



Egypt's National Action Plan (NAP) to Combat Desertification, Land Degradation and Drought

2024 - 2030

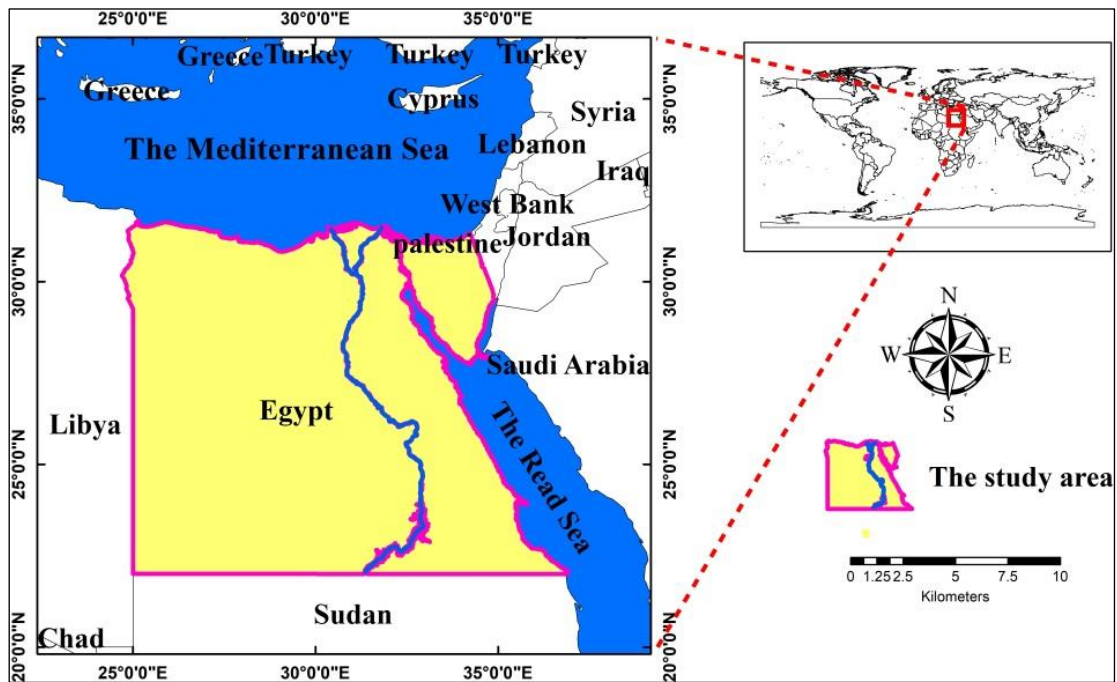




Arab Republic of Egypt
Ministry of Agriculture and Land Reclamation
Desert Research Center

**Egypt's National Action Plan (NAP) to Combat
Desertification, Land Degradation and Drought,
2024 – 2030**

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Arab Republic of Egypt

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Executive Summary

Desertification, Land Degradation, Drought (DLDD) and climate change as well as the irrational use of land, water and vegetal resources are issues of national, regional and global dimension. They are caused by complex interactions among physical, biological, demographic, socio-economic and cultural factors. Such issues lead to reduce the cultivatable land, fodder and food production, animal proteins and resilience to climate change, to increase malnutrition, and poverty, not to mention food insecurity, forced migration, biodiversity loss, and water scarcity. All these issues continue to pose serious challenges to the sustainable development of the affected areas of Egypt. Egypt ratified the UN Convention to Combat Desertification (UNCCD) in 1995.

The UNCCD 2018-2030 Strategy Framework recognized that addressing DLDD will help improve the productivity of land and rehabilitation, conservation and sustainable management of land and water resources. The strategy Framework will contribute to

- (1) Achieve the objectives of the convention and the 2030 agenda for SDGs, in particular regarding sustainable development goal (SDG) 15 and target 15.3: “by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation- neutral world” and other interrelated SDGs, within the scope of Convention.
- (2) Improving the living conditions of affected populations.
- (3) Enhancing ecosystem services.

The UNCCD 2018-2030 Strategy has five strategic objectives that are reviewed as follows:

Strategic objective 1: To improve the conditions of affected ecosystems, combat desertification/land degradation, promote sustainable land management and contribute to land degradation neutrality.

Strategic objective 2: To improve the living conditions of affected populations.

Strategic objective 3: To mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and

Strategic objective 4: To generate global benefits through effective implementation of the United Nations Convention to Combat Desertification.

Strategic objective 5: To mobilize substantial and additional financial and nonfinancial resources to support the implementation of the convention by building effective partnerships at global and national level.

The achievement of these Strategic Objectives will be guided by implementation framework:

(a) Financial and non-Financial resources.

(b) Policy and planning.

(c) Action and measures on the ground.

The UNCCD 2018-2030 Strategy urges the “Parties” to develop their National Action Plans (NAPs) with the implementation framework of the strategy. The Government of Egypt, represented by the Ministry of Agriculture and Land Reclamation, prepared and adopted the (NAP) to combat desertification, land degradation and drought in 2005 and 2015. Following the adoption of UNCCD, 2018-2030 strategy framework to enhance the implementation of the convention (2017), the current report provides an update on the Egyptian National Action Plan to combat desertification, land degradation and drought (2015-2023).

A participatory bottom-up approach was adopted through all phases of the preparation process. Multiple stakeholders from governmental and community-based organizations in the country participated in the meetings and workshops for reviewing and developing the NAP 2024-2030.

The preparation of the NAP was based on key results of the situation analysis of the country and the assessment of the NAP 2015-2023 against the operational objectives of the UNCCD strategy. The situation analysis revealed that improper management of water and soil resources, overgrazing and removal of natural vegetation of natural rangelands, intensive agriculture, recurrent droughts, land tenure, and non-sustainable land uses (such as improper plowing, inappropriate rotations, deforestation, and random urbanization), wind /water erosion, Sand and Dust Storms (SDS), water scarcity, economic problems and poverty are of the main drivers of desertification and land degradation. The situation will be accentuated further by the threats of climate change and increasing population growth which



will put more pressure on the natural resources.

Therefore, the new Egyptian National Action Plan (NAP) was developed with a future vision to avoid, minimize and reverse desertification, land degradation and mitigate the effects of drought in affected areas at national and sub - national scale and strive to achieve a land degradation-neutral world consistent with the 2030 agenda for sustainable development from 2024 to 2030 through sustainability of land resources, enhancement of population livelihood, and contribution to the national economy, capacity building, the sharing of successful experiences, technology transfer, the provision of scientific support, raising awareness, mobilization of resources and the provision of assistance in implementing policies at nation level.

The new Egyptian National Action Plan (NAP) also suggested the following actions and measures adequate communication to mobilize key stakeholders to support combating desertification; investment in research and knowledge management; establishing the Coordination Unit of the 3-Rio Conventions; fostering community-based approaches through participatory methodologies and multi-stakeholder dialogue; adopting integrated ecosystem approaches for conservation and sustainable use of natural ecosystems; developing a national monitoring program to monitor the conditions of affected populations and ecosystems; support poverty reduction; environmental sustainability and orienting higher education curricula to deal with the DLDD and SLM related issues at national universities to improve the graduates' knowledge of such issues.

The updated NAP to combat desertification, land degradation and drought in Egypt 2024 - 2030 has been prepared to realize the expected outcomes under each of the UNCCD 2018-2030 five strategic objectives as follow:

The expected outcomes of strategic objective 1 are:

- 1.1. Land productivity and related ecosystems services are maintained or enhanced;
- 1.2. The vulnerability of affected ecosystem is reduced and the resilience of ecosystem is increased.
- 1.3. The measures are identified and implemented, and necessary monitoring systems are established.

- 1.4. Measures for sustainable land management and the combating of desertification / land degradation are shared, promoted and implemented.

The expected outcomes of strategic objective 2 are:

- 2.1. Food security and adequate access to water for people in affected areas is improved.
- 2.2. The livelihoods of people in affected areas are improved and diversified.
- 2.3. Local people, especially women and youth, are empowered and participate in decision-making processes in combating DLDD.
- 2.4. Migration forced by desertification and land degradation is substantially reduced.

The expected outcomes of strategic objective 3 are:

- 3.1. Ecosystems' vulnerability to drought is reduced, including through sustainable land and water management practices.
- 3.2. Communities' resilience to drought is increased.

The expected outcomes of strategic objective 4 are:

- 4.1. Sustainable land management and the combating of desertification /land degradation contribute to the conservation and sustainable use of biodiversity and addressing climate change.
- 4.2. Synergies with other multilateral environmental agreements and processes are enhanced.

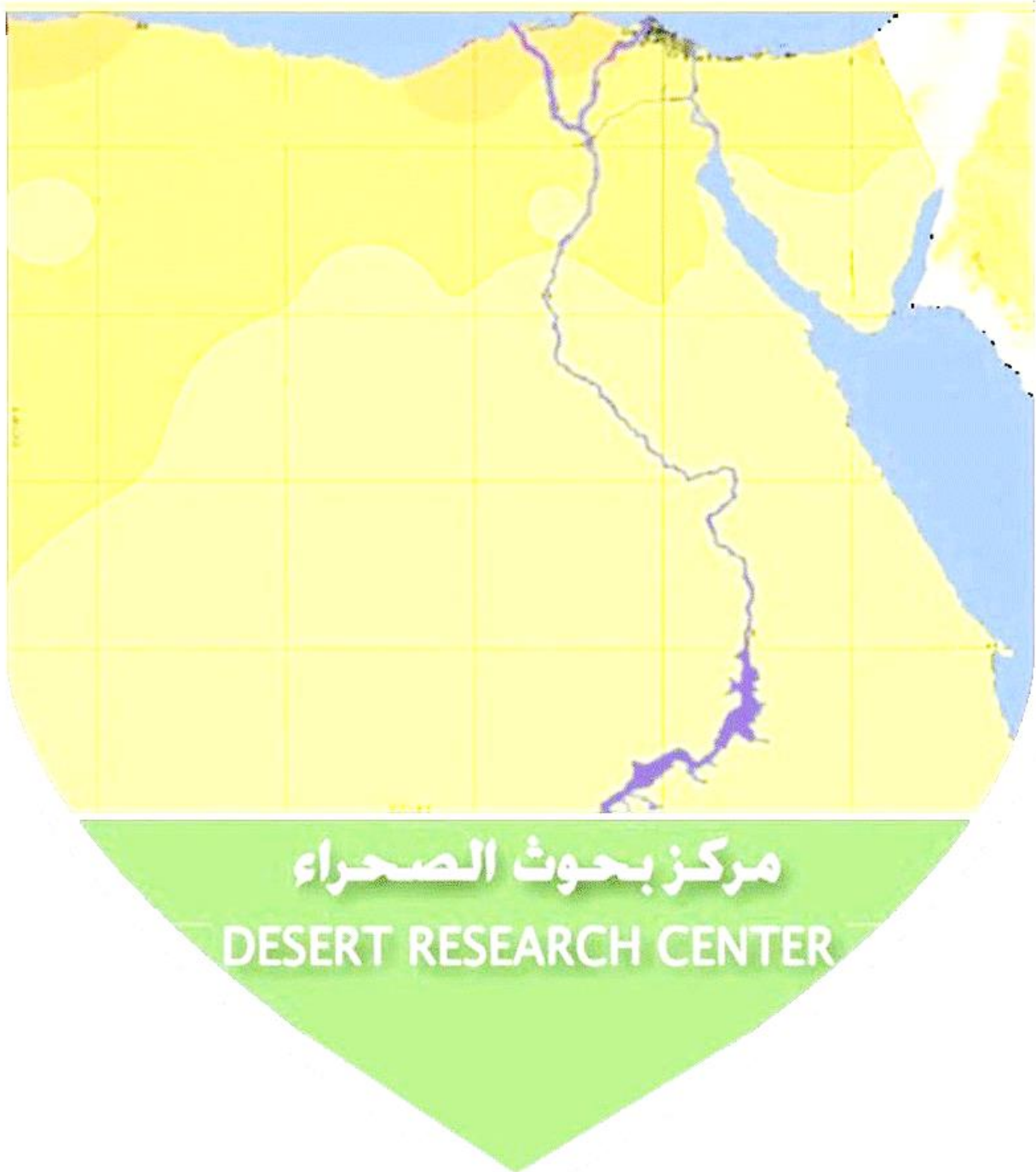
The expected outcomes of strategic objective 5 are:

- 5.1. Governmental support is provided for implementing effective and targeted capacity-building and “on-the- ground interventions” in the affected areas.
- 5.2. Adequate and timely public and private financial resources are further mobilized and made available to hotspots in Egypt.
- 5.3. Extensive efforts are implemented to promote technology transfer.

The updated NAP to combat desertification, land degradation and drought in Egypt 2024 - 2030 includes the action plan of many projects to achieve the UNCCD 2018-2030 five strategic objectives in terms of monitoring programs on DLDD and SLM, and an integrated financial plan.



The action plan has been prepared and outlining the responsible parties for addressing DLDD issues, DLDD platform for knowledge sharing, a national monitoring program on DLDD and SLM, and updating and fulfilling capacity needs for proper implementation of DLDD activities.



الملخص التنفيذي

إن التصحر وتدهور الأراضي والجفاف وتغير المناخ بجانب الإستخدام غير الرشيد للأراضي والمياه والموارد النباتية يشكلون قضايا ذات بعد وطني وإقليمي وعالمي. هذه القضايا ناجمة عن تفاعلات معقدة بين العوامل الفيزيائية والبيولوجية والديموجرافية والاجتماعية والاقتصادية والثقافية. وتؤدي مثل هذه التحديات إلى نقص كل من مساحة الأراضي الصالحة للزراعة ونتاج الغذاء والأعلاف والبروتينات الحيوانية والالياف والقدرة على الصمود في مواجهة تغير المناخ، وزيادة سوء التغذية والفقر فضلاً عن قلة الأمن الغذائي والهجرة القسرية وفقدان التنوع البيولوجي وندرة المياه. ولا تزال كل هذه القضايا تشكل معوقات وتحديات خطيرة أمام التنمية المستدامة في المناطق المتضررة في مصر. وقد وقعت جمهورية مصر العربية على اتفاقية الأمم المتحدة لمكافحة التصحر عام ١٩٩٥.

أقر الإطار الإستراتيجي لاتفاقية الأمم المتحدة لمكافحة التصحر ٢٠١٨-٢٠٣٠ بأن عمليات مكافحة التصحر وتدهور الأراضي والجفاف ستساعد على تحسين إنتاجية الأراضي وإعادة تأهيلها في حالة تدهورها نسبياً والجفاف عليها بجانب تحقيق الإدارة المستدامة لموردى الأراضي والمياه. وأن هذا الإطار سيساهم في:

(١) تحقيق أهداف إتفاقية الأمم المتحدة لمكافحة التصحر وكذا تحقيق أهداف خطة التنمية المستدامة للأمم المتحدة لعام ٢٠٣٠، ولا سيما فيما يتعلق بهدف التنمية المستدامة رقم ١٥ والغاية ١٥.٣ وذلك بحلول عام ٢٠٣٠ والتي تهدف إلى مكافحة التصحر، وإستعادة الأراضي والتربة المتدهورة، بما في ذلك الأراضي المتضررة من التصحر والجفاف والفيضانات، والسعي لتحقيق عالم خال من ظاهرة تدهور الأراضي فضلاً عن تحقيق غيرها من أهداف التنمية المستدامة ذات الصلة في نطاق الإتفاقية.

(٢) تحسين الظروف المعيشية للسكان المتضررين.

(٣) تعزيز خدمات النظام البيئي.

كما أن الإطار الاستراتيجي لاتفاقية الأمم المتحدة لمكافحة التصحر ٢٠١٨-٢٠٣٠ تتضمن خمسة أهداف استراتيجية يمكن استعراضها على النحو التالي:

الهدف الاستراتيجي ١: تحسين حالة النظم الإيكولوجية المتأثرة ، ومكافحة التصحر / تدهور الأراضي ، وتعزيز الإدارة المستدامة للأراضي ، والإسهام في تحييد تدهور الأراضي.

الهدف الاستراتيجي ٢: تحسين ظروف معيشة السكان المتأثرين.

الهدف الاستراتيجي ٣: تخفيف اثار الجفاف والتكيف معها وإدارتها من أجل تحسين قدرة السكان المتأثرين والنظم الإيكولوجية على التأقلم.



الهدف الاستراتيجي ٤: جلب منافع بيئية على الصعيد العالمي عن طريق تنفيذ إتفاقية مكافحة التصحر بفاعلية.

الهدف الاستراتيجي ٥: تعبئة موارد مالية وغير مالية كبيرة وإضافية لدعم تنفيذ الإتفاقية من خلال بناء شراكات فعالة على المستويين العالمي والوطني.

