	Convention on Biological Diversity
CO ₂	Carbon dioxide
COP	Conference of Parties
DRC	Desert Research Center
EALIP	Executive Authority for Land Improvement Projects
EEAA	Egyptian Environmental Affairs Agency
EGSA	Egyptian General Survey Authority
FAO	Food and Agriculture Organization
GARPAD	General Authority for Rehabilitation Projects and Agricultural Development
GEF	Global Environmental Facility
JICA	Japanese International Cooperation Agency
LDN	Land Degradation Neutrality
NAP	National Action Programme
NCCIP	National Climate Change Investment Plan
NDCs	Nationally Determined Contributions
NFP	National Focal Point
NGO	Non-Governmental Organizations
NRM	Natural Resources Management
SDGs	Sustainable Development Goals
SLM	Sustainable Land Management
TSP	Target Setting Programme
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

SUMMARY

Egypt has a total area of about one million km² under arid to hyper arid climatic conditions, of which only a small portion, not exceeding 4% of total area, is agriculturally productive lands. It is a densely populated country with more than 100 million inhabitants, mainly concentrated on an absolutely small territory around the Nile Valley and Delta, with regional disparities.

The country is seriously affected by desertification, land degradation and drought; therefore the Desert Research Center (DRC), Ministry of Agriculture and Land Reclamation of Egypt, and national and international organizations concerned with combating desertification work hard to reverse land degradation processes and their causes and mitigate its impacts on land productivity.

Land degradation is a global phenomenon with detrimental impacts at the local level, caused by natural processes and human activities, i.e. soil and water mismanagement, overgrazing, rapid urban sprawl. Land degradation is characterized by the reduction and loss of the biological and economic productive capacity of land. Land degradation neutrality (LDN) is an SDG accelerator, so investing in LDN substantially contributes to the achievement of several SDG targets and creates economic and social benefits.

In September 2015, the United Nations General Assembly adopted “The 2030 Agenda for Sustainable Development”, including 17 Sustainable Development Goals (SDG) and 169 targets. SDG 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. Target 15.3 aims to “combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world” by 2030. The indicator adopted to measure the achievement of SDG target 15.3 is “Proportion of land that is degraded over total land area”. Therefore, country Parties were invited, among other things, to formulate voluntary targets to achieve LDN and to incorporate them in UNCCD National Action Programmes (NAPs) in October 2015. Egypt’s NAP was adopted in 2005 and 2015 but its implementation is faced by a number of challenges including inadequate funding and the dispersed and uncoordinated nature of interventions by different stakeholders.

The Land Degradation Neutrality Target Setting Programme (LDN TSP) provided a significant opportunity to create a leverage plan for all stakeholders in Egypt. LDN target setting is a country-led process, led by the government, and spearheaded by the UNCCD National Focal Point, the Ministry of Agriculture and Land Reclamation. The process is supported by the LDN Target Setting Programme team from the Global Mechanism and the UNCCD secretariat.

To develop a national LDN leverage plan, it is essential to assess the LDN TS leverage opportunities, considering the most crucial priorities that are related to improving the productivity of around 3 million feddan affected by soil salinity and alkalinity as a top priority, followed by enhancing soil fertility and mitigating the effects of soil erosion by wind and sedimentation of desert sands on the fringes of the Nile valley and delta.

Promoting the sustainable use of land resources requires the active involvement of various sectors and stakeholders in the LDN TSP leverage plan: direct stakeholders such as land users, private service providers, and governmental agencies at national and sub-national level, national and international research institutes, civil society organizations (CSOs), and development partners to provide financial and technical support to stakeholders.

Data analysis and interpretation of the three sub-indicators in Egypt showed the following trends:

- No changes in land cover during 2000-2010.

- There was a decline in net LPD in 0.4% of the total area of Egypt in all land cover categories; however, if the values of LPD are computed relative to potential land productivity one can find that the increase in LP is considerably high, especially if intensive agriculture is taken into consideration.
- There was an early sign of decline in net LPD in 0.1% of the total area of Egypt in all land cover categories, although this sign denotes insignificant change.
- There was stable but stressed net LPD in 0.3% of the total area of Egypt in all land cover categories. Again, this may be considered insignificant.
- There was stable not stressed net LPD in 3.2% of the total area of Egypt in all land cover categories; however, this may be to some extent insignificant.
- There was increasing net LPD in 1.6% of the total area of Egypt in all land cover categories.
- SOC stocks trend couldn't be observed because the data provided were for only the year 2000.

To avoid the process of land degradation, a thorough study of the legal and institutional environment is required, together with the power to put the laws into practice. Concerning the current regulatory environment, there are many environmentally-oriented legislations that deal with the degradation of the land resource base in Egypt and related aspects, i.e. protecting the environment from desertification hazards, protecting cultivated land from deterioration, avoiding overgrazing, etc.

The LDN baseline representing the current conditions of the land resource base is supported by at least one institution in charge of monitoring LDN, and contributed to the LDN target setting process. The working group, together with the relevant stakeholders, reviewed the default tier 1 data (provided by the LDN TSP) and concluded that there was a close similarity between the interpreted data and the local data set.

For Egypt, Land Degradation Neutrality targets have been identified at different levels:

LDN at the national scale

- LDN is achieved (no net loss) by 2030 as compared to 2015 and an additional 10% of the national territory has improved by 2030 (net gain).

LDN at the sub-national scale

- LDN is achieved in the land degradation hotspots: **Kafr El Sheikh Governorate, Demiat Gov., Rasheed area, El Minia Gov., Sohag Gov., Al Fayoum, Mersa Matrouh Gov. (Fuka – El Sallum), El Khattara area, El Tina Plain area, El Farafra oasis and North Sinai** by 2030 as compared to 2015 (no net loss) and an additional 10% of the degraded hotspot areas has improved (net gain).

Specific targets to avoid, minimize and reverse land degradation

- Improve productivity and carbon stocks of 3,342 km² (802,080 feddan) of cultivated areas **by 2030.**
- Restore and increase the productivity of 11,666 km² (2,800,000 feddan) of cropland using modern agricultural techniques and SLM practices in **the northern areas, western and eastern fringes of reclaimed lands of the Nile Delta and El Tina Plains areas** by 2030.
- Rehabilitate and increase the productivity of 8,000 km² (1,920,000 feddan) of rangeland and rainfed areas using SLM practices in the north coastal areas (rangelands and rain-fed farming areas) by 2030.
- Rehabilitate and increase the productivity of 7,500 km² (1,800,000 feddan) of cropland using SLM practices in **the reclaimed areas in western desert fringes of middle and upper Egypt**

Governorates by 2030.

- Reclamation and cultivation of 6,300 km² (1.5 million feddan) of virgin land in **reclaimed desert soils at different locations in the western desert of Egypt** by 2030.
- Gain in land productivity and SOC stocks in about 8,333 km² of cropland in **reclaimed desert lands at different locations (cultivated areas)** by 2030 as compared to 2015.
- Halt the conversion of cropland to other land cover classes by 2030.
- Increase by 25% forest cover / tree cover through agroforestry and SLM in existing forests by 2030 as compared to 2015.
- Halt the occurrence of soil erosion by rain water, creating dams for water harvesting to be utilized for agricultural purposes for an area of 2,500 km² in dry valleys of elevated areas of the inland Sinai and Eastern Desert by 2030.
- Rationalize water consumption by growing crops of low water requirements and adopting modern irrigation systems for around 1,000 km² in some oases in the western desert of Egypt by 2030.

In relation to the LDN-related policy measures, some presidential decrees pertaining to policy measures have recently been outlined through a national campaign on the various encroachments on arable lands to restore and rehabilitate its productivity through putting the long standing legislations into effect; actions will be taken by a high level authority designated to enforce such measures in order to achieve LDN targets.

With regard to the contribution of stakeholders, the Egyptian government has taken several steps to achieve LDN in the form of transformative projects and policies so that stakeholders can take part in a broad participation in the design, implementation and monitoring of programs and projects related to LDN, to enable the country to achieve the defined LDN targets.

1. INTRODUCTION

Sustainable development is negatively affected world-wide by the advance of land degradation (UNCCD and UNEP 2016). Target 15.3 of the Sustainable Development Goals (SDGs) sets a global ambition for a land degradation-neutral world by 2030. Land degradation neutrality aims to maintain or increase the area of fertile land resources and can be implemented at different levels, i.e. local, regional or national. Egypt, located within the Sahara zone of North Africa, is vulnerable to land degradation with different magnitudes of effects, due to various causes and process that will be discussed hereafter.

2. LEVERAGE OPPORTUNITIES FOR LAND DEGRADATION NEUTRALITY IN EGYPT

2.1 Country's interest to LDN target setting

Land degradation is inevitable due to reasons such as population growth and increases in the demand for energy, food and shelter that lead to an expansion of agricultural and settlement areas. This fast population growth leads to increased demand for food and other needs; this exerts pressure on the limited resources. LDN is different from existing strategies to fight land degradation, as it entails the possibility of counterbalancing unavoidable land degradation ("losses") through restoration or rehabilitation efforts elsewhere ("gains"), thereby enabling a state of no net loss which amounts to "neutrality".