فضلاً عن أنه سيتم الإسترشاد في تحقيق هذه الأهداف الإستراتيجية بإطار التنفيذ الموضح على النحو التالي:

(أ) توفير الموارد المالية وغير المالية.

(ب) إتباع السياسات السليمة والتخطيط الفعال.

(ج) تنفيذ خطط العمل والتدابير على أرض الواقع.

حثت إتفاقية الأمم المتحدة لمكافحة التصحر وخاصة إستراتيجيتها الأخيرة (٢٠١٨-٢٠٣٠) " الدول الأطراف" على تطوير الإستراتيجيات وخطط العمل الوطنية (NAP) مع الأخذ في الإعتبار الاطار التنفيذى المصاحب للإستراتيجية.

وخلال العقدين الاخيرين أعدت وإعتمدت الحكومة المصرية خطة العمل الوطنية لمكافحة التصحر وتدهور الأراضي والجفاف عامي ٢٠٠٥ و ٢٠١٥ ، من خلال وزارة الزراعة واستصلاح الأراضي. وبعد إعتقاد لإطار الإستراتيجي المستقبلي لمكافحة التصحر وتدهور الأراضي والجفاف الصادر في عام ٢٠١٧ من إتفاقية الأمم المتحدة لمكافحة التصحر للفترة من ٢٠١٨-٢٠٣٠ وذلك لتعزيز تنفيذ أهداف الاتفاقية ، فإن إستراتيجية وخطة العمل الوطنية المصرية الحالية (٢٠٢٤ - ٢٠٣٠) تقدم تحديتاً لخطة العمل الوطنية المصرية السابقة لمكافحة التصحر وتدهور الأراضي والجفاف والتي صدرت في ٢٠١٥ وتم تنفيذها في الفترة من ٢٠١٥ وحتى نهاية ٢٠٢٣ بواسطة العديد من الوزارات والهيئات المعنية وشركاء العمل الوطنى حتى تتوافق مع عدة متغيرات إجتماعية وإقتصادية وبيئية وطبيعية محلية ودولية.

وتم الأخذ في الإعتبار النهج التشاركي التصاعدي خلال جميع مراحل الإعداد لخطة العمل الوطنية الحديثة. وقد شارك العديد من أصحاب المصلحة من الهيئات الحكومية والخاصة والمجتمعية في الدولة في الإجتماعات وورش العمل لمراجعة وتحديث خطة العمل الوطنية لتنفيذها في الفترة ٢٠٢٤-٢٠٣٠.

وقد إستند إعداد وتحديث خطة العمل الوطنية إلى النتائج الرئيسية لتحليل الوضع في مصر وتقييم خطة العمل الوطنية لمكافحة التصحر وتدهور الأراضي وتخفيف أثر الجفاف عن الفترة السابقة (٢٠١٥-٢٠٢٣). حيث أوضح تحليل الوضع السابق أن الإدارة غير السليمة لموارد التربة والمياه ، والرعي الجائر وإزالة النباتات من المراعي الطبيعية وخاصة في الساحل الشمالى الغربى لمصر، والزراعات المكثفة، وحالات الجفاف المتكررة، وتفتيت حيازة الأراضي فى العقود الأخيرة، والإستخدامات غير المستدامة للأراضي (مثل الحرث غير السليم، وعدم إتباع الدورة الزراعية المناسبة، وقلة عمليات التشجير، وتحويل النشاط الزراعى إلى غيره من الأنشطة الأخرى فى الأراضي الزراعية) ، وانجراف التربة بالرياح/المياه، ونشاط العواصف

الرملية والترايبية، وندرة المياه، والمشاكل الاقتصادية والفقر، حيث تعتبر هذه العوامل ضمن أهم الدوافع الرئيسية للتصحّر وتدهور الأراضي. وسوف يتفاقم الوضع بشكل أكبر بسبب تهديدات تغير المناخ وزيادة النمو السكاني الذي سيزيد من الضغط على الموارد الطبيعية.

كما كشف تقييم خطة العمل الوطنية الصادرة في ٢٠١٥ عن العديد من الفجوات الإستراتيجية التي تضمنت الإفتقار إلى الوعي بقضايا التصحر وتدهور الأراضي والجفاف، والإفتقار إلى برنامج وطني دقيق لرصد التغيرات والإتجاهات لحالة النظم الإيكولوجية وتحديد المناطق الأكثر تضرراً، ومتابعة ظروف السكان المتأثرين بعمليات التصحر والتدهور، وإنخفاض تعميم قضايا التصحر وتدهور الأراضي والجفاف. وقلة تضمينها في خطط التنمية، والإفتقار إلى التنسيق والتناغم بين إتفاقيات ريو البيئية الثلاث للأمم المتحدة (مكافحة التصحر، التنوع البيولوجي، تغير المناخ)، والإفتقار إلى آليات منظمة لتعبئة الموارد المالية اللازمة من المصادر المحلية والدولية لتنفيذ هذه الإتفاقيات البيئية الأهمية.

كما أشتملت فجوات خطط العمل الوطنية السابقة من منظور تشغيلي على إنخفاض مشاركة مختلف أصحاب المصلحة في اللجان الوطنية ذات الصلة بقضايا التصحر وتدهور الأراضي والجفاف، بالإضافة إلى قلة المساواة في المشاركة من الجنسين، وقلة الدعم والتمويل المقدم لجهة التنسيق المعنية بإدارة المعرفة وتبادلها مع أصحاب المصلحة الرئيسيين ذات الصلة بقضايا التصحر وتدهور الأراضي والجفاف وهو مركز بحوث الصحراء، وخاصة إستخدام المعارف التقليدية المحلية، وقصور التوجيه بشأن قضايا التصحر وتدهور الأراضي والجفاف في البرامج التعليمية والبحثية، وعدم ترجمة نتائج البحوث إلى مخرجات يمكن إستخدامها في ممارسات الإدارة المستدامة للأراضي، ونقص التواصل بين المؤسسات البحثية والتكنولوجية الوطنية ذات الصلة بقضايا التصحر وتدهور الأراضي والجفاف.

وعليه تم تحديث خطة العمل الوطنية الحالية (NAP) برؤية مستقبلية لتجنب التصحر وتدهور الأراضي وتقليلهما إلى الحد الأدنى وعكس إتجاههما والتخفيف من آثار الجفاف في المناطق المتأثرة والمتضررة والحصول على أراضى خالية من ظاهرة التدهور، وتتوافق مع الإطار الإستراتيجي لإتفاقية الأمم المتحدة لمكافحة التصحر (٢٠١٨ - ٢٠٣٠) وخطة الأمم المتحدة للتنمية المستدامة لعام ٢٠٣٠، وخطة التنمية الزراعية المستدامة المحدثة والصادرة في ٢٠١٩، وذلك في الفترة من عام ٢٠٢٤ إلى ٢٠٣٠ عن طريق بناء القدرات وتبادل التجارب الناجحة ونقل التكنولوجيا وتوفير الدعم العلمي وزيادة الوعي وتعبئة الموارد المالية وتقديم المساعدة في تنفيذ السياسات على المستوى الوطني وتحت الوطني.

كما إقتُرحت خطة العمل الوطنية الحالية والإجراءات والتدابير اللازمة لسد الفجوات المشار إليها سابقاً مثل: التواصل الفعال لحشد أصحاب المصلحة الرئيسيين لدعم مكافحة التصحر وتدهور الأراضي والجفاف؛ والإستثمار في البحوث وإدارة المعرفة؛ وإنشاء هيئة قومية تختص بالتنسيق بين إتفاقيات ريو البيئية الثلاث؛ وتعزيز النهج المجتمعي من خلال المنهجيات التشاركية والحوار بين أصحاب المصلحة المتعددين؛ وإعتماد منُهجيات وبرامج عمل متكاملة لحفظ النظم الإيكولوجية الطبيعية وإستخدامها المستدام؛ ووضع



برنامج وطني لرصد ظروف السكان والنظم البيئية المتضررة؛ ودعم الحد من الفقر؛ والاستدامة البيئية وتوجيه مناهج التعليم العالي للتعامل مع قضايا التصحر وتدهور الأراضي والجفاف والإدارة المستدامة للأراضي في الجامعات الوطنية لتحسين معرفة الخريجين بهذه القضايا.

كما تم إعداد خطة العمل الوطنية المحدثة الحالية لمكافحة التصحر وتدهور الأراضي والجفاف في مصر الفترة (٢٠٢٤-٢٠٣٠) لتحقيق المخرجات المتوقعة في إطار كل هدف من الأهداف الاستراتيجية الخمسة لإتفاقية الأمم المتحدة لمكافحة التصحر (٢٠١٨-٢٠٣٠) على النحو التالي:

١- المخرجات المتوقعة للهدف الاستراتيجي ١:

- ١-١: الحفاظ على إنتاجية الأراضي وخدمات النظم الإيكولوجية ذات الصلة أو زيادتها.
- ١-٢: الحد من هشاشة النظم الإيكولوجية المتأثرة وزيادة قدرة النظم الإيكولوجية على التأقلم.
- ١-٣: تحديد التدابير ذات الصلة وتنفيذها ، وإستحداث نظم الرصد اللازمة.
- ١-٤: المشاركة في تنفيذ التدابير الهادفة التي تحقق الادارة المستدامة للأراضي ومكافحة التصحر / وتدهور الأراضي، وتعزيز هذه التدابير وتنفيذها.

٢- المخرجات المتوقعة للهدف الاستراتيجي ٢:

- ٢-١: تحسين الأمن الغذائي لمن يعيشون في المناطق المتأثرة وتيسير السبل الملائمة لحصولهم على المياه.
- ٢-٢: تحسين سبل عيش سكان المناطق المتأثرة وتنويعها.
- ٢-٣: تمكين السكان المحليين ، لا سيما النساء والشباب ، من مشاركتهم في عمليات صنع القرار في مجال مكافحة التصحر وتدهور الأراضي والجفاف.
- ٢-٤: الحد بشكل كبير من الهجرة القسرية الناجمة عن التصحر وتدهور الاراضي.

٣- المخرجات المتوقعة للهدف الاستراتيجي ٣:

- ٣-١: الحد من أثر تعرض النظم الإيكولوجية للجفاف، من خلال ممارسات الإدارة المستدامة للأراضي والمياه.
- ٣-٢: زيادة قدرة المجتمعات المتأثرة على التأقلم مع الجفاف

٤- المخرجات المتوقعة للهدف الاستراتيجي ٤:

- ٤-١: إسهام الإدارة المستدامة للأراضي ومكافحة التصحر/ تدهور الأراضي في حفظ التنوع البيولوجي واستخدامه المستدام ومعالجة تغير المناخ.
- ٤-٢: تعزيز أوجه التآزر مع الاتفاقات والعمليات البيئية المتعددة الأطراف الأخرى.

٥- المخرجات المتوقعة للهدف الاستراتيجي ٥:

- ٥-١: توفير الدعم الحكومي لتنفيذ عمليات بناء القدرات الفعالة والمستهدفة و"التدخلات الميدانية" في المناطق المتضررة .

٢-٥ تعبئة المزيد من الموارد المالية العامة والخاصة الكافية وفي الوقت المناسب وإتاحتها للمناطق المتضررة في مصر.

٣-٥ بذل جهود واسعة النطاق لتعزيز نقل التكنولوجيا في مكافحة التصحر وتدهور الأراضي. كما تضمنت خطة العمل الوطنية المحدثة لمكافحة التصحر وتدهور الأراضي والجفاف في مصر للفترة (٢٠٢٤-٢٠٣٠) العديد من المشروعات المتخصصة في تحقيق الأهداف الاستراتيجية الخمسة لإتفاقية الأمم المتحدة لمكافحة التصحر (٢٠١٨-٢٠٣٠) ومن أهم هذه المشروعات ما يتعلق برصد التصحر وتدهور الأراضي والجفاف والإدارة المستدامة للأراضي. وقد تم إعداد خطة العمل الوطنية الحديثة بمشاركة الهيئات والجهات الحكومية والخاصة والمجتمعية المسؤولة عن معالجة قضايا التصحر وتدهور الأراضي والجفاف، برعاية جهة التنسيق وتبادل المعرفة بشأن التصحر وتدهور الأراضي والجفاف (مركز بحوث الصحراء - وزارة الزراعة واستصلاح الأراضي)، كما تضمنت مشروعات عن تحديث وبناء القدرات من أجل التنفيذ السليم لأنشطة التصحر وتدهور الأراضي والتأقلم مع الجفاف وتخفيف أثره وتحسين سبل المعيشة للسكان المتأثرين بظاهرة التصحر وتدهور الأراضي أو الجفاف والعمل على إستدامة المناطق المحمية وتنمية المراعى الطبيعية.

مركز بحوث الصحراء

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Preface

Preparing an update to the Egypt's National Action Plan (NAP) is a major national commitment towards the United Nations Convention to Combat Desertification (UNCCD). This preparation is carried out by Desert Research Center (DRC), as the National Focal Point for UNCCD. Egypt was the fourth country to adopt this convention in 1995 out of more than 190 countries so far. The importance of preparing the NAP stems from several considerations, the most important of which at the national level is activating national efforts to combat land degradation (desertification) to reduce major losses in the productivity of available natural resources, in addition to reducing harmful effects on the environmental, economic and social levels. At the regional level, preparing this plan will encourage participation in sub-regional and regional efforts and develop the potential for cooperation with Arab and African Countries in various fields. At the international level, the plan has great positive effects, the most important of which is the development of cooperation with international donor bodies concerned with supporting efforts to combat land degradation at various national, regional and international levels.

Efforts to prepare and update the current plan were initiated via directions from Prof. Dr. Abdullah Zaghoul, Former President of the DRC to hold intensive meetings more than six months ago, which included inviting the relevant institutions at the national level to actively participate in providing data, activities, and efforts related to combat desertification, either the implemented projects or those underway in light of the NAP (2015/2023). The response of these concerned institutions of the members of the Science and Technology Committee was active and effective. The committee's work activities included analyzing the previous situation, efforts and projects to combat desertification, land degradation and drought at different levels.

On 15/10/2023, it was approved to form a working team of scientists and experts from the DRC staff stem from the Science and Technology Committee under the supervision of **Prof. Dr. Hossam Ahmed Shawky** - the current president of the DRC and led by **Prof. Dr. Abdullah Zaghoul** - coordinator for the working team to prepare an update to the Egypt's NAP in accordance with the terms of reference for preparing the NAP approved by the UNCCD and includes the various efforts and the main results of analyzing the previous situation through

evaluating the NAP to combat desertification, land degradation and mitigate the impact of drought for the previous period (2015-2023) and identifying the challenges and constrains that hindered the implementation of some projects from the previous plan.

The working team was formed as follows:

Prof. Dr. / Abdullah Kassem Zaghoul	President of the DRC (2020-2023)
Prof. Dr. / Naiim Moselhy Mohamed	President of the DRC (2015-2020)
Prof. Dr. / Ahmed Mohamed Yousef	President of the DRC (2015)
Prof. Dr. / Mohamed Yahia Draz	President of the DRC (2009-2011)
Prof. Dr. / Mostafa Sabry El Hakeem	Emeritus Prof. of Rangelands Management DRC
Prof. Dr. / Rafat Fahmi Mesak	Emeritus Prof. of Geology -DRC
Prof. Dr. / Mohamed Mohamed Wassif	Emeritus Prof. of Soil Conservation DRC
Prof. Dr. / Taher Mostafa Yossif	Prof. of Soil Sciences - DRC

The members of the working team should be attributed to the valuable assistance, encouragement and unlimited support from **prof. Dr. Hosam Ahmed Shawky** the current president of the DRC for completing this Egypt's National Action Plan (NAP 2024 – 2030).

The working team carried out the tasks assigned via several weekly meetings and ended with the preparation of the complete main draft of the NAP to be sent to the authorities, institutions and national experts for their opinions and comments by the end of February, 2024. Then, an update of the plan in its final form is prepared to be submitted the higher national committee to combat desertification to take the necessary recommendations and approve it and to send to Executive Secretariat of UNCCD.



Souvenir photo for the committee members for preparing the Egypt's National action plan (NAP) to combat Desertification, land degradation and Drought. 2024 – 2030 with **Prof. Dr. Hosam Ahmed Shawky**, President of the DRC and focal point of the UNCCD Convention.



Members from right to left.