Land issues in Egypt are crucial to the country's social economic development. Ensuring sustainable utilization and productivity is very important for the sustainable development of the country and for poverty reduction. LDN strategy matters because land degradation has continued to impact negatively, as manifested through declining productivity and increasing poverty. Investments in LDN will create several economic and social benefits, i.e. land productivity enhanced and yields increased, farmers' incomes raised, living standards lifted, job opportunities created and poverty reduced. Thus investing in LDN will considerably contribute to achieving many SDG targets.

A number of LDN-related projects in the agriculture and natural resources management sectors, implemented by the Government or NGOs, are supported by international cooperation partners in line with their cooperation framework policies and have objectives and strategies relevant to SLM or LDN. The United Nations Development Assistance Framework (UNDAF), for instance identifies a number of priority areas for support and of direct relevance to LDN. The UNDAF has included among its expected outputs "to provide strategic focus on climate change and natural resources management" and outcomes on issues concerning climate change, natural resources management and disaster risk management for enhancing leveraging of resources for maximum impact and value for money. The LDN TSP provides an opportunity to reflect and map out an effective leveraging plan to support coordinated and focused implementation of SLM activities.

The Desert Research Center (DRC) of The Ministry of Agriculture and Land Reclamation of Egypt is the National Coordinating Body in Egypt for the United Nations Convention to Combat Desertification (UNCCD) and is responsible for coordinating with the international commitments of the Convention through the implementation of the National Action Program to Combat Desertification (EGYPT NAP of UNCCD). Key line ministries involved in land management are, for example, deputy ministers of agriculture, environment, irrigation and water resources and finance. Meanwhile, institutions responsible for overall national economic and land use planning could be ideal contributors for pursuing the LDN agenda. A higher coordination committee included a series of ministries under the supervision of the Ministry of Agriculture and Land Reclamation, and the DRC was established to act as a coordinator between governmental agencies, considering that the

UNCCD National Focal Point is the chairman of the committee that is in charge of establishing working groups for steering the LDN TS process and promoting the mainstreaming into national policies and plans.

Since climate change has a tremendous impact on land degradation, LDN contributes to mitigating the adverse impacts of climate change. LDN provides significant benefits for the mitigation of/and adaptation to climate change. Halting and reversing land degradation can transform land from being a source of greenhouse gas emissions to a sink by increasing carbon stocks in soils and vegetation.

Hence, pursuing LDN is essential for national climate action. Globally, the land sector represents almost 25% of total emissions; adoption of improved land use practices such as low-emissions agriculture, ecosystem conservation and restoration have great potential for carbon sequestration and therefore emissions reduction. LDN interventions will help to advance Egypt's climate action as it will mobilize different stakeholders - government institutions, CSOs and international cooperation partners - to implement nationally coordinated activities.

The LDN agenda will revive initiatives in various land-related sectors and improve coordination of various stakeholders towards attainment of the SDGs, particularly Goal 15 target 15.3, which will contribute to the country's efforts in fighting climate change and its impacts.

The potential declines in food production by 2030 are relatively high, and Egypt should be able to compensate for climate change impacts by improving the agricultural practices that ensure carbon sequestration in the soil. Priority should be given to raising the resilience of agricultural ecosystems through expanding the cultivated areas, improving and diversifying optimum cropping patterns with particular focus on available genetic resources. To enhance the country's resilience to climate change, national institutional reform would be as important as technological modernization, to ensure preparedness for climate disasters. As a developing country, this of course will need international support to alleviate poverty and improve living standards. International donors are invited to invest in the country's climate change adaptation programs, particularly those that support LDN; many opportunities to support LDN are available in the 3rd National Report for UNFCCC. Egypt has been adopting the new National Climate Change Policy as a guide to benefit from global climate change financial opportunities, such as investment in renewable and environmentally-friendly energy alternatives.

2.2 Country commitments to LDN

The Executive authority for Land Improvement in Egypt is mainly concerned with land improvement, which is a major task for combating land degradation. Its national plan is essentially directed to finding out the main causes of land deterioration in old cultivated lands which constitute more than 90% of agricultural activities. These lands occupy the agro-ecological zone of the Nile Valley and Delta. Besides this, its plan includes some newly-cultivated lands in other agro-ecological zones of Egypt. Therefore, its program for combating land degradation is based entirely on land amelioration and improvement through the following topics:

1. Preparation of databases on the abiotic natural resources (soil and water).
2. Preparation of the essential maps on soil salinity, alkalinity, water table levels, soil compaction and soil productivity.
3. Development and promotion of updated irrigation systems.
4. Construction and conservation of effective field drainage systems.
5. Updating, conservation and maintenance of field equipment, especially laser leveling equipment.

6. Providing soil amendments and fertilization policy to increase soil fertility and productivity.
7. Training and extension service program for specialists and technicians to provide capacity building in the field of combating desertification.
8. Providing facilities and equipment for land owners and users.
9. Stabilization of soil surface with vegetative grass or chemically.
10. Establishment of wind breaks or shelter belts against wind erosion.
11. Urgent monitoring of changes in water resources, soil and land productivity to ascertain desertification hazards and work out the possible urgent solutions to combat desertification, degradation and increasing productivity to achieve sustainable agricultural development.

2.3 National development priorities

The majority of salt-affected soils in Egypt are located in the northern-central part of the Nile Delta and on its eastern and western sides. Other areas are found in the oases, many parts of the Nile Valley and El-Fayoum province. About 2.8 million feddan suffer from salinization problems in cultivated areas.

In some coastal areas the extraction of groundwater has proceeded to the point where intrusion of saline seawater into aquifers has deteriorated the quality of these resources. Continued irrigation with such low quality groundwater has contributed to the expansion of land salinization. Saline soil distribution is closely related to environmental factors such as climatic, geological, geochemical and hydrological conditions.

Inundation of the soil by sea and lake saltwater over a long time is the major cause of salinization in the abovementioned soils, besides the tidal effect and the salty soil solution in Shalma and El-Hamoul South Burullus Lakes. In Mariut and Tal-El-Kabeer areas, the main factor responsible for the deterioration of their soils is seepage from irrigation canals in Mariut and from Ismailia canals in Tal - El-Kabeer.

In general, soil and water mismanagement and intrusion of seawater are the main causes of salinization in addition to the use of slightly saline water (drainage or mixed water) for irrigation without proper management and agronomic practices. Accordingly, improving the productivity of 2.8 million feddan of cropland affected by soil salinity and alkalinity is the top priority and ultimate target in Egypt. Improving the productivity of about 2 million feddan of cultivated land affected by deterioration of soil fertility (poor soil organic carbon stock) existing across different parts in Egypt is the second priority.

In the desert areas and the desert valley fringes, the active sand dunes and sand encroachment phenomenon is widespread, causing around 16% of Egypt's total areas covered with Aeolian windblown sands and sand dunes, which lead to movement of sand dunes and sand sediments on productive agricultural lands. The total agricultural area affected by such phenomenon is estimated at around 1.8 million feddan of the total agricultural land in Egypt. The economic losses are estimated at around 25% of average productivity. Therefore, mitigating the effects of soil erosion by wind and sedimentation of desert sands on the fringes of the Nile valley and delta is the third priority.

2.4 Leverage Opportunities

Leverage opportunities for LDN in Egypt were recognized. For leveraging efforts and resources to achieve LDN as a tool to fulfil the SDGs, particularly SDG 15, huge modifications need to be introduced. Areas requiring leveraging including institutions and individuals to be engaged in the LDN target setting programme have also been identified.

Table 1 summarizes in a logical framework that best depict the leveraging opportunities, the actions to be undertaken in the process of leveraging and the responsibilities.

Table 1: Framework for National LDN Target Setting Leverage Plan

Leverage Opportunities		Actions	Responsibilities
Why does LDN matter?			
1	Creating multiple benefits	<ul style="list-style-type: none"> - Confirm relation of LDN to Egypt's national plan - Relate LDN to fulfillment of SDG's - Engagement of multi-stakeholders in LDN TSP 	<ul style="list-style-type: none"> - Ministry of Planning - Ministry of Agriculture and Land Reclamation - NFP & LDN TSP Consultant
2	Fostering policy coherence	<ul style="list-style-type: none"> - Revise related policies to evaluate LDN adherence, set policy recommendations to realize adherence. - Combine LDN and other SDGs in the national development plan - Include LDN in donor collaboration plan - Mainstreaming of LDN into relevant policies and programs 	<ul style="list-style-type: none"> - NFP & LDN TSP Consultant - Ministry of Planning - Donors (Bank for Development and Agricultural Credit) - Ministry of Agriculture and Land Reclamation - Ministry of Water Resources and Irrigation
3	Advancing climate action	<ul style="list-style-type: none"> - Merge LDN into National Action Program for Climate action - Make a plan for implementing the Rio Convention (CCD, CBD & FCCC) - Intensify implementation of NAP and Nationally Appropriate Mitigation Action (NAMA) 	<ul style="list-style-type: none"> - Ministry of Environment - Ministry of Agriculture and Land Reclamation and Ministry of Environment - NFP monitors implementation in relation to LDN
4	Tapping financing opportunities	<ul style="list-style-type: none"> - Execute the National Climate Change Investment Plan - Develop fundable transformative LDN project proposals to access the LDN Fund - Include LDN in the national budget and allocate adequate resources to LDN-related sectors 	<ul style="list-style-type: none"> - Ministry of Environment - Ministry of Environment and Ministry of Finance - Ministry of Environment and Ministry of Finance
WHAT to leverage?			
5	National development programmes, priorities and objectives	<ul style="list-style-type: none"> - Sustainable Development Goals - Processing soil salinization, alkalinity and drainage projects - Egypt's agricultural development program 	<ul style="list-style-type: none"> - Ministry of Finance - Executive Authority for Land Improvement Projects - Ministry of Agriculture and Land Reclamation
6	Country commitments and engagements	<ul style="list-style-type: none"> - Project of reclaiming 650,000 hectares in Egypt's Western Desert - Involvement of multiple stakeholders in LDN target setting program 	<ul style="list-style-type: none"> - Ministry of Agriculture and Land Reclamation - NFP & LDN TSP Consultant
WHO to engage to create leverage?			
7	Senior government	<ul style="list-style-type: none"> - Prime Minister - Minister of Agriculture and Land Reclamation - Minister of Water Resources and Irrigation - Minister of Environmental Affairs - Minister of Finance - Minister of Planning 	<ul style="list-style-type: none"> - Council of Ministries

8	National coordination mechanisms	<ul style="list-style-type: none"> - UNCCD National Coordination Committee - LDN Working Group - UNCCD Scientific Committee - UNCBD National Coordination Committee - UNFCCC National coordination Committee 	<ul style="list-style-type: none"> - Council of Ministries (18 ministries) - Ministry of Agriculture and Land Reclamation, Ministry of Water Resources and Irrigation and Ministry of Environmental Affairs - UNCCD National Coordination Committee - UNCBD National Coordination Committee - Ministry of Environmental Affairs
9	International development partners	<ul style="list-style-type: none"> - United Nations Development Program - Food and Agriculture Organization - World Bank - Japanese International Cooperation Agency - UNCCD - Sahara and Sahel Observatory (OSS) 	NFP
10	National and International governmental and NGOs stakeholders	<ul style="list-style-type: none"> - Bank for Development and Agricultural Credit - Farmers' Union of Egypt - Desert Research Center - Agricultural Research Center - The Arab Center for the Studies of Arid Zones and Dry lands (ACSAD) - Misr Al Khair Corporation - Resala Charity - Scientific Research Academy 	NFP & LDN National Consultant

3. ASSESSING LDN

3.1 LDN trends and drivers

Egypt has experienced land degradation in terms of land cover, land productivity and carbon stocks above and below land due to mismanagement and anthropogenic factors. This has taken place across all productive land areas and is the priority area for remediation, either from salinity hazard, fertility loss and choice of suitable cropping patterns.

A retrospective assessment of land degradation trends, coupled with an analysis of the driving forces behind these trends, is an essential step in understanding current conditions of land degradation, revealing anomalies and identifying degraded areas. Such an assessment will provide an informed evidence base for setting sound LDN targets, making decisions on potential interventions and prioritising efforts in areas where degradation is taking place.

Egypt has four agro-ecological zones characterized by different climate features, water and soil resources, geomorphic characteristics, land use patterns and socio-economic implications, as well as the types of land degradation drivers. Irrigated agriculture is the dominant system in most of these zones; however, rain-fed agriculture is practiced in the North Coastal zone (NC) and concentrated mainly in the North Western Coastal subzone (NWC). In the Nile Delta and Valley zone, the human pressure with limited total area of arable land and low returns from small land holdings encourage encroachment of urban development onto the fertile agricultural land.

The average rate of urban encroachment reached 130 sq. km per year, and has increased to 210 sq. km per year since 2011. In addition to the problems associated with urban encroachment, rising sea levels associated with climate change are expected to increase salinity and water logging in the northern governorates of the Nile Delta. There is a number of other factors leading to land degradation in this zone and other zones, such as inadequate maintenance of irrigation and drainage networks, sea water intrusion, overgrazing, unsustainable use and management of soil and water,

over-abstraction of groundwater, soil erosion by water and wind, release of airborne pollution, depletion of soil fertility, soil compaction, soil salinization and water logging, and sand encroachment.

Small meetings involving the LDN working group and relevant stakeholders were held to assess the land degradation trends based on the data of the three sub indicators which are used for setting the baseline (the default tier 1 data provided by UNCCD LDN TSP), i.e. land cover, land productivity and carbon stocks above and below ground (SOC). The national data of complementary national indicators are not enough to cover all of Egypt, both spatially and temporally.

It was agreed upon during the meeting to use the provided default tier 1 data for analysing and observing the changes in the value of the three sub indicators individually over the periods given in the provided data, taking in consideration that land cover was used to stratify the other two sub indicators. Land degradation takes place when land productivity shows a significant negative trend; or SOC shows a significant negative trend; or negative land cover change occurs.

The national and local authorities and institutions that coordinate monitoring and reporting at the national level convened, with the collaboration of Egypt's National Focal Point for the UNCCD and the LDN TSP National Consultant, all relevant stakeholders and the national LDN working group to interpret the changes in the three sub indicators, i.e. land cover, land productivity and carbon stocks above and below ground (metric: SOC) to ensure a sound and broad consensus on actions to achieve the LDN targets.

Based on the default tier 1 data (provided by the LDN TSP), which were in line with the local data, results showed no change in land cover because the positive changes were equivalent to the negative ones. Net LPD showed changes in trends (sq. km) ranging from "declining, early signs of decline, stable but stressed, stable not stressed and increasing" for the five land use/cover categories (2-6), meaning that areas with increasing land productivity can generally be interpreted as improving, while areas with decreasing land productivity can be interpreted as deteriorating (i.e. degradation). Trends in SOC stocks couldn't be observed because the data provided were for only the year 2000.

Data analysis and interpretation for the three sub indicators in Egypt showed the following trends and drivers:

Indicator 1: land cover and land cover changes during the period 2000-2010

It is a fundamental land surface parameter that assists with the interpretation and disaggregation of the other two sub-indicators. This indicator focuses on intervention on the land that changes directly their situation and the impact on goods and services.

The categories of land use/cover on the national level of Egypt were obtained from the ESA CCI-LC (2000 and 2010). Table 2 and Figs 1 and 2 show the land use/cover categories in the year 2000 and 2010 and the net surface change for each use of the land in these years. The net rate of change in land cover at the national level is zero. This rate reflects no change in categories of land cover occurring in Egypt. This means that no changes, either reduction or increase in the extent and degree of fragmentation in natural habitats/ecosystems, occurred. Also, these data provide no change in vegetative cover. However, at the simplest level, this type of change indicates; 1) no progress towards land degradation neutrality, 2) no change of protective vegetative cover and 3) improvements in land and soil protection or even restoration.

In this respect, these data need further efforts to evaluate land cover and cover changes at the agro-ecological zone level because of the data on the agricultural sector in Al-Wadi Al Jadid (New Valley) governorate (western desert agro-ecological zone) showed that the cultivated area decreased from

65,000 fed (27,299.5 ha) in the winter season to 35,000 fed (14,699.7 ha) in the summer season due to shortages of groundwater irrigation and high air temperatures, which led to increasing water consumption, from 30m³/day/fed in the winter season to 60m³/day/fed in the summer season.

Indicator 2: Net Land Productivity

Land productivity is important for assessing changes in the carbon stocks of natural and managed systems, and thus their contribution to climate change mitigation efforts. It is also essential to distinguish between land degradation resulting in long-term negative consequences, such as the persistent loss of ground cover due to overgrazing, or the one-time clearing of vegetation. Therefore, the land productivity dynamics may indicate the levels of soil and land quality.

The land productivity dynamics for Egypt was calculated by the Joint Research Centre. In general, there are some factors affecting land productivity, such as factors related to climate change and soil properties as well as human intervention expressed in urbanization, overgrazing, improper management practices and social factors, translated into poverty. Consequently, land productivity is an expression of factors occurring in this area in terms of total production of growing crops/vegetation.

The decline of land productivity at the national level is the result of desertification and land degradation due to soil salinity, soil erosion, urbanization and infrastructure development, combination of natural causes and improper management of soil and water and overgrazing.

Table 2 and Fig. 3 reveal the results of net land productivity change for the period 1998 – 2012, according to each category of land use. The absolute values of declining productivity that varied according to land use and the magnitude of decline can be arranged as follow: bare lands and other areas > crop land > artificial area > wet land > shrubs, grasslands and sparsely vegetated areas.

The greatest decline of land productivity is reflected on the surface covered by bare lands and other areas (2,883 sq. km). Generally, the declining class is concentrated mostly in the agro-ecological zones of the Western Desert, inland Sinai and the Eastern Desert, the North Coastal Zone (NCZ) particularly the North Western Coast subzone (NWC) and some areas in the Nile Delta and valley zone, (Fig. 3). The drivers of these declines include overgrazing, over-abstraction of groundwater irrigation, excessive irrigation water, poor drainage, soil erosion by water and/or wind, removal of natural vegetation, urbanization and improper management of the soil. The role of each driver differs according to the climate, cropping pattern and farming system of each agro-ecological zone.

On the basis of declining land use/cover, the highest percent change (decline) occurred in artificial areas, which include degradation of irrigation and drainage infrastructure. On the basis of absolute value and percentage of decline, the surface covered by croplands, concentrated in the Nile Delta and valley agro-ecological zone, occupied the second largest decline. In such zone, the drivers of land degradation mainly include urbanization, discharges, over-abstraction of water, disturbance of the water cycle and improper management of the soil. In addition, the surface covered by croplands in the North West Coast sub-zone suffered from declines caused from soil erosion and improper soil management, sea water intrusion (Fig. 3). Likewise, the surface covered by artificial areas and croplands occupied the highest percentage decrease in the early signs of decline, stable but stressed and stable not stressed classes of Net LPD. Consequently, these land use areas will take priority in intervention plans and carrying out activities to achieve LDN.