Prof. Dr. Ahmed Mohamed Yousef

Prof. Dr. Mostafa Sabry El Hakeem

Prof. Dr. Mohamed Mohamed Wassif

Prof. Dr. Mohamed Yahia Draz

Prof. Dr. Abdulla Kassem Zaghloul (Chair of the Committee)

Prof. Dr. Hosam Ahmed Shawky (President of the DRC & Focal Point)

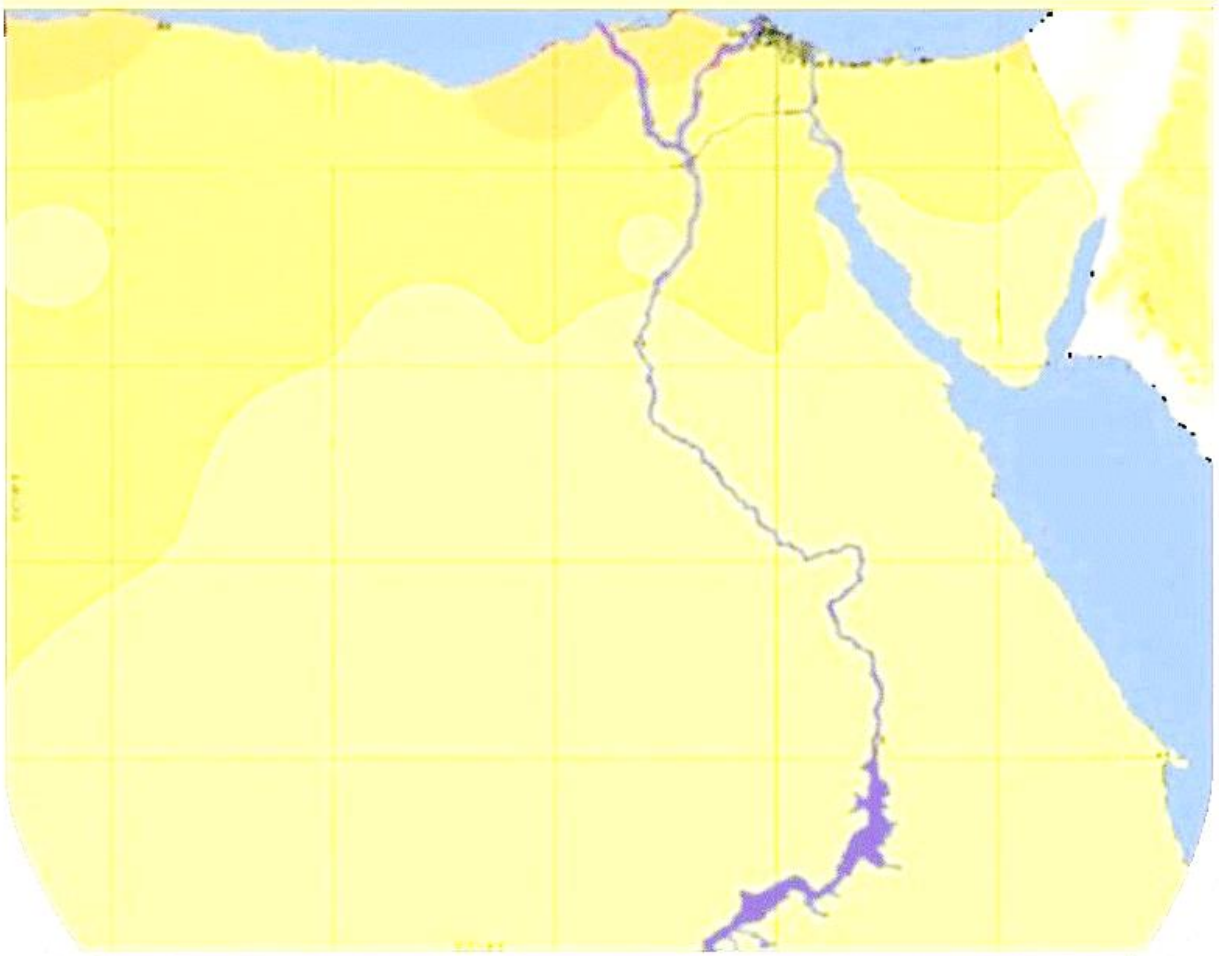
Prof. Dr. Naiim Moselhy Mohamed

Prof. Dr. Taher Mostafa Yossif

Prof. Dr. Rafat Fahmi Mesak

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1- Introduction

The National Action Plan (NAP) to combat desertification is a national sectorial document aiming at identifying the factors contributing to desertification and practical measures necessary to combat desertification and mitigate the effects of drought under the guidelines of UNCCD. It proposed a strategy including priority programs, their implementation and coordination requires creation of a competent international setup.

In view of the country interest in sustainable development within a framework of reserving the environment and combat land degradation, the National Action Plan (NAP) to combat desertification was prepared including the followings: (1) driving forces, processes and impact of desertification and drought; (2) land degradation hot spots; (3) responses and efforts to combat desertification and drought; and (4) proposed programs and projects to combat desertification and drought.

The United Nations Convention to Combat Desertification (UNCCD) entered into force on December 26, 1996. Egypt became a signatory in October 1994, ratifying the Convention in 1995. The Convention affirms the critical role of countries in reversing and preventing desertification and mitigating the effects of drought.

Historically, Egypt is a pioneer for Sustainable Land Management (SLM), food security and drought resilience, where, SLM was implemented on the ground in Egypt from thousands of years ago. Where the Prophet Yusuf gathered up all the food of the wet seven years when there was plenty in the land of Egypt, and stored up food particularly, the wheat grains with spikes in all the cities in large amounts. When the drought and the famine had spread over all the land, the Prophet Yusuf opened all the storehouses. In addition, Egypt has historical and recent experience in drought resilience through watershed management, plant diversification, water development and management and rainwater harvesting and recharging shallow groundwater aquifers (since Romans Era thousands of years age). In addition, Egypt has broad experience in reducing the risks of Sand and Dust Storms (SDS) in the Western Desert, Sinai and parts of the Nile Valley and Delta (since 1929).

Desert Research Center (DRC) is the Focal Point of UNCCD under the umbrella of Ministry of Agriculture and Land Reclamation (MALR) in Egypt.

The Egyptian Partners / Stakeholders with MALR are: Ministry of Foreign Affairs, Ministry of Environment (Egyptian Environmental Affairs Agency); Ministry of Water Resources and Irrigation; Ministry of Health & Population; Ministry of Housing, Utilities & Urban Communities; Ministry of Planning & Ministry of International Cooperation; Academy of Scientific Research and Technology (ASRT); Egyptian Council of Legislations (Parliament); Egyptian Meteorological Authority; Egyptian Cabinet Information & Decision Support Center; Climate Change Information Center; Renewable Energy and Expert Systems Center; National Authority for Remote Sensing and Space Science; Agricultural Research Center; General Organization for Physical Planning; academic institutions and universitiesetc and NGOs and public sector.

1-1 Linkage of UNCCD to other global conventions, and national efforts

Egypt committed itself to the other two UN conventions which are closely linked; the UN Convention on Biological Diversity (UNCBD) and UN Framework Convention on Climate Change (UNFCCC) Besides UNCCD. The UNCBD recognizes that biological diversity is about more than plants, animals, micro-organisms, and their ecosystems, it is about people and their need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. This convention was signed by 150 government leaders at the 1992 Rio Earth Summit. Egypt joined the UNCBD and formulated its National Biodiversity Strategy and action plan in 1998.

Egypt ratified the UN Convention to Combat Desertification (UNCCD) in 1995. The overall Egyptian National Coordination Committee (NCC) was formulated to implement the convention. This committee was chaired by Minister of Agriculture and Land Reclamation and made up of distinguished representatives of concerned ministries including, Agriculture and Land Reclamation, Water Resources and Irrigation, Foreign Affairs, Local Development, Higher Education and Scientific Research, Environmental Affairs, Planning and International Cooperation, in addition to representatives of parliament, NGO's as well as a group of professional experts in the concerned fields. Recently, this committee was chaired by the Ministry of Agriculture and Land Reclamation and representatives of the most of ministries.

With 198 members – countries, the UNFCCC sets an overall framework for



inter-governmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is shared resource whose stability can be affected by industrial and other emissions of CO₂ and other greenhouse gases. As a party to the Convention since 1999, Egypt developed the National Adaptation Program of Action (NAPA) to mitigate the effects of climate change and in consultation with governmental authorities and stakeholders formulated the national framework strategy on climate change. As known, tackling climate change is one of the great challenges that centered on global warming and its consequences and reducing global emissions can be approached through the endorsed role played by the government, consumers and business men to achieve this target. The government focuses on initiated programs to meet its share and encouraging the people to think environmentally. These programs put forward a number of interesting and useful recommendations to manage and control the process in a cost – effective way, put in place short and long term solutions and maximize the gains in terms of new markets and increased competitiveness while reducing global emissions. They considered a range of policies and approaches designed to encourage all regions and sizes of business to respond to the climate change challenge while retaining the valuable business tool of flexibility. These approaches were seen as the first step and we are on track to reach the target. The programs decision was based on the precautionary principles and took on account the scientific knowledge which indicated the severe risk of irreversible climate change. In brief, integration and synergy of environmental dimension in other polices and highlighted climate change, energy, water resources, agriculture and transportation are essential and urgently needed.

In September 2015, the global community agreed on “The 2030 Agenda for Sustainable Development”, including 17 Sustainable Development Goals (SDGs) and 169 targets. Egypt actively participated in the formulation of these goals and targets. The global sustainable development goals have focused on achieving human dignity without excluding anyone, wherever they are, from the fruits of development. They also seek, in their content, to end poverty and hunger in all their forms and dimensions, and ensure the right of all human beings to employ their potential in a framework of justice, equality and a healthy climate, in addition to protecting the planet from environmental degradation to ensure the sustainability of natural resources.

As a matter of fact, land degradation and drought are essentially influenced

by climate change and create detrimental impact on biodiversity and is certainly associated with chain of events including loss of productive lands, affecting ecologically fragile lands and destruction of natural vegetation. Accordingly, desertification, climate change and loss of biodiversity are closely interconnected; their implementation requires a synergy of efforts of UNCCD with UNCBD and UNFCCC. Meanwhile, their consequences on the environmental components (ecosystem, techno-system and socio-system) should be fairly considered. For convenience, the physio-anthropogenic complexity of desertification processes including the irrational use of land, water and vegetal resources beside climatic trigger contributes effectively to less cultivatable land, less fodder and food production, less animal proteins, low economic potential, poverty, malnutrition and famine. Therefore, Egypt affirmed its commitment to contribute fully to the implementation of UNCCD within a sound overarching policy of long term sustainable development to yield multiple benefits at national level.

In the years 2005 and 2014, Egypt has prepared its two national action plans (NAP) to combat drought and desertification and promoted many initiatives to increase public awareness of factual desertification hazards. Since then Institutional Integration has been improved and strengthened and progress in environmental planning is being achieved through preparation of a strategy to promote sustainable development at both ministerial and administrative levels. Despite the real progress in NAP implementation, much remains to be done in view of the continuity of high pressures on natural resources and the limited capacity to draw up, carry out and account for development programs at the regional and local levels. Meanwhile, environmental information especially monitoring systems should be reviewed for relevance and consistency: availability of environmentally relevant information is weak; integration of regional data at national level suffers from insufficient harmonization and problems with data flows; citizens are often unaware of desertification and its environmental and socio-economic impact and hazards. Therefore, efforts to develop capacity building, public awareness and participation, environmental education and training, legislation, strengthening of institutional framework for favorable development and reorientation of resources toward institutions that combat desertification as well as promotion of policies to support the various tasks of implementing the convention in the affected regions have attracted the attention from scientists and decision makers. Nevertheless, these efforts are still uneven across the country, particularly in less developed regions drastically affected by



desertification.

Some 1.5% of Egypt's territory is vulnerable to desertification (about 3.6 million Feddans, Feddan = 4200 m²) equal about 1.5 million hectares, primarily in the northern portion of Nile Delta (lands cultivated for centuries) which suffers from the worst soil degradation, including salinization. The government proclaimed a state of emergency for seawater intrusion in such region. Urbanization, irrational uses of land, water and vegetal resources as well as overgrazing of pastures and poor management practices, wind and water erosion under the prevailing aridity are found in numerous regions. Studies were conducted in the hot spot areas most affected by desertification to develop a set of desertification indicators to help identify priorities for action.

The NAP identifies four priority aspects: Soil and water resources protection, sustainable water and soil management, reduction of the impact of productive activities particularly agriculture and land restoration (including measures such as recovery of soils damaged by erosion). The Egyptian Committee has promoted many initiatives to increase public awareness and disseminate information on desertification.

A national observatory on desertification is already established to study and monitor desertification and promote international partnership. Central information unit was created to gather and disseminate national and international data and information on land degradation.

The present updated NAP based on the progress reports in the last 10 years, particularly since the previous NAP was dedicated. As planned, the relevant deliverables of the NAP are:

1. Activities related to desertification including studies (factors and processes involved in this phenomenon), mapping of the physical environment and risk conditions as well as the impact assessment of plans and projects.
2. Extended and improved monitoring of desertification through vulnerability mapping area of risk sensitiveness to desertification within the frame of database.
3. Prevention of desertification and further expansion of land degradation through:
 - Land and water technology development for the best management practices.

- Promotion of water saving technology and conservation.
 - Sustainable management system for irrigated agriculture.
 - Implementing balanced fertilization and manuring.
 - Improve land use planning.
 - Ensure implementation of existing legislation to prevent and control the misuse of productive lands (terrain) and maintaining integrity of ecosystem.
 - Prevent constructed building on the agricultural lands without permit,
 - Initiating comprehensive resource projects and studies directed to mitigating the effects of land degradation and drought.
 - Capacity building and development of farmer's association and cooperatives.
 - Establishing and rehabilitation of small-scale irrigation projects.
4. Water quality monitoring focusing on groundwater, sludge water and industrial waste water.
 5. Evaluation and adoption of improved farming practices on soil and water resources.
 6. Construction and installation of forecasting and early warning system.
 7. Enhancing agricultural production through sustainable use of shallow and deep groundwater.
 8. Integrated soil and water conservation.
 9. Establish an intelligent decision support for environmental hazards management using GIS and remote sensing.
 10. Production of audio-video materials, articles, technical papers, manual, brochures and training manuals.
 11. Promote citizens and public awareness on desertification hazards and risk supporting and strengthening in education in schools and universities with an emphasis on lessons learned.
 12. Adoption of practical measures to include environmental protection disciplines.
 13. Incorporation of traditional wisdom into modern knowledge about desertification.
 14. Promote the creation of environmental – related jobs.

1-2 Overview of Egypt's NAP 2014-2024 and the main achievements



The National Action Plan of Egypt (NAP) for (2014-2024) was submitted to the Secretariat of the UNCCD in May, 2014 by the Desert Research Center, (Ministry of Agriculture and Land Reclamation), the Focal Point of the UNCCD in Egypt, to fulfil the requirements of the UNCCD under its Articles 9 and 10.

This work was done under partenariat of the Ministry of Agriculture and Land reclamation, Desert Research Center (the focal point of the UNCCD in Egypt) in collaboration with: Executive Authority for Land Protection closed to MALR, Ministry of Environment (Egyptian Environmental Affairs Agency, EEAA), Ministry of Water Resources and Irrigation, National Authority for Remote Sensing and Space Science (NARSS), Ministry of Foreign Affairs and, Ministry of Local Development.

The Egyptian National Action Plan 2014-2024 is purposeful on sustainable management of land degradation which has been achieved through the following main programs:

1-2-1 Thematic Programs

- **Desertification Assessment and Monitoring**

- Measuring the types and degrees of desertification and monitor their extension in the four agro-ecological zones in Egypt,
- Producing thematic maps and creation of relevant indicators to inform stakeholders and decision-makers regularly with the scope of the desertification phenomena,
- Setting up a system to monitor the impact of desertification.

- **Capacity Building**

- Self-assessment of national capacity building needs to help stakeholders,
- Measure their capabilities,
- Define their priorities and constraints to develop manpower in environmental management overall the country.

1-2-2 Programs for irrigated agriculture

- **Irrigation development**

To develop irrigation water management and increase agricultural productivity of Egypt's old lands taking into considerations the irrigation delivery system, on the farm level, technical, economic, environmental and social factors impacting water management. The developed irrigation system was practiced on old agricultural lands and newly reclaimed areas.

- **The integrated irrigation management plan (IMP).**

- Preparation and implementation of integrated water management plan.

- Expansion and up- scaling of water user organization.
- Irrigation and drainage infrastructure and facilities.
- Environmental management & on farm improved water use.

• **Soil improvement**

Application of amendments, sub-soiling, land levelling and improvement of drainage and other management practices that increase the land productivity in the Nile Delta and Valley as well as the newly reclaimed lands.

• **Water and soil pollution control**

- Survey and monitor the locations to study the impacts of industrial pollutants discharged to water and soil resources.
- Initiating database of pollution sources, types of pollutants, extension migration and impacts.
- Applying the technologies to treat minimize and curtail the discharge.

• **Use of treated sewage water for afforestation**

Some selected remote areas of desert lands close to waste water treatment plants to dispose waste water for afforestation and prevent its hazardous effect.