Indicator 3: Soil organic carbon

Soil organic carbon directly affects the productivity of plants and it determines ecosystem and agro-ecosystem functioning, influencing soil fertility, water holding capacity, water flow regulation and

many other functions. In addition, it is of global importance because of its role in the global carbon cycle. It is highly sensitive to the changes in land use and the way in which land is managed.

The estimation of soil organic carbon was carried out by ISRIC and covered the period from 1998 to 2002 and from 2008 to 2012 for each land use (Table 2) and (Fig. 4), which indicate a relatively high value of SOC in croplands (53.2 ton/ha), concentrated in the agro-ecological zone of the Nile Delta and Valley. This zone has fertile and good old cultivated soils, and often has sustainable crop rotations. The values given (in Table 2) are in line with data for arid and semi-arid conditions, which showed that most of the soils contain less than 1% and frequently less than 0.5% of carbon.

Table 2 - Presentation of national basic data using the LDN indicators framework																
Land Use/Cover Category	Area (2000)	Area (2010)	Net area change (2000- 2010)	Net land productivity dynamics (NetLPD)**												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
				(sq km)	%	(sq km)	%	(sq km)	%	(sq km)	%	(sq km)	%	(sq km)	%	
Forest	0	0	0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
Shrubs, grasslands and sparsely vegetated	39826	39826	0	53	0.8	75	0.2	31	0.1	322	0.8	13	0.0	39332	98.8	0.8
Croplands	36288	36288	0	719	2.0	1008	2.8	1615	4.5	16615	45.8	14415	39.7	1916	5.3	53.2
Wetlands	15305	15305	0	157	1.0	20	0.1	61	0.4	1494	9.8	501	3.3	13073	85.4	23.5
Artificial areas	4943	4943	0	588	11.9	195	3.9	339	6.9	1959	39.6	556	11.2	1306	26.4	37.5
Bare land and other areas	913638	913638	0	2883	0.3	364	0.0	1843	0.2	12356	1.4	858	0.1	895334	98.0	4.3
SOC average (ton/ha)																4
Total (sq km) and Percent of total land area	1010000	1010000	0	4399	0.4%	1662	0.1%	3890	0.3%	32745	3.2%	16343	1.6%	950961	94.1%	
LDN Target Setting Programme																
(*) sq. km. stands for square kilometer or km ² . To convert sq km to hectares (ha) x100. (**) Values for NetLPD and SOC are only for areas where Land Use/Cover is unchanged from 2000-2010. (***) 'No Data' includes snow, ice, desert areas, water bodies and missing pixels																

3.2 LDN institutional and legal environment

It is worth stating that avoiding the advance of land degradation processes requires not only perfect assessment of their trends, but also an investigation of the enabling conditions, i.e. legal and institutional environment, willingness to enforce regulations and enforcement capacity. These together with the desired targets are considered the key concepts for addressing the negative trends to meet the hopeful targets.

The analysis of the legal and institutional framework governing land management is of paramount importance in terms of identifying gaps, inconsistencies, weaknesses and opportunities in order to create or enhance the national regulatory environment in view of achieving LDN.

Policies, laws and regulations related to addressing desertification, land degradation, and managing land use and drought issues (agriculture, environment, infrastructure development) have been enacted to deal with particular issues related to the degradation of the land resources base in Egypt.

- Concerning the current regulatory environment (laws, policies and regulations), there are many environment-oriented legislations that have been reviewed
- The laws and regulations are dealing with the following concerns:

- Protecting the environment from desertification processes and hazards.
- Protecting the water stream of the River Nile from pollution.
- Conserving cultivated lands from deterioration.
- Controlling grazing of rangeland to combat desertification by avoiding overgrazing.
- Considering the principles of Environmental Impact Assessments (EIA) in the establishment of developmental projects.
- Establishment of protected areas and biosphere reserves.
- Establishment of Desert-Gene Banks (EDGB).
- Clean Development Mechanism (National Committee).
- Using treated sewage water in agriculture (code).
- Restriction of using of waste water in the agricultural sector.
- Controlling the use of chemicals in agricultural activities.

The Land Degradation Neutrality SWOT analysis on legal and institutional environment should be carefully observed and handled to help enhance LDN (Table 3).

Table 3: SWOT analysis on the linkage between the legal and institutional environment in Egypt and the country's commitment to achieve LDN

STRENGTHS	WEAKNESSES
<p>Legal</p> <p>1-The Agricultural Law No. 53 (1966). (Articles 150 - 156), (still valid) are concerned with combating desertification and land degradation.</p> <p>2- The Law No. 4 (1994) modified by Law No. 9 (2009), (article 28) prohibiting the excessive use of chemicals for agricultural purposes.</p> <p>3- The Law No. 102 (1983) for Protected Areas.</p> <p>Institutional</p> <p>1- Egypt's National Land Degradation Neutrality Target Setting Leverage Plan established and under implementation.</p> <p>2-The research stations in areas vulnerable to land degradation are operational.</p> <p>3- Serious endeavors to apply modern irrigation systems are underway.</p>	<p>Legal</p> <p>1- The process of delimitation of protected areas exhibits increasing delays. Land rights process is not working efficiently.</p> <p>2- The penalties are not proportional to the hazardous effects.</p> <p>3- Poor enforcement of the LDN-relevant laws.</p> <p>Institutional</p> <p>1- Low coordination among the entities in charge of LDN agenda.</p> <p>2- Lack of environmental police.</p> <p>3- Low investment finances.</p> <p>4- High custom duties for tools needed for LDN and combating desertification.</p> <p>5- Applying traditional irrigation methods.</p> <p>6- Low awareness of water crisis.</p> <p>7- Cultivating crops with high water demand.</p> <p>8- Inadequate finances.</p> <p>9- Insufficient integration among institutes.</p> <p>10- Lack of databases.</p> <p>11- Government staff inexperienced with LDN.</p> <p>12- Stakeholders are not so involved.</p>
OPPORTUNITIES	THREATS
<p>Legal</p> <p>1- The national strategy includes the land use sector as a key component to achieve LDN.</p> <p>2- Council of representatives to enact and revise relevant laws.</p> <p>Institutional</p> <p>1- Coordination and cooperation among UNCCD National Focal Point and National Consultant, institutions and private sector.</p>	<p>Legal</p> <p>1- Not all legislations are directed to LDN.</p> <p>2- Absence of mechanisms to execute courts dictions.</p> <p>Institutional</p> <p>1- Absence of coordination among the different administrative agencies.</p> <p>2- Absence of relevant data bases.</p> <p>3- Slowdown in the judicial procedures.</p>

2- Dissemination of technologies related to LDN. 3- Improving field irrigation systems. 4- Willingness of stakeholders to apply the recommendations from research centres. 5- Reuse of treated drainage water. 6- Establishment of some governmental LDN - related projects.	4- Negative impact of food security. 5- Increasing settlement. 6- Weakness of infrastructure and low investments. 7- Economic crisis and few job opportunities. 8- Over population. 9- High losses in the productive areas. 10- Changing land use patterns.
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3.3 LDN baseline

The procedure for assessing LDN involves setting the LDN baseline, assessing land degradation trends and monitoring progress towards LDN targets. Setting the baseline and assessing initial land degradation trends are conducted in the initial phases of LDN target setting. LDN monitoring is conducted at a point in the future to track progress towards LDN targets.

The LDN baseline refers to the current status and conditions of land-based natural capital and the ecosystem services.

The baseline is the initial numerical value of the recommended three indicators used as proxies of land-based natural capital:

- Land cover;
- Land productivity (metric: net primary productivity);
- Carbon stocks above and below ground (metric: soil organic carbon (SOC) stock).

These indicators correspond to the UNCCD progress indicators and have been recommended as sub-indicators for indicator 15.3.1, “Proportion of land that is degraded over total land area”, adapted to measure progress toward the SDG target 15.3.

The UNCCD National Focal Point for Egypt (the DRC), the UNCCD LDN TSP National Consultant, the LDN working group and relevant stakeholders endorsed, after several meetings, the use of the three recommended progress indicators (UNCCD, 2015) for monitoring progress towards LDN in Egypt. Data available in Egypt are not adequate to cover most of the areas, so the use of the default tier 1 data derived from global data (provided by the LDN TSP) are urgently required to complement our national data for the time being; the default data will be analysed to obtain the baseline, trends and targets at the national level.

After the national baseline validation meeting with the LDN working group and other stakeholders, it was agreed to use the default data provided by the LDN TSP as the LDN baseline in Egypt (t0 = 2010).

The maps (Figs 1-4) show land cover in 2000 and 2010, soil organic carbon in 2000 and land productivity dynamics from 2000 to 2010 in Egypt.

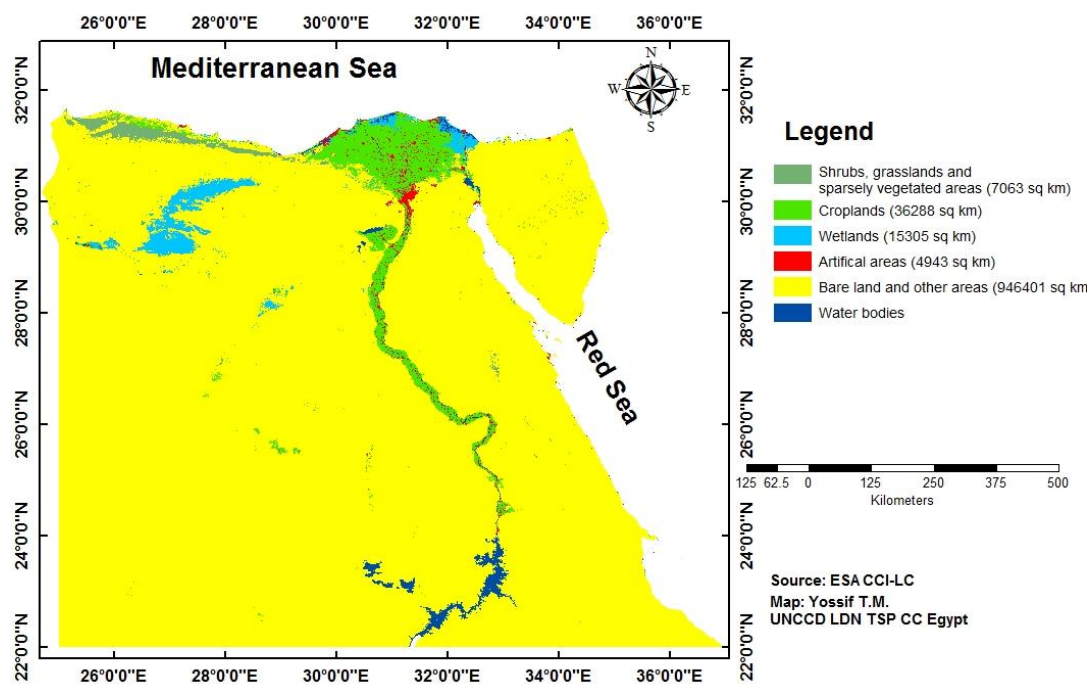


Fig. 1. Land cover for Egypt, 2000

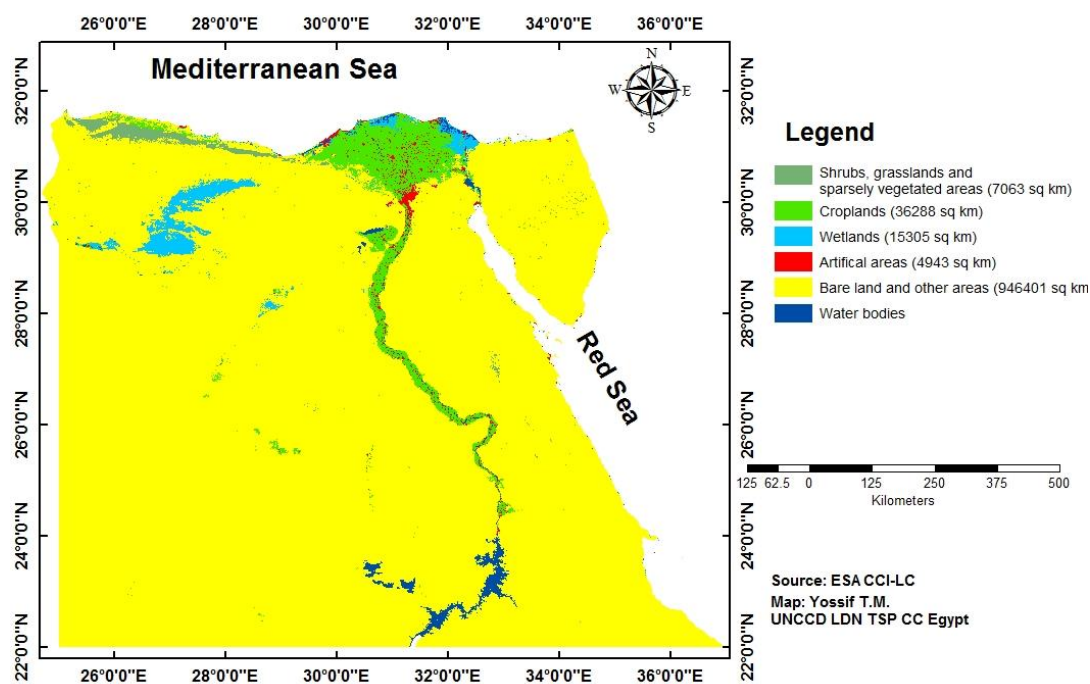


Fig. 2. Land cover for Egypt, 2010

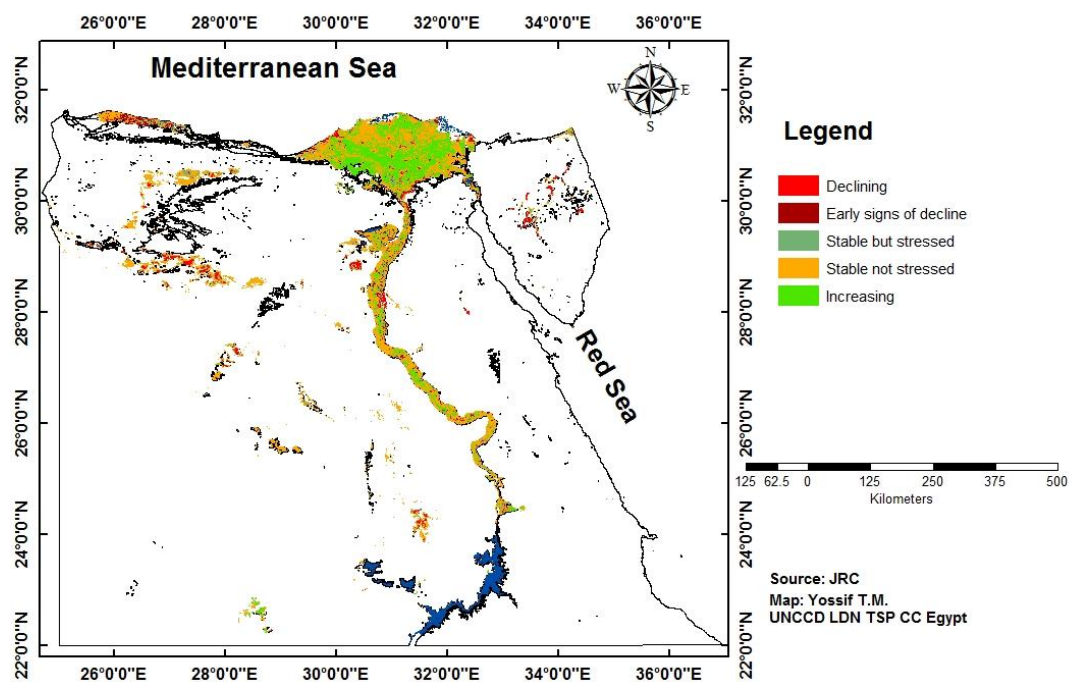


Fig. 3. Land productivity dynamics in Egypt, 1998 - 2013

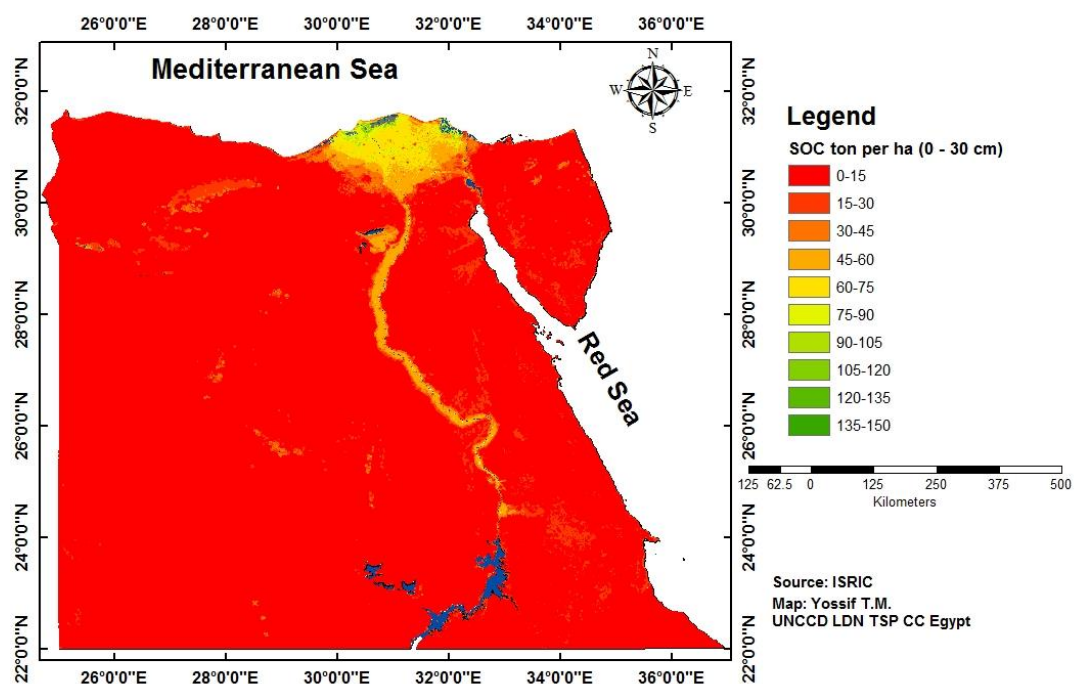


Fig. 4. Organic carbon stocks in Egypt, 2000

4. SETTING LDN TARGETS

4.1 LDN targets

The defined national targets are considered the mainstay of a desired action to achieve land degradation neutrality. In Egypt, the majority of land is occupied by barren landscapes that account for about 93.7 % of the whole country. At the same time, cropland, being the cornerstone of Egypt's economy, occupies only around 4% of the country. This situation, in fact, means that the resource base needed for population nourishment is limited, which strictly indicates the importance of the establishment of realistically aspiring LDN targets, especially when this situation is accompanied by other drawbacks, i.e. aggressive urban encroachment upon the limited fertile arable land, causing possible drastic reductions in production. Likewise, mismanagement of natural resources might result in a 10 to 15% loss in agricultural output.