1-2-3 Programs of rehabilitation, conservation and use of rangeland

• **Revegetation of degraded rangeland**

Revegetation / reseedling and / or planting of seedlings of the perennial fodder shrubs to increase forage and livestock production.

• **Conservation of soil and water resources**

- The areas suggested for this sub-project are W. Al-Arish, SW Sinai, W. Hederba and W. Halayeb where soil and water conservation including control of wind & water erosion, securing soil fertility & stability and increasing water use efficiency.
- Construction of sizeable dams, gully plugs, contour terracing trenches, furrows pitting & water harvesting, management of watershed areas, etc.

• **Grazing Management**

The sub-project aims at improving rangeland communities, livestock performance, soil stability and watershed management, restoring vigor of forage plants and improve grazing schedule. This program will be devoted to North Coastal Zone, Sinai and Shalateen-Halayeb district.

1-2-4 Programs of rain-fed agriculture

• **Land Use Planning**



Scheduling land use patterns for the northern coastal zone to include rehabilitation of rangeland, rain-fed agriculture, desertification activities, expansion of touristic resorts and infrastructures for urban, travel and industrial activities.

- **Soil Erosion Control**

This sub-project focused on soil erosion rates by water and wind in the NCZ, preparing a data base on erosion to find out the most efficient methods for controlling soil erosion and maintain soil conservation for sustainable use. Concerning wind erosion, two sub-projects focused on two Agr-ecological zones; The Oases in Western Desert (The determination of wind erosion and, precipitation and economic measures to combat desertification factors in the Oases areas. Such project focused on monitoring and evaluation of both erosion and precipitation by wind as well as selecting the appropriate measures for controlling them. The second one carried in NWC (Using and verifying modified wind erosion equation under NWCZ). It was focused on fitting the equation under this area and applied it for chose the optimum measures for controlling soil erosion by wind.

- **Improving Livestock Performance**

This sub-project aimed to increase animal productivity through cross-breeding and veterinary services, provide green fodders (silage). Also, to save losses in feeds and other practices to improve nutritive value and feed conversion efficiency to improve animal productivity and maximize profitability.

- **Improving Small Ruminant Production in North Sinai**

This sub-project includes improving feeding and nutritional value through biotechnology of agricultural residues, fodder shrubs, natural rangeland, improving animal management as well as veterinary care and protection of livestock from endemic diseases and malnutrition to increase animal productivity and sustainability.

1-2-5 Programs for sand dunes fixation

- **Control of sand encroachment on High Dam Lake**

This sub-project aims at control sand movement on the High Dam Lake via establishing successive green belts crossing the main wind direction. This will also contribute to improvement of local climate and environmental conditions.

- **Fixation of sand dune in Siwa Oasis**

This sub-project deals with controlling sand encroachment on Siwa Oasis using mechanical, chemical and biological measures. This also includes the use of agriculture drainage water in fixation the sand dunes to alleviate drainage problem in the Oasis, in addition to transfer the sand dunes ecosystem to agricultural productive lands.

- **Fixation of shifting sand dunes in North Sinai**

The objective of this sub-project is formulating a master plan for the control of shifting dunes in north Sinai and to establish some pilot areas to test the biological measures for dunes fixation and their proper management practices.



2- Rational for preparing Egypt's NAP 2024-2030



In September 2015, the global community agreed on “The 2030 Agenda for Sustainable Development”, including 17 Sustainable Development Goals (SDGs) and 169 targets. Egypt actively participated in the formulation of these goals and targets. The global sustainable development goals have focused on achieving human dignity without excluding anyone, wherever they are, from the fruits of development. They also seek, in their content, to end poverty and hunger in all their forms and dimensions, and ensure the right of all human beings to employ their potential in a framework of justice, equality and a healthy climate, in addition to protecting the planet from environmental degradation to ensure the sustainability of natural resources.

Goal 15 (Life on Land) 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. This goal is consistent with the objectives and mechanisms of action of the three United Nations Conventions (Rio Conventions).

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. This target is consistent with the objectives and mechanisms of action of the United Nations Convention to Combat Desertification (UNCCD).

At the 12th session of the Conference of Parties (COP.12) of the UNCCD, held in Ankara, Turkey in October 2015, the Parties endorsed SDG target 15.3, which includes the concept of land degradation neutrality (LDN), as a strong vehicle for driving the implementation of the convention (decision 3/COP 12).

Also, on the basis of SDGs, Egypt formulates Sustainable Development Strategy, "Egypt Vision 2030", which includes three pillars; Economic, Environmental, Social dimensions. The environmental pillar includes the conservation and proper management of natural resources and control the deterioration of such resources. It also includes the integrated management and reduce the pollution of air, soil and water.

At the 13th session of the Conference of the Parties (COP 13) to the UNCCD in September 2017, parties to the convention adopted the UNCCD 2018 - 2030 Strategic Framework to enhance the implementation of the convention (ICCD/COP(13)/21/Add.1).

This new strategy is a tool to effectively respond to new challenges and opportunities in the global context. Its purpose is to establish a global partnership to halt and prevent desertification, land degradation and to mitigate the effects of drought in affected areas in order to support desertification reduction and environmental sustainability.

The UNCCD 2018 - 2030 strategic objectives are reviewed as follows:

Strategic objective 1: To improve the conditions of affected ecosystems, combat desertification/ land degradation, promote sustainable land management and contribute to Land Degradation Neutrality (LDN).

Strategic objective 2: To improve the living conditions of affected populations.

Strategic objective 3: To mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems.

Strategic objective 4: To generate global benefits through effective implementation of the United Nations Convention to Combat Desertification.

Strategic objective 5: To mobilize substantial and additional financial and non-financial resources to support the implementation of the Convention by building effective partnerships at global and national level.

Moreover, the UNCCD faces different opportunities and constraints that will determine its implementation in the forthcoming decades due to the significant changes of policy environment since Rio conventions adopted the Sustainable Development Goals in 2015, raising the support to developing countries, worldwide commitment to climate change mitigation and adaptation, growing numbers of refugees and environmental migrants shedding more light on the impacts of poverty and environmental degradation.

At the country level, one of the constraints that Egypt encountered was the inadequate institutional structure to the effective implementation of programs and projects indicated in Egypt NAP 2005-2014. Another challenge was the insufficient financing for the NAP's programs and projects. Also, donors have



geared their financing strategies to support country-identified priorities based on the poverty alleviation strategy and other country-led development planning tools.

During 2017, Egypt set the necessary national goals and measures to land degradation neutrality to be achieved by 2030 as one of the prominent countries in combating desertification at the global level.

Over the past five years, various socio-economic and environmental challenges have risen, i.e., overpopulation, water scarcity, climate change, Covid 19 together with other international and regional conflicts and crises. Accordingly, Egypt – as an affected country - has to prepare its National Action Plan (NAP) to combat desertification, land degradation and drought 2024 – 2030 in line with the recent UNCCD 2018 - 2030 strategic objectives. This implies the revision and updating and preparing Egypt's NAP 2024 to 2030.

In the updating process of NAP to combat desertification, land degradation and drought for 2024-2030, a **participatory approach** was carried out in accordance with the UNCCD requirement. Articles 9 and 10 of the UNCCD state that the affected country party is to prepare and make public the NAP and specify the respective roles of government, local communities and land users as well as the required available resources. **In view of this, a series of consultation meetings and workshops were held in different parts of the country.**

Therefore, the NAP 2024-2030 is a working document for the synergy among the three Multilateral Environmental Agreements (MEAs) on Biodiversity, Climate Change and Land Degradation at the country level, and the convergence of action among national government agencies (NGAs), Local Government Units (LGUs), and Civil Society Organizations (CSOs) under the supervision of MALR/ Desert Research Center, the Egyptian Focal Point of UNCCD, to contribute to hunger mitigation, poverty reduction, and environmental sustainability.

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3- Country profile

3-1 Location and topography

Egypt has a total area of about one million Km² located within the arid to hyper arid climatic zones of North Africa of which only a small portion, not exceeding 5.5% of total area, is agriculturally productive lands. Egypt can be considered African/Asian/Mediterranean country, most of its area (94%) occupies the northeastern corner of Africa and 6% is the Sinai Peninsula which is part of Asia.

It is a densely populated country with more than 105 million inhabitants in 2023, mainly concentrated on an absolutely small territory around the Nile Valley and Delta with regional disparities based on main water resources from the Nile River. The high population densities lead to eventual environmental pressures which, together with the diversity and sensitivity of the natural parsimony and cultural heritage have made environmental protection a matter of serious public concern. Among the environmental issues of prime importance, air and water pollution, soil and water management, waste management, climate change, coastal erosion and marine environment are of major concern.

Egypt has coastlines on both the Mediterranean Sea and the Red Sea. Egypt borders Libya to the west, the Gaza Strip to the northeast, and Sudan to the south, (Fig. 3-1). The domain Egyptian Land is desert interrupted by the Nile Valley and Delta land. The land surface rises up on both sides of the valley to reach around 800 m above sea level in the western side and around 1000 m above sea level in the eastern side. The relief is characterized by low-lying sand dunes cover and depressions of the Western Deserts. East of the Nile valley, the arid Arabian Desert expands to the borders of the Red Sea. In the far southwest, the land rises into the Gifl Kebir plateau, with elevations near 1000 m above sea level. In the far southeast, the Red Sea Mountains, an extension of the Ethiopian Highlands, continue on into Sudan. The highest elevation, located at Mount Catherine in the Sinai, is 2614 m above sea level and the lowest elevation, at the Qattara Depression in the northwest, is 139 m below sea level.

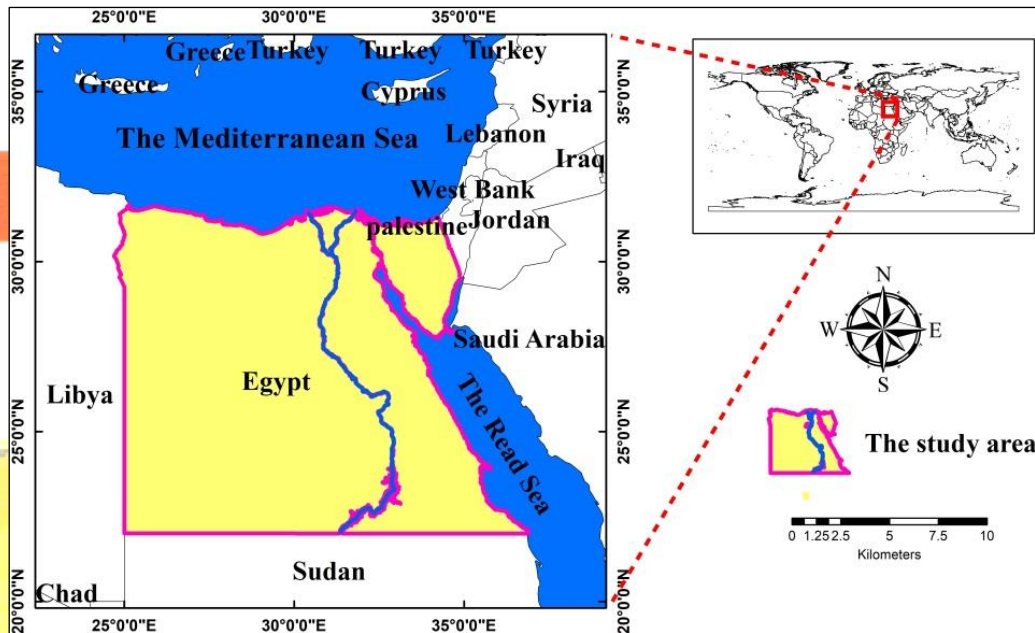


Fig. (3-1): Location map of Egypt

3-2 Climate

The climate of Egypt is relatively wet and cool in winter (October to March) and dry and hot in summer (April–September). The four seasons show geographical and temporal variety due to the country's significant regional and temporal variability in climate. Egypt's location and topography play a role in the distribution of rainfall and temperature. The rainfall in Egypt is relatively high in the coastal area along the Mediterranean Sea in the north (> 200 mm/year) and the Red Sea in the east than in the inland areas. Most areas in the south and west of Egypt, a part of the Sahara, receive an average rainfall of below 5 mm. Rainfall in the north is influenced by the North Atlantic Oscillation (NAO) and the East Atlantic–West Russia index. Furthermore, temperature varies in Egypt by location and altitude. The temperature generally gets cooler in the north than in the south. The mean temperature in the north is around 20°C , while 25.9°C in the south. However, the temperature in higher elevation lands, such as Saint Catherine Mountain, may reach subzero in winter.

Egypt's climate showed a rapid change in recent years. The maximum temperature has increased from 0.07 to $0.24^{\circ}\text{C}/\text{decade}$ and the minimum temperature by 0.08 – $0.29^{\circ}\text{C}/\text{decade}$ in the last five decades. At the same time, the rainfall decreased up to -5.00 mm/decade in the Nile Delta.

3-3 Soil resources

Soil resources in Egypt include a number of soil associations that differ from each other in characteristics and suitability for agriculture (FAO/UNESCO 1998). (Figure 3-2) shows the geographical distribution of the different major soil associations in Egypt. (Table 3-1) manifests areas and the percentage of each, out of the total area.

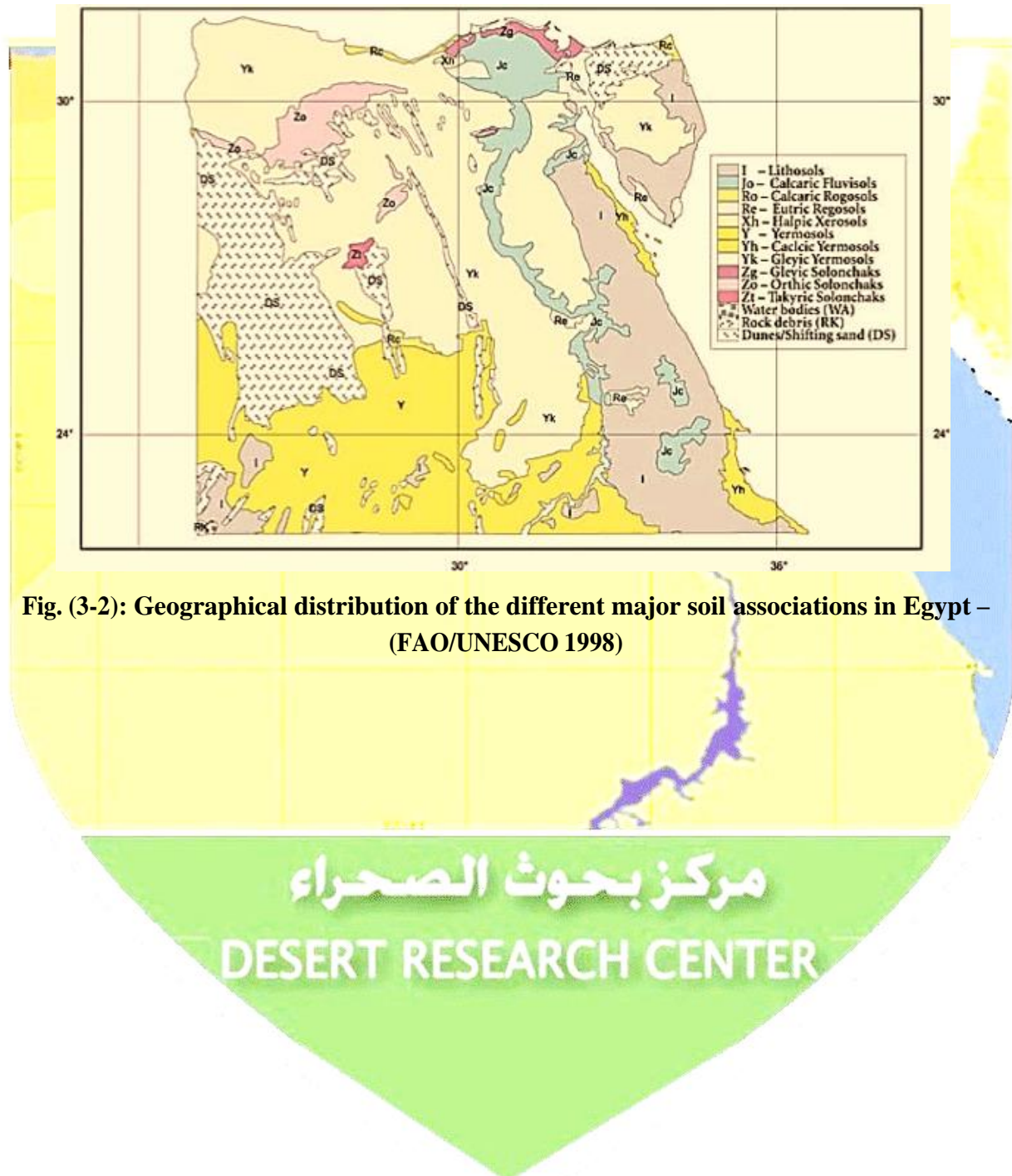




Table (3-1): Different soil associations, their areas and percentages in Egypt

Soil Associations	Area (1,000 Feddans)	(%)
1- Lithosol	34363	15.76
2- Calcaric fluvisols	13400	6.14
3- Calcaric Regosols	729	0.33
4- Eutric Regosols	3828	1.76
5- Haplic xerosols	270	0.12
6- Yermosols	44888	20.58
7- Calcaric Yermosols	3244	1.49
8- Gleyic Yermosols	78200	35.87
9- Gleyic Solonchaks	1342	0.62
10- Orthic Solonchaks	4979	2.28
11- Takyric Solonchaks	502	0.23
12- Rock Debris	225	0.1
13- Dunes/Shifting sand	32100	14.72

Source: (FAO/UNESCO 1998), 1 Feddan = 4200 m²

3-4 Water resources

Water is one of the most important natural resources, as it is an essential component of all development activities and a source of renewable energy. Water is also one of the most significant elements of the ecosystem and one of Egypt's development axes. Water resources are scarce in Egypt; the Nile River is the main source of water and the other sources represent about 7 % of the water resources in the country (Ministry of Water Resources and Irrigation, 2010).