Geographically, Egypt could be grouped into a number of agro-ecological zones; each has its particular drivers leading to degradation. Regarding the Northern Coastal Zone, as the case of El Tina Plain (at the north western corner of the Sinai Peninsula) and the northern sector of the Nile Delta, water logging and soil salinity are the striking problems that cause sea water intrusion into the subsoil. Other problems here include irrational application of irrigation water and inefficient drainage systems. As far as the western desert is concerned, soil erosion and scarcity of fossil ground water are considered the most influential limiting factors on land productivity and its economic revenues.

In the meeting organized to discuss the LDN targets, the national LDN working group and relevant stakeholder groups reviewed the assessment of those ecological zones in terms of their sensitivity to desertification, as reported by the Desert Research Centre (2009-2010). This approach resulted in a map showing the sensitivity of the northern coastal zone of Egypt to desertification processes. The study indicated that this region corresponds to the critical class (C3), which means that its land is vulnerable to a rather high level of degradation due to mismanagement of natural resources. The remote eastern and western areas are negatively affected by climatic oscillation, causing prominent runoff and thereafter soil erosion.

Land degradation neutrality as a government-led process should be consistent with the national development policy. Therefore, Egypt's UNCCD 2014– 2024 NAP was reviewed by the working group to help set the targets for the different ecological zones (see Box 1).

Concerning the northern coastal zone, many projects dealing with sustainable soil management, water conservation, remedial measures against soil erosion and improvement of rangelands have taken place in different localities, i.e. West- Mersa Matrouh, Fuka to El Sallum.

In the Nile Valley and the Delta ecological zone, many projects related to water have been established for on-farm irrigation techniques, irrigation and drainage networks establishments, which have been carried out in many governorates (e.g. Kafre El Sheikh, Sohag, El Behiera, Qena and Aswan). In addition, projects on the restoration or reclamation of some areas have been established, i.e. 25 sq. km in El Sharquia Gov.) and 625000 sq. km in the Western Desert of Egypt.

In the Western Desert, groundwater has been given paramount importance with respect to the assessment of capability and water quality of aquifers in some oases (e.g. El Farafra). Treated sewage water could be used in the establishment of forests for timber production in Luxor.

Box 1: LDN Targets of Egypt

LDN at the national scale

- LDN is achieved by 2030 as compared to 2015 and an additional 10% of the national territory has improved by 2030 (net gain).

LDN at the sub-national scale (if applicable/done)

- LDN is achieved in the land degradation hotspots: **Kafr El Sheikh Governorate, Demiata Gov., Rasheed area, El Minia Gov., Sohag Gov., Al Fayoum, Mersa Matrouh Gov. (Fuka – El Sallum), El Khattara area, El Tina Plain area, El Farafra oasis and North Sinai** in Egypt by 2030 as compared to 2015 and an additional 10% of the degraded Hotspot areas has improved (net gain).

Specific targets to avoid, minimize and reverse land degradation

- Improve productivity and carbon stocks of 3,342 km² (802,080 feddan) of cultivated **areas by 2030.**
- Restore and increase the productivity of 11,666 km² (2,800,000 feddan) of cropland using modern agricultural techniques and SLM practices in **the northern areas, western and eastern fringes of reclaimed lands of Nile Delta and El Tina Plain area** by 2030.
- Rehabilitate and increase the productivity of 8,000 km² (1,920,000 feddan) of rangeland and rainfed areas using SLM practices in the north coastal areas (rangelands and rain-fed farming areas) by 2030.
- Rehabilitate and increase the productivity of 7,500 km² (1,800,000 feddan) of cropland using SLM practices in **the reclaimed areas in western desert fringes of middle and upper Egypt Governorates** by 2030.
- Reclamation and cultivation of 6,300 km² (1.5 million feddan) of virgin land in **reclaimed desert soils at different locations in the western desert of Egypt** by 2030.
- Gain in land productivity and SOC stocks in about 8,333 km² of cropland in **reclaimed desert lands at different location (cultivated areas)** by 2030 as compared to 2015.
- Halt the conversion of cropland to other land cover classes by 2030.
- Increase by 25% forest cover / tree cover through agroforestry and SLM in existing forests by 2030 as compared to 2015.
- Halt the occurrence of soil erosion by rain water, creating dams for water harvesting to be utilized for agricultural purposes for an area of 2,500 km² in dry valleys of elevated areas of the inland Sinai and Eastern Desert by 2030.
- Rationalize water consumption by growing crops of low water requirements and adopting modern irrigation systems for around 1,000 km² in some oases in the western desert of Egypt by 2030.

4.2 Key policy and technical measures to achieve LDN

There is general agreement that the achievement of the land degradation neutrality targets should be coupled with the implementation of specific key policy and technical measures, through which desired gains will balance any expected losses. Those measures fall into a wide spectrum of potential options which address both the drivers and consequences of degradation. As previously stated, land degradation drivers, trends and targets are prominently varied with the different agro-ecological zones in Egypt.

Measures address **policy or technical issues** that can be implemented in the form of **programmes or projects** that are tailored to a specific area at a given geographical and temporal scale. Policy measures mainly address the indirect drivers of land degradation (e.g. land tenure, education, governance) and should be identified drawing on the assessment of the drivers of land degradation and the legal and institutional environment. Technical measures mainly address the direct drivers of land degradation and can for example be classified as agronomic, vegetative, structural and management measures. Table 4 gives the measures to be implemented in each geographic site in order to achieve LDN.

Policies that can be used to support the implementation of the stated measures in Table 4 are as follows.

The technical measures should be accompanied by other indirect measures (policies) so that the main objective can be realized. The following is merely an account of the essence of them.

- 1- Enforcement of laws which are concerned with the avoidance of urban encroachment on arable land.
- 2- Policies encouraging contractual agriculture.
- 3- Policies promoting an investment climate.
- 4- Policies encouraging the rational use of irrigation water in terms of actual crop requirements.
- 5- Policies discouraging cultivation crops with high water consumption.
- 6- Policies that give incentives for cultivating particular crops (strategic, cash crops, etc.) on the basis of the sustainable farming.
- 7- Reviving the role of agricultural cooperatives.
- 8- Policies encouraging farmers to practice crop rotation that helps in maintenance or improvement of soil fertility.
- 9- Enhancing marketing conditions by providing producers of particular crops with reasonable information, which help obtain economic revenue.
- 10- Policies encouraging the balanced application of fertilization, bio-fertilization, and organic manure.
- 11- Policies concerned with setting up practical training to enhance the skills of farmers and technicians.
- 12- Integrating the principle of National Development Targets (NDT) into regional planning.
- 13- Integrating the LDN principle into the design and / or implementation of sectorial policies / strategies.
- 14- Strengthening the capacity for cross-sectorial innovation through the Working Group on Sustainable Land Management.
- 15- Mobilizing financial incentives to promote research on sustainable land management in relation to biodiversity and climate change.

Table 4: Measures identified for consideration by UNCCD National Focal Point and LDN working group to achieve LDN in Egypt.

Negative trend	Area [km ²]	Drivers		Corrective measures	Area [km ²]	Timelin e
		Direct	Indirect			
Location	The northern areas, western and eastern fringes of reclaimed lands of the Nile Delta and El Tina Plain area					
- Cropland showing declining and early stage of declining productivity due to salinity and water logging.	11,666	-Sea water intrusion into soils, causing decline of water table and water logging leading to Salinization. -Improper soil management. -Intensive agric., -Imbalanced mineral fertilization and eutrophication of water courses. - Anthropogenic activities (urbanization and infrastructure establishment). -Improper drainage system. -Low soil fertility. -Soil erosion.	-Misuse of land resources. -Crop pattern diversion. -Education and access to knowledge and support services. - Governance and institutional settings and policies. - Poverty of direct stakeholders. - Funding	<u>Agronomic measures:</u> - Enhancing organic matter/soil fertility. <u>Structural measures:</u> - Improving irrigation network. - Introduction of modern irrigation system. <u>Policy measures:</u> - Improving productivity of smallholders through integrating research and extension services. - Supporting marketing for smallholders. - Supporting employment and encouraging establishment of micro and small enterprises. - Revising the role of agricultural cooperatives. - Providing farmers with training courses.	11,666	2030
The north coastal areas (rang lands and rain-fed farming areas) Matrouh Gov. (Fuka – El Sallum) and North Sinai						
- Range land and rain-fed areas showing declining and early stage of declining productivity and/or having stable but stressed trends.	8,000	- Sea water intrusion. - Overgrazing of rangelands. - Removal of natural vegetation (fuelwood collection) - Natural (drought). -Lack of water. - Low soil fertility. - Soil erosion and deposition. - Anthropogenic activities	- Land tenure. - Low socio-economic services. - Lack of specific Agric. extension services. - Poverty - Education and access to knowledge and support services. - Governance and institutional settings and policies.	<u>Agronomic measures:</u> - Improving rangeland management techniques and control of overgrazing. - Disseminating new technologies of cereal, olive production to combat soil erosion. - Enhancing soil organic matter/soil fertility. - Enhancing water conservation	8,000	2030

		<p>(tourism, mining, urbanization and infrastructure establishment).</p> <ul style="list-style-type: none"> - Improper management of soil - Improper crop management. - Lack of awareness and knowledge of pastoralists. - Minimum research activities. - Landscape and geomorphology. - Sand dune encroachment. 	<ul style="list-style-type: none"> - Funding. - Lack of proper marketing. 	<p>techniques.</p> <ul style="list-style-type: none"> - Applying biological control. <p><u>Vegetative measures:</u></p> <ul style="list-style-type: none"> - Introducing new varieties of grasses and shrubs to enrich the biodiversity of rangelands, and enhance productivity. - Controlling rangeland by producing seedlings of perennial fodder shrubs. <p><u>Structural measures:</u></p> <ul style="list-style-type: none"> - Enhancing rainwater harvesting by constructing dams and barriers. - Drilling water wells and establishing reservoirs to be used for supplementary irrigation. <p><u>Management measures:</u></p> <ul style="list-style-type: none"> - Improving soil management practices to control degradation of plant cover. - Improving rain-fed cropping and utilize rainwater and complementing ground water resources. - Activating the use of natural reserves. <p><u>Policy measures:</u></p> <ul style="list-style-type: none"> - Providing farmers with the needed seeds and seedlings. - Combat misuse of plant resources (fuel, etc.) - Capacity building of technicians and farmers. - Capacity building and providing sheep herders with training on sustainable land management of rangelands (SLM). - Encouraging stakeholders to conduct SLM with low cost farm practices and 		
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				economic incentives. - Enhancing socio-economic services.		
The reclaimed areas in western desert fringes of middle and upper Egypt Governorates (El Minia Gov. to Sohag Gov., and Al Fayoum, Gov.)						
Cropland showing declining and early stage of declining productivity and/or are stable but stressed due to sand encroachment and degrading physical soil properties.	7,500	<ul style="list-style-type: none"> - Sand encroachment from the western desert. - Lack of protection belts. - Improper management of soil - Improper management of cultivated crops. - Miss use of water. 	<ul style="list-style-type: none"> - Lack of knowledge and support services. - Need for improved local governmental support. - Governance and institutional settings and policies (including taxes, subsidies, and incentives). -Economic problems. - Poverty. - Funding. 	<p><u>Agronomic measures:</u></p> <ul style="list-style-type: none"> - Disseminating new technologies on cereal, olive production; controlling soil erosion. - Enhancing soil organic matter/soil fertility. - Enhancing water conservation techniques. <p><u>Vegetative measures:</u></p> <ul style="list-style-type: none"> - Introduction of proper protection belts. <p><u>Structural measures:</u></p> <ul style="list-style-type: none"> - Introduction of modern irrigation system. <p><u>Management measures:</u></p> <ul style="list-style-type: none"> - Introduction of proper management of protection belts and its goods and services. <p><u>Policy measures:</u></p> <ul style="list-style-type: none"> - Improving the research and application of modern techniques. - Capacity building of technicians and farmers. - Encouraging stakeholders to conduct SLM with low cost farm practices and economic incentives. 	7500	2030
Reclaimed desert soils at different locations in the western desert of Egypt						
- Virgin lands at various stages of reclamation	6300	<ul style="list-style-type: none"> - Water scheduling and improper production. - Low soil fertility. 	<ul style="list-style-type: none"> - Lack of incentives facilities. - Land tenure. - Lack of agric. extension. 	- Following Approaches and Technologies for Sustainable land resources management, WOCAT.	6,300	2030

showing stable but stressed productivity.		<ul style="list-style-type: none"> - Wind erosion. - Deepening of ground water and low quality water due to over-extraction of ground water resources. 	<ul style="list-style-type: none"> - Lack of institutional facilities and services. - Funding. 	- Following proper cropping pattern.		
Reclaimed desert lands at different location (Cultivated areas)						
- Low soil organic carbon stock.	8,333	<ul style="list-style-type: none"> - Low soil fertility. - Soil erosion. - Misuse of land resources. 	<ul style="list-style-type: none"> - Low crop pattern diversity. - Access to modern knowledge and support services. - Governance and institutional settings. - Unavailability of labour. - Poverty - Funding and incentives. - Low agricultural investments. 	<u>Agronomic measures:</u> -Disseminating new technologies on cereal production. - Enhancing soil organic matter/soil fertility by appropriate SLM practices. - Proper use of soil amendments. <u>Management measures:</u> - Following integrated farming management system.	8333	2030
Different locations						
- Low forest cover / tree cover	100		<ul style="list-style-type: none"> - Education and access to knowledge and support services. - Governance and institutional settings and policies. - Unavailability of labour. - Funding. 	<u>Agronomic measures:</u> Enhancing soil organic matter/soil fertility. <u>Structural measures:</u> - Establishing irrigation network. - Introduction of modern irrigation system. <u>Policy measures:</u> -Providing labourers with training courses.	125	2030
Dry valleys of elevated areas of inland Sinai and Eastern Desert						
- Lands showing early signs of decline	2,500	<ul style="list-style-type: none"> - Low soil fertility. - Soil erosion. - Misuse of land resources. 	<ul style="list-style-type: none"> - Access to modern knowledge and support services. - Governance and institutional settings. - Unavailability of labour. - Poverty 		2,500	2030

			<ul style="list-style-type: none"> - Funding and incentives. - Low agricultural investments. 			
El Farafra Oasis, El Baharia Oasis, El Kharga Oasis and El Dakhla Oasis						
- Declining quantity of groundwater.	1,000	<ul style="list-style-type: none"> - Improper soil management. - Salinization. - Wind erosion. - Improper management of annual, perennial, shrub and fruit orchards. - Over-exploitation of vegetation for domestic use. - Over-abstraction of ground water of aquifers. - Lack of ground water, potentially leading to lower ground water or low quality water. 	<ul style="list-style-type: none"> - Land tenure. - Economic problems and poverty. - Education, cultural and training programs to knowledge and support services. - Funding. - Standard of living. 		1,000	

5. ACHIEVING LDN

5.1 Leverage achieved

- **Creating multiple benefits**
 - Engagement of a series of Ministers and multiple stakeholders to revise the related policies to evaluate LDN adherence and set policy recommendations.
- **Fostering policy coherence**
 - Revising related policies to evaluate LDN adherence, set policy recommendations to achieve adherence.
 - Including LDN and other SDGs in the national development plan.
 - Including LDN in donor collaboration plans.
 - Mainstreaming of LDN into relevant policies and programs.
- **Tapping financing opportunities**
 - Implementing the National Climate Change Investment Plan – in process.
 - Developing fundable transformative LDN project proposals to access the LDN Fund – in progress.
 - Including LDN in the national budget and allocating adequate resources to LDN related sectors - underway.
- **Country commitments and engagements**
 - Project of reclaiming of 650,000 hectares in Egypt's Western Desert - in progress.
 - Egypt's agricultural development program – in the process.

5.2 LDN transformative projects and programmes opportunities identified in Egypt

Relevant ongoing LDN projects

- Rehabilitation of new and existing wadis in the governorate of Matrouh, a project that is funded by the European Union - Joint Rural Development Program (EU-JRDP) in partnership with the Desert Research Center (DRC).
- Providing Water for Local Communities via Water Harvesting and Sustainable Management for Natural Resources in Matrouh Governorate, a project funded by the European Union - Joint Rural Development Program (EU-JRDP) in partnership with the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD).
- The Italian-Egyptian Project for Socio-Economic Development (SED) in Matrouh Governorate, funded by the General Directorate for Cooperation Development, Italian Ministry for Foreign Affairs and International Cooperation.
- On-Farm Irrigation Development project in the Nile Delta and Valley Governorate by the World Bank and Ministry of Agriculture and Land Reclamation.
- Mapping agricultural communities vulnerable to the impact of climate and enhancing their livelihood in selected countries of MENA and SSA Regions, funded by the GEF.
- Integrated management strategy for date palm crop (Agriculture Research Center, Egypt)
- Seed production of salt-tolerant crops in the New Valley (USAID and Desert Research Center).
- National program of extermination of fruit fly (Ministry of Agriculture and Land Reclamation).