The Nile River is the main source of water in Egypt; it represents about 93 % of water resources, while the other sources represent only about 7 %. Egypt's water resources are divided into 59.68 billion cubic meters per year of used freshwater, and 21.38 billion cubic meters per year of unconventional sources, most of which are reused water.

Reused water includes treated agricultural and sewage water, as well as shallow groundwater, which is water seepage from agricultural lands and waterways. All these are estimated at 21.38 billion cubic meters per year, divided as follows: (a) shallow groundwater in the Delta about 7.87 billion cubic meters annually; (b) reuse of agricultural wastewater in the Delta about 8.38 billion cubic meters annually; and (c) reuse of treated sewage water about 5.13 billion cubic meters annually, while desalinated seawater is estimated at 0.38 billion cubic meters annually.

Figure (3-3) shows the relative distribution of Egypt's available water resources during 2019/2020. The Nile River's share of water represents 68.5 % of Egypt's total conventional and non-conventional water resources. Water resources from deep groundwater, rain, and floodwater as well as desalinated seawater only account for about 7 % of its total water resources. The rest are the non-conventional water resources resulting from the reuse of wastewater and shallow groundwater.

Water uses in Egypt are distributed among the agricultural sector, accounting for 76 % of the total annual water use, 20.9 % for other sectors, and finally, 3.1 % of the waterways evaporate. The total water usage in Egypt is estimated at 81.26 billion cubic meters per annum (including losses by evaporation). **Figure (3-4)** shows the relative distribution of water use in Egypt during 2019/2020. The agricultural sector is the largest water consumer with nearly 76 % of the total annual water usage in Egypt. On the other hand, the industrial sector consumes much less water than the agricultural sector, at a rate of approximately 6.7 % of the total annual water usage in the country.

Water policies in Egypt have evolved towards an integrated water management approach, through the Water Resources Strategy 2050; a shift towards adapting to water scarcity, rationalizing its consumption, and linking water resources management to energy and food. The Second National Water Resources Plan (2017- 2037) aims to achieve “water security for all” through four main axes: improving water quality, rationalizing water use, developing water resources, and finally, creating a suitable environment for integrated water management and planning and implementation. This plan is in line with Egypt's Vision 2030, which aims to raise agricultural and industrial wastewater resource efficiency by 80 % by 2030 and improve access to sanitation to reach an estimated 88.7 % by 2030.

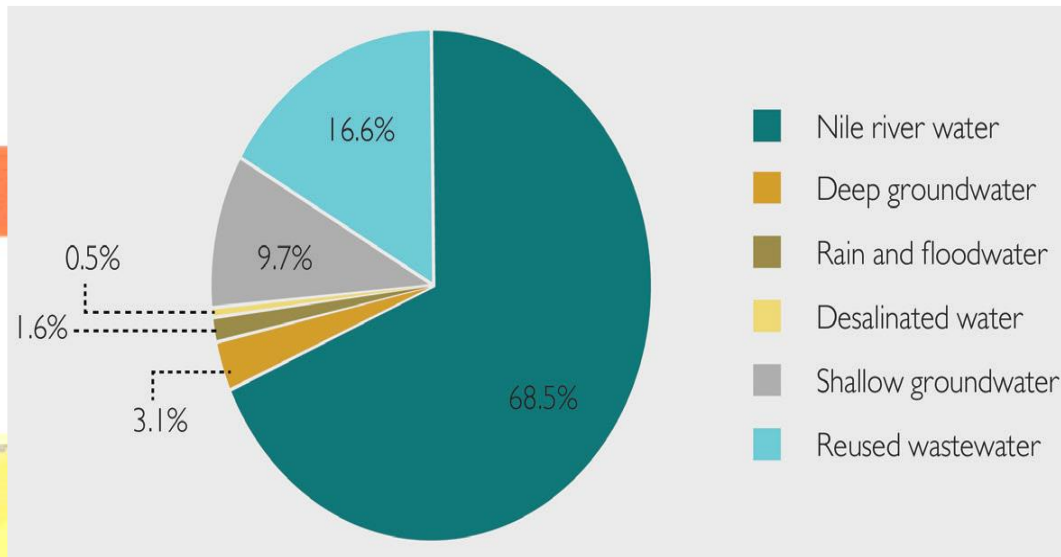


Fig. (3-3): Relative distribution of water resources in Egypt during 2019/2020
(Ministry of Water Resources and Irrigation, 2020)

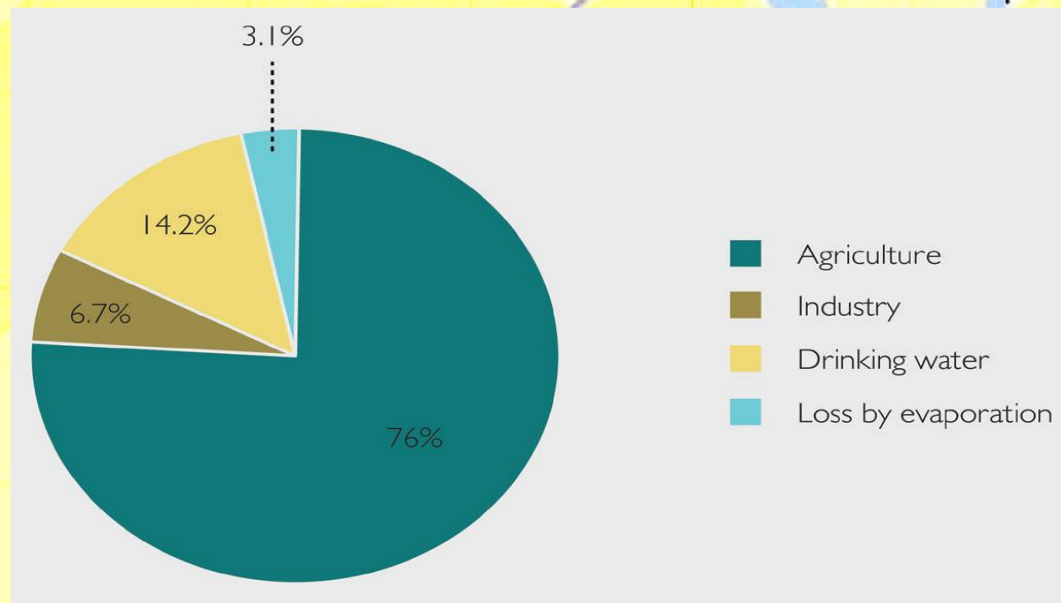


Fig. (3-4): Relative distribution of water use in Egypt during 2019/2020
(Ministry of Water Resources and Irrigation, 2020)

3-5 Natural vegetation resources

Apart from the Western Coastal Mediterranean narrow belt which enjoys a relatively higher rainfall than the inner desert, the present-day plant life in the Western Desert of Egypt constitutes a part of the vegetation of the Sahara with a few endemic species known from Kharga Oasis and one near endemic genus from Dungul and Nakhila Oases. As a result of the climatic changes, the ancient vegetation of the Western Desert which was a Savanna type during the Early and

Middle Holocene was degraded into a hyper arid zone, poor in diversity and plant cover. The recent prolonged periods of drought, especially in Gilf El-Kebir and Gebel Oweinat, which often last for more than one decade, brought drastic losses to the vegetation and probably resulted in the extinction of some species.

The plant life in the Eastern Desert is much richer than that of the Western Desert. The flora of the northern wadis and mountains of the Eastern Desert west of the Gulf of Suez has strong relations with that of the Sinai Peninsula.

The southern region of Gebel Elba, the only part of Egypt which lies within the Sahel regional transition zone, has a rich plant life including some Sahelian woody elements which are not known elsewhere from Egypt.

The Sinai Peninsula, although occupying only 6.1% of the area of Egypt, has 56.2% of the taxa of vascular plants of the entire flora, and 51.4% of the endemics of Egypt (Boulos, 2008).

3-6 Agriculture

3-6-1 Cultivated area

The total area of cultivated land is about 9.7 million Feddans, 81% of which is located in the Nile River Valley and Delta, and the rest lies in the desert governorates, especially in the New Valley and Matrouh Governorates (Table 3-2). It is worth noting that the old agricultural lands in the Nile River basin floodplain occupy about 63% of this area and the rest, estimated at about 3.4 million Feddans, are the newly reclaimed lands at the borders of the Nile Valley, especially in East and West Delta.

The old lands witnessed a decrease estimated at more than 500,000 Feddans during 2002 - 2019, due to urban expansion at the expense of agricultural lands. On the other hand, the new lands witnessed an increase of about 1.8 million Feddans, within the context of the efforts made to reclaim more lands through establishment agro-developing mega projects to meet the growing demand for food (Table 3-3).

3-6-2 Crop composition and crop area

Agricultural land crop composition includes the crop group comprising different cropping patterns for strategic cereals i.e. wheat, rice, corn; fiber crops such mainly cotton; fodder crops; and vegetable crops encompassing tomatoes, cucumbers, onions, and potatoes; in addition to, fruit and palm trees with



occupancy rates of 75%, 13%, and 12% respectively (Table 3-4). These main seasonally crops are cultivated throughout the year on a crop area estimated at about 16 million Feddans, with a crop density of 1.7 %.

3-6-3 Production of agricultural land

Agricultural lands produce food from plant, animal, and fish sources as follows:

- **Plant sources:** agricultural land production is estimated at 22 million Tons of grains; 30 million Tons of sugar crops; more than 52 million Tons of fodders; 21 million Tons of vegetables; and 13 million Tons of fruits (Table 3-4).
- **Animal sources:** the number of cattle, sheep, and goats that live on produced fodders by agricultural lands is estimated at about 7.4 million heads producing about 726 thousand Tons of meat and about 6 million Tons of dairy (Table 3-5). Poultry production is estimated at about 1.7 million Tons (gross weight) of white meat and about 14 million eggs annually.
- **Production of fish stocks:** the total fish production from various fisheries is estimated at about 2 million Tons, most of which (78%) is from fish farms and rice fields, while production from marine sources represents about 5%, and from lakes approximately 13%. Meanwhile, production from the Nile River fresh water, canals, and drains does not exceed 4% (Table 3-6).

Table (3-2): The cultivated area in Egyptian regions

Region	Cultivated areas (1000 Feddans)	(%)
Nile Valley and Delta Governorates		
- Lower Egypt.	4937.8	49.8
- Middle Egypt.	1445.5	15.5
- Upper Egypt.	1449.8	15.6
Sub - total	7533.1	80.9
Desert Governorates		
- Red sea.	6.2	0.1
- New Valley.	507.7	5.4
- Matrouh.	219.9	2.4
- North Sinai.	24.6	0.3
- South Sinai	45.4	0.5
- Nobarria	983.9	10.4
Sub - Total	1787.7	19.1
Grand Total	9320.8	100

Source: CAPMAS (2023), Ref. No. 71-22122-2021

Table (3-3): The development of the cultivated area in the new and old lands

Year	Area (1000 Feddans)		
	Old land	New land	Total
2002	6487.2	1661.1	8148.3
2005	6648.3	1736.4	8384.7
2010	6117.7	2623.4	8741.1
2015	6156.0	2939.9	9095.9
2019	5916.2	3416.6	9332.8

Source: CAPMAS (2022), Ref. No. 71-01111-2022

Table (3-4): Area and production of the most important agricultural crops

Crop	Area (1000 Feddans)	Production (1000 Tons)
1- Cereals		
- Wheat.	3419	9842
- Maize.	2443	8035
- Rice.	1105	4242
2- Legumes		
- Beans.	126	216
- Lentil.	516	1
3- Sugar Crops		
- Sugar beet.	683	14195
- Sugar cane.	342	15959
4- Fodder crops		
- Clover.	1553	44672
- Green fodders.	125	7613
5- Fiber crops		
- Cotton.	238	305
6- Onion and garlic		
- Onion.	250	3618
- Garlic.	45	446
7- Oil crops	328	252
8- Vegetables	1950	21347
9- Fruits		
- Date palm.	141	1714
- Fruits.	1674	11628

Source: CAPMAS (2023), Ref No 71-22122-2021

Table (3-5): Livestock numbers and their meat and dairy production

Kind	Numbers (1000 heads)	Meat quantities (1000 Tons)	Dairy quantities (1000 Tons)
Cows	2812	419	4794
Buffaloes	1428	203	1337
Sheeps	1938	54	-
Goats	1130	20	34
Camels	239	30	31

Source: CAPMAS (2023), Ref No 71-22111-2021

**Table (3-6): Fish production from various fisheries**

Source	Production quantity (1000 Tons)	%
Marine water	95.6	4.8
Lakes	255.6	12.8
Fresh water	74.5	3.7
Fish farms	1570.7	78.4
Rice fields	5.5	0.3
Total	2001.9	100

Source: CAPMAS (2023), Ref. No. 71-22112-2021

3-6-4 Self-sufficiency of some agricultural commodities

Agricultural commodities productivity has achieved different rates of self-sufficient. About 48 % self-sufficient has been achieved in wheat production, 98% in rice in the grains group, about 22.8 % in the beans group, 107 % in vegetables, and 99 % in fruits. Furthermore, the self-sufficient 57% for meat, 97% for poultry, 90% for fish and about 100 % for eggs and milk, respectively (Table 3-7). This asserts the importance of land productivity in providing a great deal of food self-sufficient in Egypt.

3-6-5 Total value and net income of agricultural production

From an economic perspective, the value of agricultural products from various sources is estimated at LE 740 billion. Plant production contributed about 54%, animal production about 36%, and fish production about 10%. After deducting production requirements value, the net income from agricultural land resources is estimated at approximately LE 443 billion (Table 3-8).

Table (3-7): Self-sufficiency percentage of some agriculture commodities

Food commodities	Self-sufficiency (%)
Wheat	48.2
Maize	46.0
Rice	98.0
Beans	22.8
Vegetable	106.9
Fruits	98.8
Red meat	56.6
Poultry	97.4
Fish	89.9
Eggs	100.0
Milk	100.4

Source: CAPMAS (2023), Ref. No. 71-01112-2023

Table (3-8) Agriculture production value and income

Items	Production value (1000000 LE)	%
1- Agriculture value		
- Plant production.	406344	54
- Animal and insect production.	266526	36
- Fish production.	67539	10
Total	740409	100
2- Cost production in puts	297798	
Net agriculture income	442611	

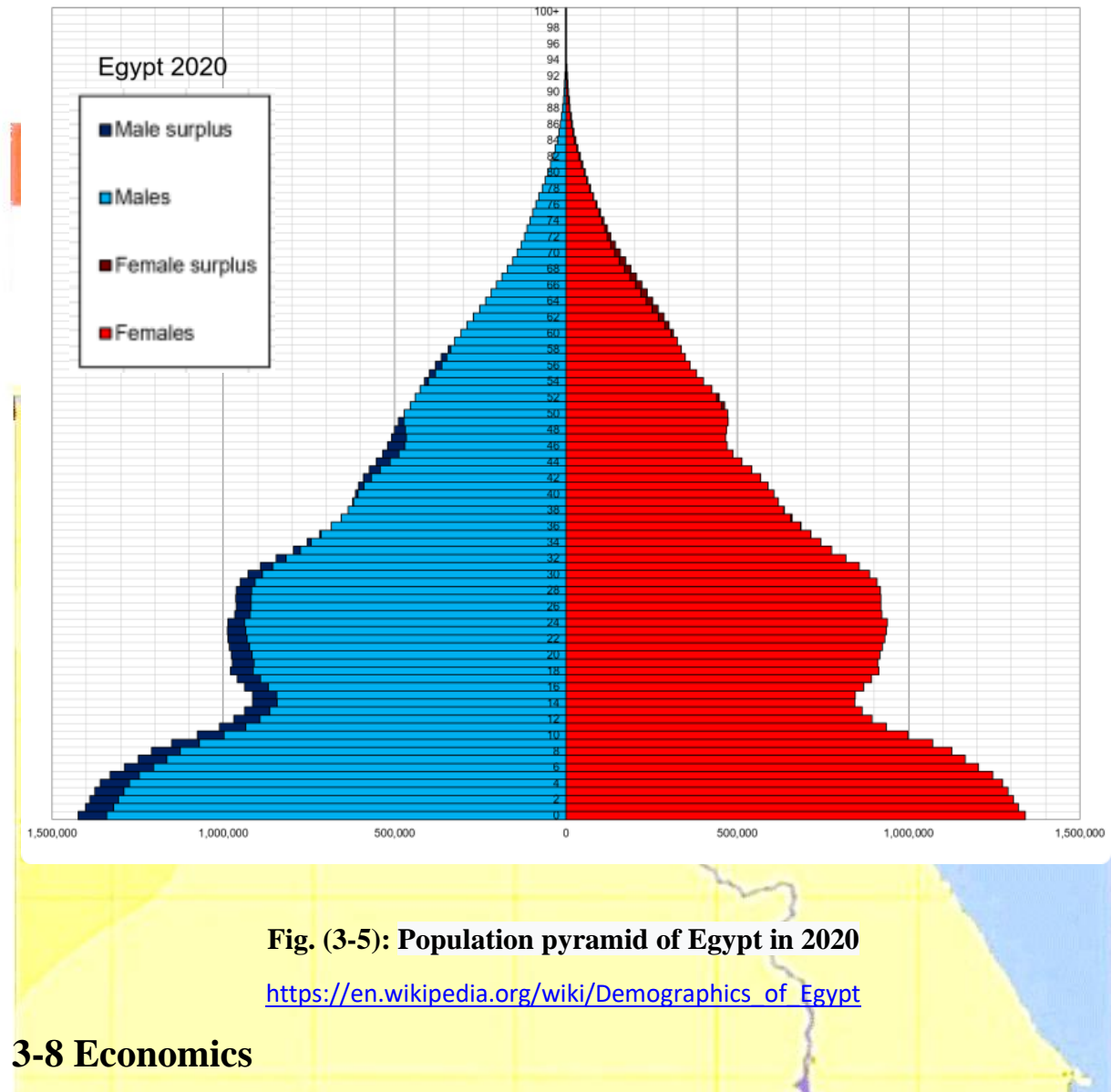
Source: CAPMAS (2023), Ref. No. 71-01112-2023.

3-7 Demography

Egypt is the most populous country in the Middle East, and the fourth-most populous on the African continent, after Nigeria, Ethiopia and Democratic Republic of the Congo. About 95 % of the country's 104 million people (July 2023) live along the banks of the Nile and in the Nile Delta, which fans out north of Cairo; and along the Suez Canal. These regions are among the world's most densely populated, containing an average of over 1,540 people per km², as compared to 96 persons per km² for the country as a whole.

Small communities spread throughout the desert regions of Egypt are clustered around historic trade and transportation routes. The government has tried with mixed success to encourage migration to newly irrigated land reclaimed from the desert. However, the proportion of the population living in rural areas has continued to decrease as people move to the megacities in search of employment and a higher standard of living.

The basic problem, Egypt has an unemployment rate driven by a demographic youth bulge: with the number of new people entering the job force at about 4% / year, unemployment in Egypt is almost 10 times as high for college graduates. An estimated 51.2% of Egyptians are under the age of 25, with just 4.3% over the age of 65, making it one of the most youthful populations in the world (Fig. 3-5).



3-8 Economics

Egypt's economic structure is one of the most developed and diversified among the African and Middle East Countries. It has a large industry sector, an essential primary sector and a fast evolving service sector.

Agriculture used to be the mainstay for the Egyptian economy. However, with rapid industrialization, its share has been reduced to 13.1 % of GDP in 2010. In the 1970s, agriculture used to employ more than 90 % of the Egyptian working population. Today, it only employs 32 % of the labor force.

The industrial sector employs approximately 17 % of the labor force and contributes 37 % of GDP. Egypt has a range of industries, such as steel, electricity, oil extraction and refinery, chemicals, domestic goods and automobiles. The IT industry is also gradually expanding in the region.

The service sector is the largest contributor to the Egyptian economy, with a contribution in excess of 49 %. Also, it offers employment to almost 50 % of the population. The major service sector areas are construction, tourism, canal trade and administrative jobs. (Fig 3.6)

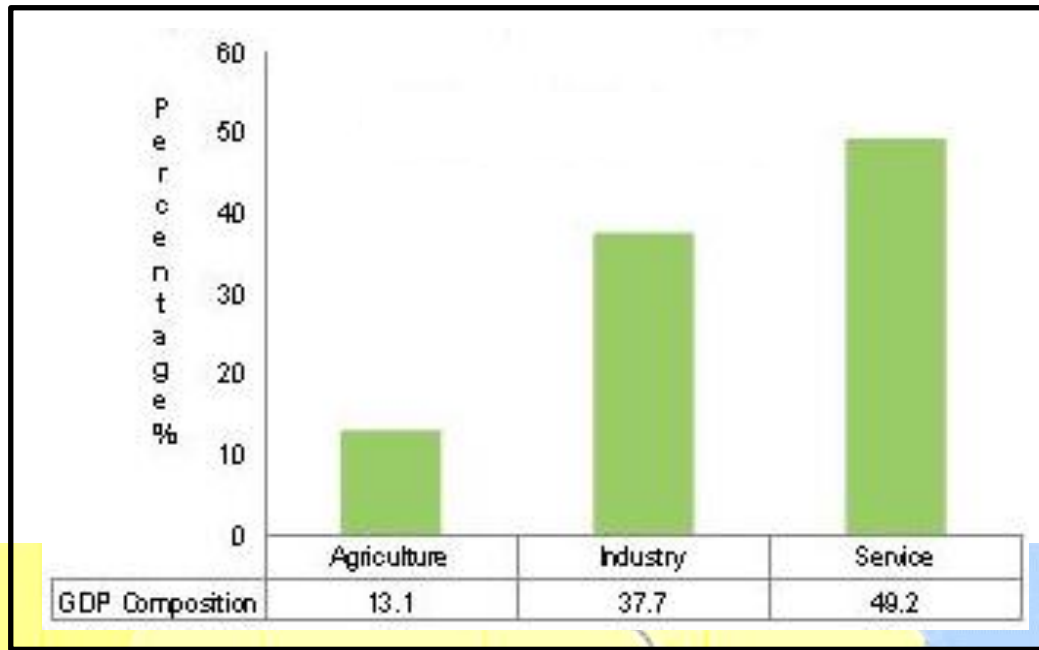


Fig. (3-6): GDP comparison by sectors

3-9 Agro-ecological zones

Egypt has been distinguished into four Agro-ecological zones on the basis of climate in combination with the physiography, natural resources, agriculture and other factors affecting the socio-economic activities. This approach would facilitate the investigation and identification of the active factors of desertification; their impacts; capacity building needs; participating stakeholders; required legislations; economic tools and social implications. It would also facilitate the selection of indicators and measures for monitoring ongoing and future desertification processes. These zones are given below (Fig. 3-7). Also, these agro-ecological zones have specific attributes of resource base, climatic features, terrain and geomorphic characteristics, land use patterns and socio-economic implications. Since significant variations in the environmental characteristics are apparent in each zone, the active factors and processes of land degradation and their impact are necessarily variable.

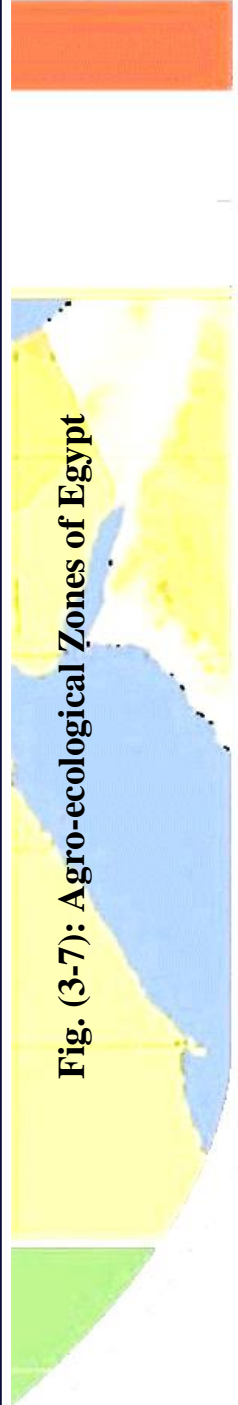
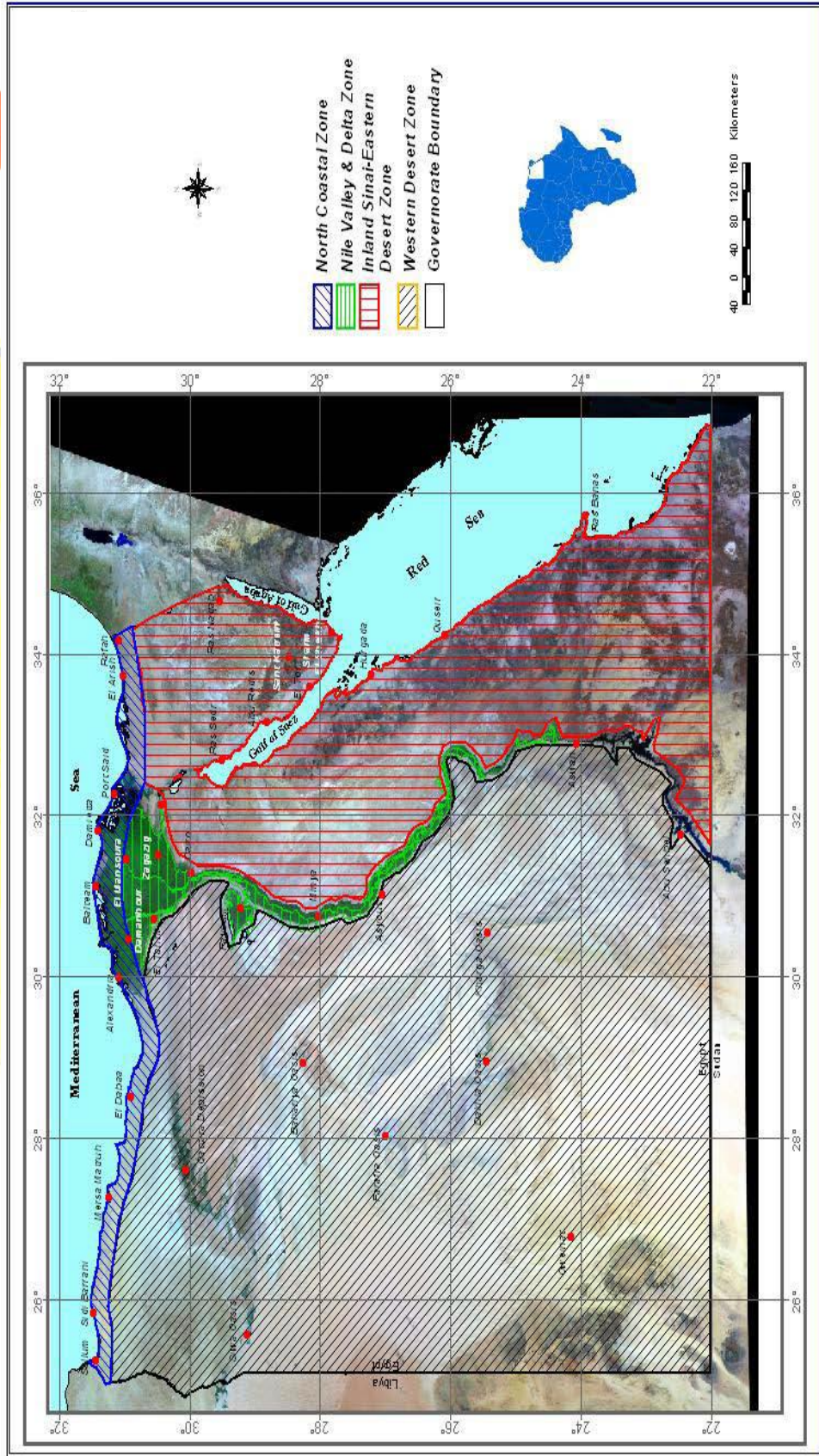


Fig. (3-7): Agro-ecological Zones of Egypt

3-9-1 Nile Valley and Delta

This zone is distinguished into two sectors: (i) The Nile Delta and its vicinities, with latitude 29° N as southern boundary except for the north coastal belt, the area corresponds roughly to the accentuated arid province with 20 to 100 mm annual rainfall, and (ii) The Nile Valley and the surrounding reclaimed areas which are almost rainless; roughly belongs to the hyper-arid province. It includes the most of population and economic activities (Agriculture, industry ...etc.).

3-9-2 North Coastal Zone

This zone is composed of two major subzones; northwestern coast and northeastern coast of Sinai. Such zone represents the arid province under the maritime influence of the Mediterranean with shorter dry period (attenuated).

The northwestern coast (NWC) is characterized by dry Mediterranean climate with an average high and low temperature of 18.1 and 8.1°C in the winter and 29.2°C and 20°C in summer seasons, respectively. Rainfall in the northwestern coast ranges between 105.0 mm/year at Salloum and 199.6 mm /year at Alexandria. Data from eight stations located near the coastline show that most of the rainfall (70 % or more) occurs within the winter months (November to February), Mostly during December and January. The NWC area has the highest average wind speed in Egypt in the winter which can reach 18.5 Km/h and drops gradually inland.

The north coastal areas of Sinai are also characterized by the Mediterranean climate with relatively rainy, cool winter and dry hot rainless summer. Air temperature is similar to those of the NWC. The greatest amount of rainfall in Egypt (300 mm/year) occurs on the far northeast of North Sinai (at Rafah). Generally, about 70 % of rain along the North Coastal Zone occurs in winter and 30 % falls during the transitional months.

3-9-3 Inland Sinai and Eastern Desert

This zone is characterized by the hyper-arid conditions with a mild winter and a hot summer. With the Exception of the coastal belt along the Gulf of Suez, Gulf of Aqaba and the high lands of South Sinai is are characterized by a hyper-arid province with a cool winter and hot summer.



3-9-4 Western Desert

This zone is characterized by hyper-arid climatic conditions with rare rainfall and extremely high temperature. The northwestern and the northern winds extend from the Mediterranean over the Western Desert with fallen speed south wards. These winds are the major factors of erosion and deposition. The Western Desert includes five important Oases (Siwa, Bahariya, Farafra, Dakhla and Kharga). These isolated Oases have long supported substantial communities of people and substantial agriculture development depending on the groundwater as well as a culture unique from the Nile Valley.

3-10 Land cover classifications

Land cover refers to the observed physical cover of the earth's surface which describes the distribution of vegetation types, water bodies, bare rocks/soils, inland water bodies and the anthropogenic impact. It also reflects the use of land resources i.e. (soil, water and biodiversity) for agriculture, forestry, human settlements and other purposes. It is used as a reference principle for several processes, i.e., combating desertification, climate change, bio-diversity, and rangeland monitoring, etc. (FAO, 2016).

According to Yossif (2019), land cover on the national level of Egypt falls into seven broad categories (Table 3-9) which reflects climate, topography, the availability moisture supply and water resources, and soils. In general, availability of water resources is the most important factor. Variation between classes of land cover is observed coming from different factors.

3-11 Rangeland

In Egypt, rangelands occupy around 10 Million Feddans and are located in North Western Coastal Zone (3.5 Million Feddans), and (1.5 Million Feddans) in south east corner of Eastern Desert, in addition to, 5 Million Feddans in Middle and South Sinai. Such areas host about 1 Million heads of cheeps, goats and camels providing about 50-60% of the fodder needs.

Rangelands are in variable conditions of desirable plant cover and productivity. However, about 45% of the total rangeland areas is severely degraded and could be described as very poor ranges, 35% as fair, 15% as good and 5% as excellent ranges. The last two categories are restricted to the far from rough topographic areas, areas lacking water points and / or areas protected by tribes, governmental agencies or for military purposes.

The general trend is shrinkage of areas and decline in quantity and quality of forage production. Adverse changes in range plant composition, i.e., more annuals, less palatable and more unpalatable and noxious species are reported for most range areas. The combined effects of overgrazing, uprooting of wood plants and extension of rain-fed cultivation have accentuated the decline in native forage production and the deterioration of good native forage species, thus threatening biodiversity. The most areas of Western Coastal Zone and North Sinai, forage production had declined by 50-60 % in less than 30 years and about 40-50 % of the plant cover has been lost. These changes are mainly attributed to plowing of the most productive range areas to cultivate barley (and sometimes wheat), uprooting of shrubs for fuel and to increasing grazing pressure.