LDN relevant projects in design

- Promoting Resilience in Desert Environments (PRIDE) project: The IFAD is collaborating with the Ministry of Agriculture and Land Reclamation.
- Adapting agriculture to climate change: the FAO is collaborating with the government through the Ministry of Agriculture and Land Reclamation.
- On-Farm Irrigation Development project in old and newly-reclaimed lands. The World Bank is working with the Ministry of Agriculture and Land Reclamation.
- Using agricultural drainage water in irrigation: the Science & Technology Development Fund in Egypt (STDF) is working with Desert Research Center.
- A national project for reclaiming and cultivating 1.5 million feddan: Ministries of Agriculture and Land Reclamation, Water Resources and Irrigation, Housing and New Communities, Energy, Finance, Science and Technology.
- A project for rehabilitating the degraded natural resource of rangelands and rain-fed areas in the north western coastal zone: in preparation.
- A project for changing the irrigation system from surface to drip irrigation systems in the Farafra, El Dahkla, El Kharga, and El Baharia Oases: in preparation.
- A project for improving and enhancing soil organic carbon in cultivated and newly reclaimed lands: in preparation.
- A project establishing forest cover/tree cover, using the treated sewage water: in preparation.

Proposed strategy towards the design of LDN transformative projects in Egypt

Short-term

- Mainstreaming land degradation neutrality in the rehabilitation of new and existing wadis in the Governorate of Matrouh.
- Mainstreaming land degradation neutrality in Providing Water for Local Communities via Water Harvesting and Sustainable Management for Natural Resources project in Matrouh Governorate.
- Mainstreaming land degradation neutrality in the Italian-Egyptian Project for Socio-Economic Development (SED) in Matrouh Governorate.
- Mainstreaming land degradation neutrality in the On-Farm Irrigation Development Project in the Nile Delta and Valley Governorate.
- Mainstreaming land degradation neutrality in mapping agricultural communities vulnerable to the impact of climate and enhancing their livelihoods.
- Mainstreaming land degradation neutrality in the integrated management strategy for date palm crop.
- Mainstreaming land degradation neutrality in the seed production of salt tolerant crops in the New Valley.
- Mainstreaming LDN in the national program of the extermination of fruit fly.

Medium-term

- Co-design a new land degradation neutrality transformative project with the Food and Agriculture Organization of the United Nations (FAO), the World Bank (WB), International Fund for Agricultural Development (IFAD), the International Union for Conservation of Nature (IUCN) and/or other international or national partners.

6. CONCLUSIONS

The LDN TSP has concluded the following key strategic implementation actions/measures:

1. Establishment of specific LDN related administration.
2. Establishment of LDN monitoring systems as targeted in the NAP.
3. Obtaining funds through national ministerial budgets and/or other new mechanisms such as taxes, penalties, payment for ecosystem services.
4. Developing clear national awareness on LDN.
5. Reviewing current legislations and developing new legislations, especially those addressing the LDN concept.
6. LDN-related aspects should be implemented at land degradation hotspots and be integrated at integral regional land use planning.

7. ANNEXES

7.1 List of LDN working group members

The UNCCD Egypt National Focal Point (DRC), Ministry of Agriculture and Land Reclamation, Ministry of Water Resources and Irrigations, Ministry of Environment, and other national bodies i.e. National Authority of Remote Sensing and Space Sciences (NARSS), Executive Authority for Land Improvement Projects (EALIP), General Authority for Rehabilitation Projects and Agricultural Development (GARPAD), Egyptian Public Authority for Drainage Projects (EPADP), Agricultural Research Center (ARC), Egyptian General Survey Authority (ESA), and Egyptian Environmental Affairs Agency (EEAA), are to take charge of achieving LDN in Egypt together with the working group and the respective stakeholders. Below is the list of LDN working group members.

	Name of representative	Position	Name of Institution/ Organization
1	Prof. Dr. Naiim Moselhy Mohamed	DRC President, UNCCD National Focal Point	Desert Research Center
2	Prof. Dr. Mohamed Abd El Tawab H El Sayed	Deputy Minister of Agriculture and Land Reclamation, Head of Executive Authority for Land Improvement Projects (EALIP).	Ministry of Agriculture and Land Reclamation
3	Prof. Dr. Saad El Demerdash El Kadi	Member of SC UNCCD Egypt	Desert Research Center
4	Prof. Dr. Mohamed Mohamed Abdu Wassif	Member of SC UNCCD Egypt	Desert Research Center
5	Prof. Dr. El-Sayed Ahmed Abd El-Ghafour	Member of SC UNCCD Egypt	Desert Research Center
6	Prof. Dr. Hala Yousry	Sociologist	Desert Research Center
7	Dr. Taher Mostafa Hamed Yossif	UNCCD LDN TSP National Consultant Egypt	Desert Research Center
8	Dr. Ahmed Abdel Atti	UNCCD CST Egypt	Desert Research Center
9	Dr. Emad Mohamed Mohamed Salem	Member of SC UNCCD Egypt	Desert Research Center
10	Dr. Ahmed Esmail	Member of SC UNCCD Egypt	Desert Research Center
11	Dr. Sami Mohamed Mahmoud El Saadany	Head of Central Administration for Lands and Water	Ministry of Agriculture and Land Reclamation
12	Prof. Dr. Ahmed Mohamed Awad	Soil Science	Agricultural Research Center
13	Dr. Ibrahim Abu El Eish	Chairman of Board of Directors	SEKEM Company, A (Private Sector)
14	Magdy Yousif Ahmed	Chairman of Board of Directors	Techno green Company Private Sector
15	Representative of the Ministry of Finance	Prime sector ministry Affairs	Ministry of Finance
16	Representative of the Ministry of Foreign affairs	Prime sector ministry Affairs	Ministry of Foreign affairs
17	Representative of the Ministry of International cooperation	Prime sector ministry Affairs	Ministry of International cooperation
18	Representative of the Ministry of Planning, Follow - up and Administrative Reform	Prime sector ministry Affairs	Ministry of Planning, Follow - up and Administrative Reform
19	Dr. Abdel Wahab Afifi	Researcher, Environment Affairs system	Ministry of Environment
20	Hashem Morad Fared Shear	Prime sector ministry Affairs	The Ministry of Social Solidarity
21	Dr. Ebraheem Mohamed Mahmoud	Prime sector ministry Affairs	The Ministry of water resources and irrigations
22	Dr. Amani Abdel Mageed Ebraheem	Executive Manager for organizing land uses	National center for planning land uses

23	Magda El Saied Mahmoud	Manager , General Department for Agricultural Statistics	Central Agency for Public Mobilization and Statistics
24	Dr. Nagwan Farok Sheha	Expert	Center for Information and Decision making Support
25	Prof.Dr. Abdallah Gad Abdallah	GIS	NARSS
26	Prof.Dr. Abdelaziz Belal	GIS	NARSS
27	Prof. Dr. El Sayed Ali Khalifa	Agricultural representative	Agricultural Association
28	Eng. Ashraf El-Mhmady	Manager of the Directorate of Irrigation in Kafr El-Sheikh	The Ministry of water resources and irrigations
29	Eng. Abd El-Rafea Ahmed Abdelazeem	Manager of the Directorate of Agricultural in Kafr El-Sheikh	Ministry of Agriculture and Land Reclamation
30	Eng. Hussein Mofteh El-Seniny	Manager of the Directorate of Agricultural in Matrouh	Ministry of Agriculture and Land Reclamation
31	Eng. Atef Hamed Farag	Manager of the Directorate of Agricultural in Saini	Ministry of Agriculture and Land Reclamation
32	Eng. Magd El-Morsy Awad	Manager of the Directorate of Agricultural in El-Kharga	Ministry of Agriculture and Land Reclamation
33	Eng. Maher Rashwan	Manager of Environmental System	Ministry of Environment
34	Dr. El-Sayed Khalil Mubarak	Manager of the Directorate of Agricultural in Ismailia	Ministry of Agriculture and Land Reclamation
35	Eng. Atef Obeed Matar Or Yousif Abdelhaleem Wafa	Manager of the Directorate of Agricultural in North Saini	Ministry of Agriculture and Land Reclamation
36	Dr. Yehia Ibrahim	Lecturer	Faculty of Agriculture in Alexandria University

7.2 Working group meeting

- Some meetings were attended by the UNCCD national focal point (NFP), LDN TSP country consultant as well as representatives of ministries, authorities and agencies concerned (Working Group), together with the UNCCD Egypt Scientific Committee, to set Egypt's LDN.
- Following the inception workshop held on 28 Feb, 2017, a meeting for the Working Group and relevant stakeholders was conducted to review the provided default tier 1 data. Having interpreted the data, it was concluded that there is no forest in Egypt as it is in reality. Land cover categories (in sq. km) during the 10-year interval (2000-2010) remained unchanged. Net LPD showed changes in trends (in sq. km) ranging from "declining, early signs of decline, stable but stressed, stable not stressed and increasing" for the five land use/cover categories (2-6). SOC stock trends should be followed in light of the average data for 15 years before and after the year 2000. All the interpreted data were in line with national data sets; see Table 1.
- During the small meeting of the Working Group and stakeholders, it was suggested that an accuracy evaluation for the provided default data be made as follows:
A sampling grid composed of 10 geographically distributed plots was delineated in a randomized way on the provided default data maps (2000 and 2010). Each of the 10 plots was composed of a 4*4matrix, equal to 16 points with a total of 160 points which were cross-checked via the available multi-temporal high-resolution Google Earth images, as verification data for tracking land cover patterns and their changes over time. According to this method, the average accuracy for the land cover maps of Egypt in 2000 and 2010 was estimated at 95.6% and 94.4% respectively. The validation was also based on the comparison with the available official data.

7.3 Photos of events on LDN target setting in Egypt