Table (3-9): The main classes and areas of land cover in Egypt, 2019 (Yossif, 2019)

Class name	LC area in 2019	
	Km ²	%
Agro-forest areas	5.1	0.001
Shrubs, grasslands and sparsely vegetated areas	14252.7	1.4
Croplands	42066.2	4.2
Wetlands	10514.6	1.0
Artificial areas	3486.4	0.3
Bare lands	929552.4	92.0
Water bodies	10122.7	1.0
Total	1010000	100

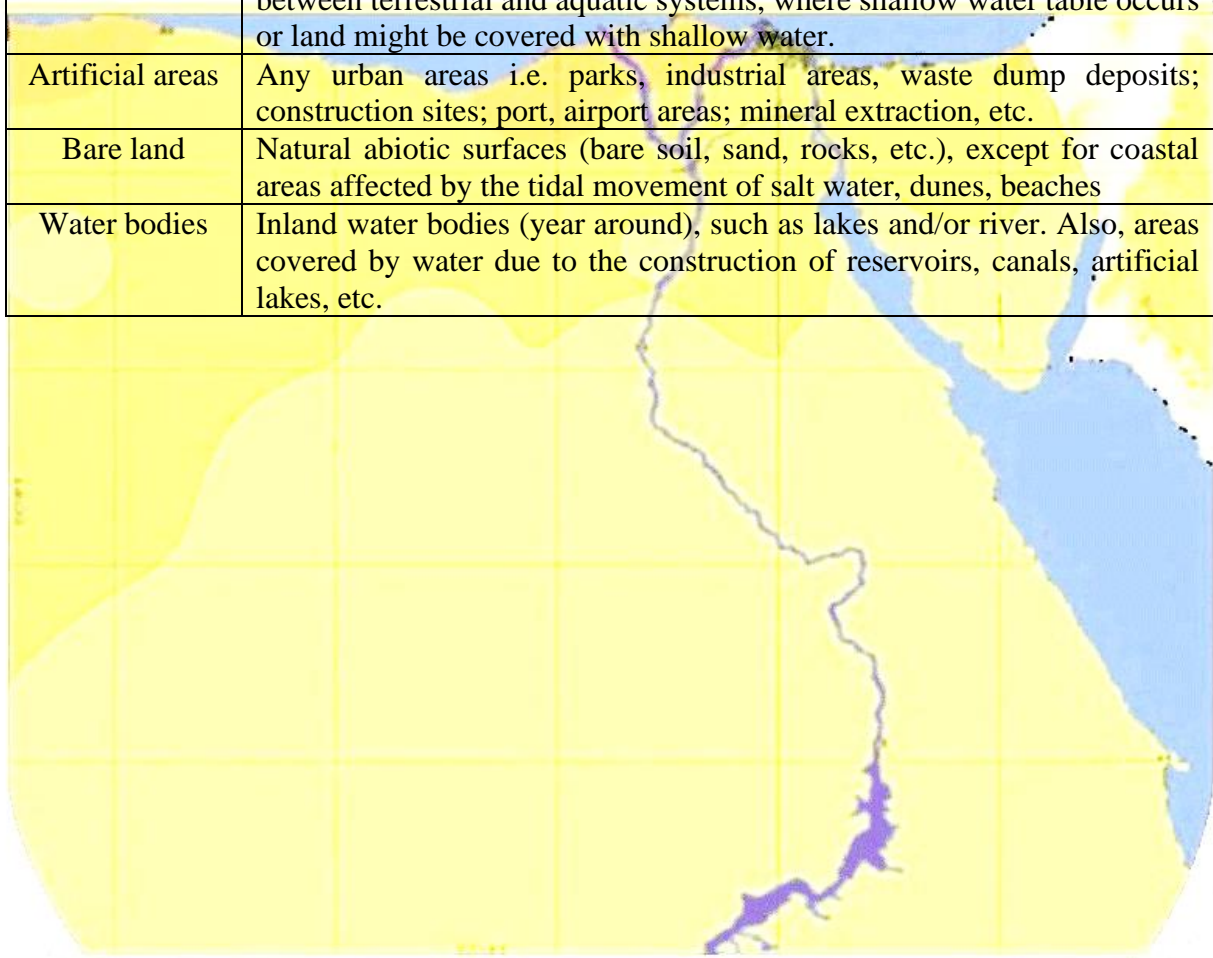
The absolute values of land cover classes that varied according to land use are arranged as follow: bare lands > crop land > shrubs, grasslands and sparsely vegetated areas > water bodies > wet land > artificial area > Agro-forest areas. According to the same study, land use shows that most of the country is dominated by non-cultivated areas, classified as bare lands i.e., 92% of the total Egypt area. The description of the main land cover types in Egypt is summarized as shown in table (3-10).

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Table (3-10): Description of different land cover classes (Yossif, 2019)



Class	Description
Agro-forest	Cultivated woody trees covering between 15 to 100%, mostly irrigated by waste and/or saline water.
Shrubs, grasses and sparse vegetation	Annuals, perennial grasses; perennial herbs and sub-shrubs; evergreen non-succulent sub-shrubs, partially deciduous perennial sub-shrubs; evergreen succulent perennial shrubs; and deciduous perennial shrubs and scattered trees with less than 15%.
Cropland	Cultivated herbaceous plants; permanent cultivated tree or shrub crops and including Orchards, rainfed and/or irrigated.
Wetland	Includes coastal mangroves, inland marshes, Peat bogs, intertidal flats, marshes, swamps and aquatic beds. They represent the transitional zone between terrestrial and aquatic systems, where shallow water table occurs or land might be covered with shallow water.
Artificial areas	Any urban areas i.e. parks, industrial areas, waste dump deposits; construction sites; port, airport areas; mineral extraction, etc.
Bare land	Natural abiotic surfaces (bare soil, sand, rocks, etc.), except for coastal areas affected by the tidal movement of salt water, dunes, beaches
Water bodies	Inland water bodies (year around), such as lakes and/or river. Also, areas covered by water due to the construction of reservoirs, canals, artificial lakes, etc.



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4- Desertification, land degradation and drought (DLD) driving forces, pressures, processes and impacts in the different Agro-Ecological Zones

Land degradation status at various levels may be determined according to a number of axes, including: Driving factors, pressures, state, impacts and responses (Fig. 4-1).

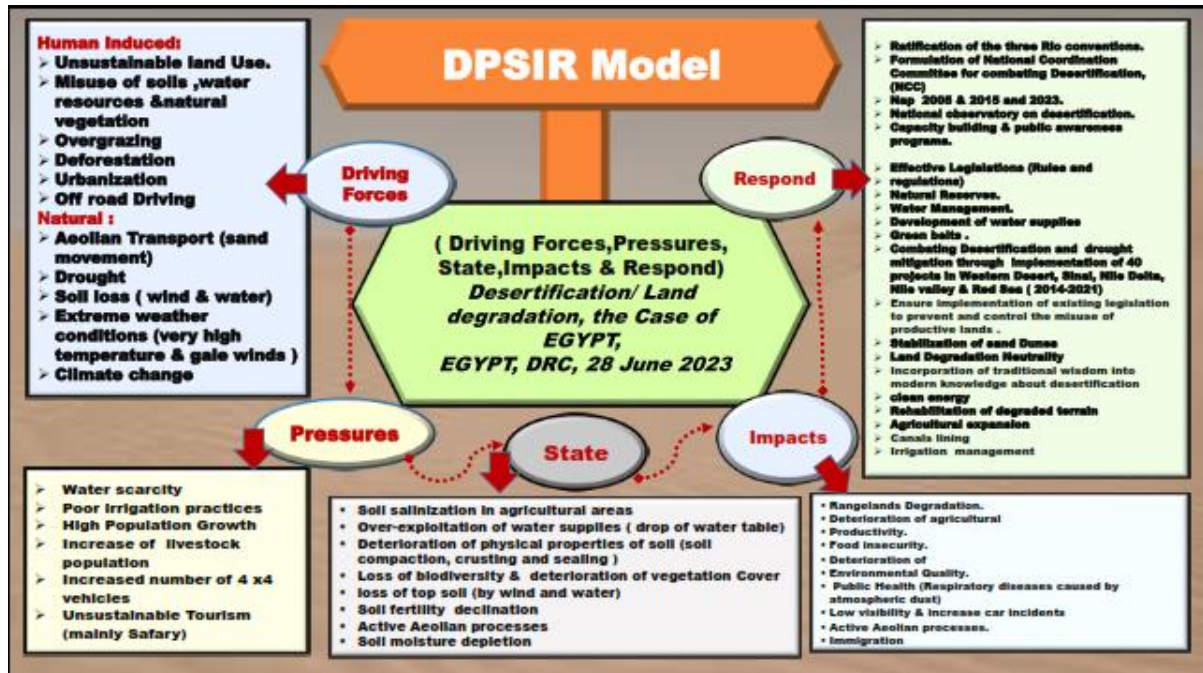


Fig. (4-1): General driving factors, pressures, degradation status, impacts, and responses

4-1 Land cover changes

According to (Yossif, 2019), the land cover changes for 19 years from 2000 to 2019. (Table 4-1) indicate that there was a 0.8% increase in the cropland area as a result of land reclamation projects and 0.2% increase in the artificial areas. Furthermore, water bodies and wetlands both recorded 0.1% rise. On the other hand, there was a decrease in the natural vegetation areas (Shrubs, grasslands and sparsely vegetated areas), such as areas lying on the northwestern and northeastern coasts, central and southern Sinai, and the Eastern Desert. There was also a 1.1 % decrease in bare land. In this regard, the results indicate that during 2000 - 2019, about 10097.2 km² (2.4 million Feddans) were developed in the form of land reclamation projects and the construction of new cities. On the other hand, about 835.8 km² (200000 Feddans) were exposed to various degradation factors.



Table (4-1): Land cover changes during the period from 2000 to 2019

Class name	LC area in 2000		LC area in 2019		Net area change	
	Km ²	%	Km ²	%	Km ²	%
Agro-forest areas	4.5	0.0004	5.1	0.001	0.6	0.00006
Shrubs, grasslands and sparsely vegetated areas (Natural vegetation)	15088.6	1.5	14252.7	1.4	-835.8	-0.1
Croplands	33989.3	3.4	42066.2	4.2	8076.8	0.8
Wetlands	9563.4	0.9	10514.6	1.0	951.2	0.1
Artificial areas	1466.0	0.1	3486.4	0.3	2020.4	0.2
Bare lands	940476.0	93.1	929552.4	92.0	-10923.6	-1.1
Water bodies	9412.4	0.9	10122.7	1.0	710.4	0.1
Total	1010000	100	1010000	100	0	0


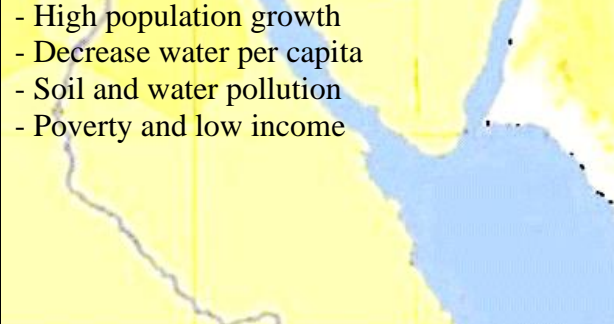
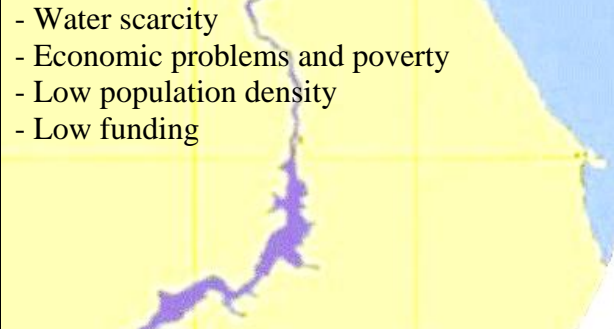
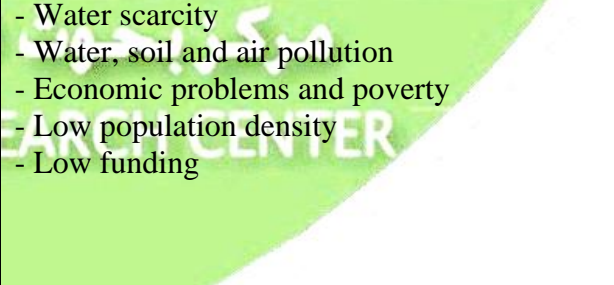
Source: Yossif (2019)

4-2 Land degradation driving forces, pressures, processes and impacts

The National Action Plan to Combat Desertification (DRC, 2005) indicates that Egypt's geographical area may be classified into four agro-ecological zones as follows: (1) the Northern Coastal Zone; (2) Nile Delta and Valley; (3) the Western Desert; and (4) Inland Sinai and the Eastern Desert.

Driving factors and pressures causing land degradation in the abovementioned regions differ according to the environmental, climatic, social, and economic conditions prevailing in each of these regions. Table (4-2) indicates the most important driving factors and pressures causing land degradation in these regions (Yossif, 2019).

Table (4-2): The general framework for the driving factors and pressures causing land resources degradation

Drivers	Pressures
Zone 1: The Northern Coastal Zone	
<ul style="list-style-type: none"> - Improper management of water and soil resources - Overgrazing and removal of natural vegetation - Urbanization and infrastructure development - Wind/water erosion 	<ul style="list-style-type: none"> - Water scarcity - Seasonal population pressure - Decreasing pastoralist's number - Economical problems as a result of poverty and wealth - Labor unavailability - Lack of support services
<ul style="list-style-type: none"> - Aeolian transport (sand movement) - Climate change (Sea water intrusion, etc.) - Drought - Tourism activities and mining - Lack of education and awareness 	
Zone 2: Nile Delta and Valley	
<ul style="list-style-type: none"> - Improper management of water and soil resources - Climate change - Intensive agriculture - Urbanization - Soil salinization - Land tenure - Lack of education and awareness - Institutional settings and policies 	<ul style="list-style-type: none"> - High population growth - Decrease water per capita - Soil and water pollution - Poverty and low income
	
Zone 3: The Western Desert	
<ul style="list-style-type: none"> - Improper management of water and soil resources - Climate change - Soil salinization - Aeolian transport (Sand & Dust Storms, "SDS") - Wind erosion - Lack of education and awareness - Institutional settings and policies 	<ul style="list-style-type: none"> - Water scarcity - Economic problems and poverty - Low population density - Low funding
	
Zone 4: Inland Sinai and the Eastern Desert	
<ul style="list-style-type: none"> - Wind/water erosion - Aeolian transport (Sand & Dust Storms, "SDS") - Climate change - Lack of education and awareness - Industrial and touristic activities, waste deposition and mining - Institutional settings and policies 	<ul style="list-style-type: none"> - Water scarcity - Water, soil and air pollution - Economic problems and poverty - Low population density - Low funding
	

In view of the aforementioned, the most important drivers and processes affecting land resources in Egypt can be presented as follows:



4-2-1 Population growth

Population growth from 2005 to 2023 amounted to about 34.5 million people, which was reflected in the increase in the total population density. In this context, the total population density (people/km² of land area) witnessed a continuous increase (Table 4-3), reaching about 70.2 people/km² in 2005, and rising to 78.1 people/km² in 2010, reached to 87 people/km² in 2015 and 101.8 people/km² in 2020 and increased to 104.2 people/km² in 2023. The inhabited area reached 68.3 thousand km²; representing 6.8 % of the total area, and the population density therein reached about 1529 people/km². This population percentage in inhabited areas rises in major cities; as it is estimated at about 5610 people/km² in Cairo and about 3277 people/km² in Alexandria.

It is worth mentioning that continued population growth and the increase in population density will lead to a decline in returns on development efforts, more specifically a decline in the per capita spending on health, education, housing, and transportation, as well as a decrease in the per capita share of agricultural land. Population growth will also result in an increase in population density in agricultural lands, and in competition for water and energy. Overpopulation has had repercussions on agricultural land uses, which includes the following:

Table (4-3): Total population density (2005- 2023)

year	* Population (Million)	Population density (Pop/ km ²)
2005	70.0	70.2
2010	77.0	78.1
2015	86.8	87.1
2020	99.8	100.1
2023	104.5	104.2

* Population at the beginning of the year

Source: CAPMAS (2023) Ref No 71-01112-2023

a- Fragmentation of property and agricultural land tenure

The steady population increase, and the concomitant increase in the cultivated and cropped areas, have been reflected in the dominance of property and smallholdings, which led to the inefficient management of these holdings and failure to benefit from the availability of the large production. The average agricultural holding area in Egypt is estimated at 2.2 Feddans. Table (4-4) indicates that the number of holdings of less than one Feddan is estimated at about 2.1 million holdings for an area of 923.6 thousand Feddans, representing 39 %

and 9.5 % of the number of holdings and the cultivated area, respectively. Meanwhile, the number of holdings having an area between 1- 5 Feddan reached about two million holdings covering an area of 4.6 million Feddans, representing 47 % of the number of holdings and 47 % of the cultivated area. As for medium and large holdings (7-100 Feddan), they are estimated at about 195 thousand holdings covering an area of 3.3 million Feddan, representing about 4 % of the total holdings, and 34 % of the total cultivated area. With regard to the enormous holdings (more than 500 Feddan), they are located on an area of 892 thousand Feddan, but they only represent 1 % of the total cultivated area.

Table (4-4): Number and area of holdings according to area categories

Area Categories (Feddan)	Number	Area (Feddan)	Average holding (Feddan)
Less than 1	2143888	923638	0,4
1- 5	2100086	4575923	2,2
7- 100	195127	3339443	17.1
More than 100	431	891782	2069.1'
Total	4439532	9730786	2,19

Source: CAPMAS (2022), Ref. No. 71-01111-2022.

b- Decrease of agricultural land and cropped area per capita

In view of the population increase and the high population density on agricultural lands, the share per capita of agricultural land and the cropped area witnessed a continuous decline, which undermined the ability of agricultural lands to provide food requirements and raw materials for industry. In this context, the increase in population density on agricultural lands from 8 individuals/Feddan in 2000 to 10.6 individuals/Feddan in 2018 led to the decrease in the per capita share of agricultural land from 0.12 Feddans in 2000 to about 0.09 Feddans in 2021, representing a 25 % decline. Likewise, the cropped area per capita decreased from 0.22 Feddans to 0.15 Feddans; a 32 % decline (Table 4-5)



Table (4-5): Development of the per capita of cultivated and cropped area

Year	*Population (Million)	Area (1000 Feddan)		Per capita/Feddan		Density on the agriculture land
		Cultivated	Cropped	Cultivated	Cropped	
2000	63.3	7718	13922	0.12	0.22	8.2
2005	70.6	8385	14905	0.12	0.21	8.4
2010	78.7	8741	15334	0.11	0.19	9.0
2015	89.0	9096	15637	0.10	0.18	9.8
2020	100.6	9451	16295	0.09	0.18	10.6
2021	102.1	9596	16384	0.09	0.15	10.6

* Population at the middle of the year

Source: CAPMAS (2022), Ref. No. 71-01111-2022

4-2-2 Urban sprawl on agricultural land

The accelerating population growth and the high demand for housing and services, lead to encroachment on agricultural lands. This encroachment is one of the most serious forms of land degradation, as it is considered a total loss of land productivity, and a loss of the land's ability to produce living matter, which includes food, clothing and medicine.

In addition to public benefit deductions, encroachment on agricultural lands takes various forms. During the last ten years, from 2011 to 2020, their number amounted to about two million cases, with an estimated area of 90,000 Feddans. The CAPMAS (2022) reported that encroachments on agricultural lands have been signify increasing since 2011. The encroachments jumped to about 287 thousand cases of infringement on an area of about 12 thousand Feddans in 2011, followed by 365 thousand cases on an area of about 15.5 thousand Feddans in 2012, 231.8 thousand cases on an area of 14.7 thousand Feddans in 2013, and 276.4 thousand cases on an area of 12.8 thousand Feddans in 2014. Infringement cases began to decline in 2015, reaching 194.9 thousand cases in 2015, 176 thousand cases in 2016, 44.7 thousand cases in 2019, and 55.6 thousand cases in 2020.

In 2021, encroachments amounted to about 19.2 thousand cases in an area of about 1126 Feddan, most of which lay in Lower and Middle Egypt, representing 35.2 % and 32.3 % of the total area, respectively. Al Beheira Governorate in Lower Egypt and Al Minya Governorate in Middle Egypt were the highest governorates in terms of encroachment on agricultural lands (Fig. 4-2 and Table 4-6).

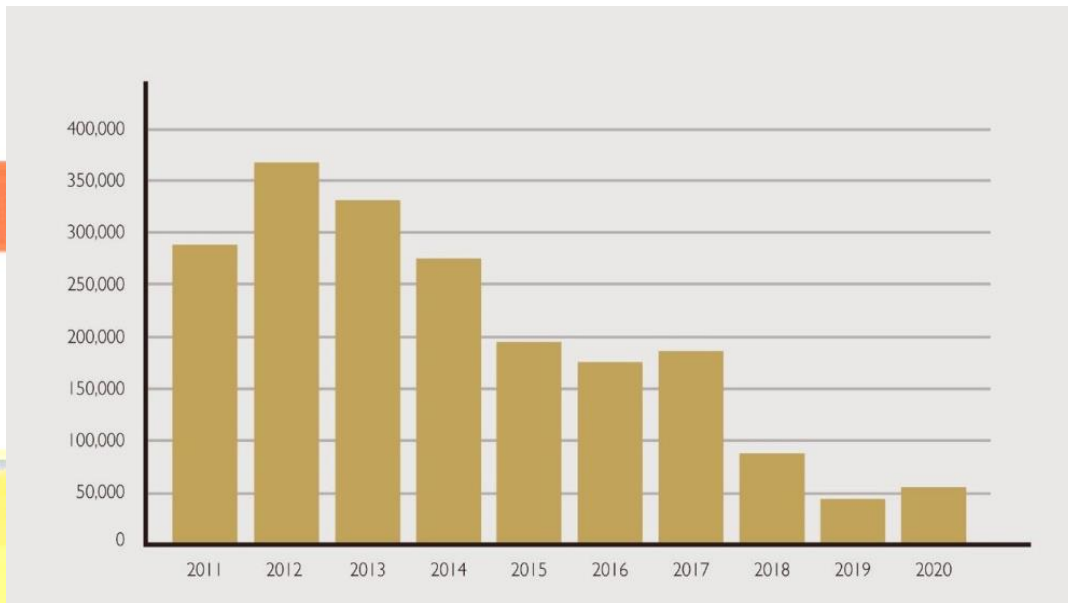


Fig. (4-2): Development of the number of encroachment cases on agricultural lands

Source: CAPMAS (2022), Ref. No. 71-22128-2021

Table (4-6): Encroachments on agricultural lands (2022)

Region	Number	Area (Feddan)
Lower Egypt	6779	571
Middle Egypt	6222	266
Upper Egypt	6157	288
Desert Gov.	19	1
Total	19277	1126

Source: CAPMAS (2022), Ref. No. 71-22128-2021

4-2-3 Pollution

Agricultural lands pollution sources in Egypt include: (a) extensive use of fertilizers and pesticides; (b) agricultural drainage; (c) sewage; and (d) sediment pollution in the atmosphere and air pollution.

a- Extensive use of fertilizers and pesticides

The increase in agricultural intensification to meet the growing demand for food necessitates the enormous use of fertilizers and pesticides to increase agricultural production. These results in the accumulation of fertilizer residues and pesticides in the soil, which increases pollution, especially by heavy elements. Therefore, Integrated Agricultural Production Management (IAPM) and Good Agricultural Practices (GAP) play an effective role in protecting the environment and human health from pollution risks. Studies (Elbana *et al.*, 2019)



indicate that about 12 thousand Ton of pesticides and more than 6.4 million Ton of fertilizers are used annually, resulting in the accumulation and absorption of heavy metals in plants, which adversely affect human health.

b- Agricultural drainage

The quantities of agricultural drainage in Egypt are estimated at about 12 billion cubic meters annually. Agricultural drainage is an important water source that reduces the gap in resources and water needs, 7.2 billion cubic meters of which are reused (CAPMAS, 2023). It is targeted to increase this amount to about 9.4 billion cubic meters. The biggest share of agricultural drainage water is used in reclamation areas north of the Nile Delta (El-Salam Canal Project). A study (Elbana *et al.*, 2019) referred to increased salinity in the agricultural drainage water in the area extending from the south of the Delta to its north, with a salinity estimated at about 1,000 ppm and more than 2,000 ppm, respectively. An increase in the level of heavy metals such as nickel, cadmium, and cobalt was also recorded in the soil at rates exceeding the permissible levels in the reclamation area in Al-Hussainiya, irrigated with El-Salam Canal waters, polluted by agricultural drainage and the Nile water at a rate of 1:1 (Abdel Hafez *et al.*, 2015).

c- Sewage

Sewage quantities are estimated at about 2.5 billion cubic meters, about 1.3 billion cubic meters of which are reused for irrigation. Due to the extreme need for additional water resources, treated wastewater is totally or partially used in agriculture.

Some studies indicate that irrigation with sewage water that is partially treated or mixed with agricultural and industrial drainage (Gabel Al-Asfer area and the irrigated areas by using Gharbia drain water in Central Delta) has resulted in increased soil pollution with heavy metals such as cadmium, chromium, and lead. (El Alfy *et al.*, 2017).

d- Air pollution

Agricultural lands surrounding the industrial areas (Shubra El-Kheima - Helwan ... etc.) and the main road axes, as well as, areas exposed to rice straw incineration, suffer from pollution. This is because air carries numerous particles of iron, manganese, zinc, nickel, cadmium, copper, cobalt, and other elements that are deposited in the surface soil, causing a decline in agricultural productivity (Elbana *et al.*, 2019).

4-2-4 Waterlogging and salinization

Waterlogging and salinization are major factors inducing the deterioration of soil productivity in Egypt as a result of water resource mismanagement, low drainage efficiency, and the dominance of the traditional surface irrigation system, whose efficiency does not exceed 60 %. Other causes include inefficient drainage networks and the use of highly saline agricultural drainage water, especially in North Delta.

Accordingly, some studies estimated that the agricultural lands affected by salinity in Egypt are about 2.3 million Feddan, representing 25% of the total cultivated area and about 60% of these lands are located in the northern Delta, 20% in the southern Delta and Middle Egypt, and 25% in Upper Egypt (Shadad and Hendawy, 2018).

4-2-5- Soil erosion

There are two main types of erosion, geologic erosion and accelerated erosion. Geologic erosion or Normal Erosion or Natural Erosion is a normal process of weathering that generally occurs at low rates in all soils as part of the natural soil-forming processes. It is not influenced by human activity. The second type is accelerated erosion. It is occurring when erosion process influenced by human and its rate exceeds a certain threshold level and becomes rapid. The accelerated erosion affects soil by wind or water or tillage which has become vulnerable, usually because of human interference with the natural environment. For this reason, soil erosion can be considered as a symptom of bad land use and management. Then, accelerated erosion can be reviewed as anthropogenic erosion. This type of erosion is caused by human activities such as overgrazing, mismanagement (intensive plowing, up and down cultivation on sloping land, slash the plant residue during harvesting, deforestation, and biomass burning). Under Egypt conditions different activities have been widely carried out



accelerated soil erosion considered their types, factors affecting on it, processes, principles, and measures of controlling it.

The country where rainfall is negligible, consequently, some regions are subjected to water and wind soil erosion types and others are subjected to only wind erosion.

Almost water erosion studies were conducted in the (NWCR) which extending about 480 km along the Mediterranean Sea from 35 km west of Alexandria to Libyan border coastline in land variations in topography and rainfall's divide the watersheds into five parts and 70% of rainfed agriculture lies in this region. It received rainfall between 60 and 140 mm and occupied by barley and grazing on slope margins and orchards in wadi-beds as the main land uses. Most of the watersheds along the (NWCR) are subjected to water erosion hazards.

Some indicators of water erosion have been evaluated i.e. soil erodibility, rainfall erosivity, modeling of water erosion. These indicators indicated that rainfall is relatively low but few events characterized by high intensity cause excessive runoff and soil loss. Runoff occurred when individual rainfall storm exceeds 10 mm. However consistent relation is found between the period of effective rainfall storm and runoff yield. When the amount of rainfall increased in effective storm, runoff increased.

The annual runoff water and soil loss due to water erosion in NWCR were found to be related to the number of effective events during three seasons. The results concluded that runoff values are increased by increasing clay, however the values of soil loss are decreased by increasing clay content. Bounded plots of known area, slope steepness, slope length and soil type were used to measure soil loss due to water erosion in NWCR. The results showed that soil loss from shallow soil ranged from 1.23 to 5.6 t ha⁻¹ year⁻¹. Some of these values are below and others are upper the permissible limits of water erosion. The accumulation through different years with misuse and poor management of soil and water resources may be considered detrimental soils unless; appropriate soil conservation measures are applied. The average annual amounts of soil loss reached to 25.71 and 39.3 t ha⁻¹ for slope 6 and 10%, respectively. These values can consider high and very high category of erosion risk. Moreover, water erosion causes losses of organic matter, silt, clay and nutrients, enrichment ratios (ERs), were greater than one.

The estimated values of soil loss using these models were verified by the values of soil loss measured by bounded runoff plots. The contribution of soil loss in yield of crops ranged between 72 % and 84 %.

Concerning wind erosion in Egypt, about 18 million ha of the country area are affected by different levels of wind erosion. Wind erosion threatens the farms and cultivated lands. Climatic and soil factors in combination with human activities are largely responsible for prevalence of wind erosion in Egypt. Laboratory conditions using DRC's Wind Tunnel or field conditions intended to find out and quantify indicators and rates of wind erosion in different agro-ecological zones, particularly in NWCZ, WDCZ and EDZ as well as to evaluate the feasibility of different management measures. In addition, some models were used to estimate wind erosion rate and to develop effective wind erosion control. Climatic factor, as wind erosion indicator, was calculated for 24 sites in different regions. The values varied between the highest climatic factor is associated with El-Hurghada. It is clear that the climatic factor is >1 in most selected areas. This means that about 80% of the studied areas have high erosive climatic factor.

Soil erodibility, as wind erosion indicator, was determined in different sites on basis of the percentage of non-erodible soil fraction. The soils under study varied in their texture, organic matter content and calcium carbonate percentage. Soil erodibility indicator ranged from 0.00 to 560 t/ha/year.

Various wind erosion models were used for estimating soil loss and develop appropriate measures for wind erosion control. In case of the Oases of Western Desert the estimated wind erosion rate ranged between 10 and 105 t/ha/year. It is clear that these values exceed the tolerable limits.

DRC's wind tunnel was used to determine the threshold wind velocity using soil samples varied in their texture. The threshold wind velocity ranged between 5.42 and 6.6 m s⁻¹.

To measure wind erosion rates, big spring number eight (BSNE) traps were used. These traps were installed in WDCZ, NCZ and in land Sinai. Obtained results showed that the annual soil loss varied from 4.5- 17.99 t/ha/year. Meanwhile the rate of deposition by wind varied from 4.5 to 66.9 t ha⁻¹ year⁻¹. The enrichment ratios (ERs) of organic matter, total nitrogen, available phosphorus, and available potassium of bare soil reached greater than 1 as the results of wind erosion hazards.

With respect to tillage erosion, it is the redistribution or gradual



translocation as the movement of soil or displacement downhill or down slope by mechanical implements of tillage. Recently, in sloping cultivated soils tillage erosion has become an important component of total soil erosion and has been considered one of the drivers of land degradation (LD).

It can be concluded that the human activities and climatic factor are the main drivers of soil erosion. The first one can be controlled. However, the other cannot be controlled. Also, the major problems of soil erosion can be summarized as follows: (1) Loss of topsoil through nutrients, organic matter and fine particles loss; (2) Reduction of soil quality and soil moisture retention; (3) Crop damage; (4) Reduction of soil productivity; and (5) Pollution of air and water.

Under Egypt conditions, the problems of soil erosion were mitigated by appropriate measures such as: (a) Appropriate soil conservation measures such as application of organic matter, soil mulching, appropriate tillage operation regarding perpendicular tillage across the slope or erosive wind direction and sprinkler or drip irrigation as well as the application of conservation agriculture; and (b) Applying integration measures of soil conservation and selecting low cost measures such as tillage across the slope or erosive wind direction.

4-2-6 Sand dunes movement

Due to Egypt's geographical location in arid regions, sand dune formations are considered one of the main land forms. They cover an area of about 262 thousand km², representing approximately 26 % of the total area. These areas are distributed as indicated in (Fig. 4-3 and Table 4-7).

Table (4-7): Distribution and areas of sand dunes in Egypt

Region	Area (1,000 km ²)	Region	Area (1,000 km ²)
The Great Sand Sea	114.4	South Rayan	1.2
Selima plain	63.2	Southeast Qattara	28.8
South Qattara	10.4	North Delta	0.9
Abu Muharraq	6.00	Eastern Cairo	0.1
East Farafra	10.3	Um Hibal	0.8
North Sinai	13.6	East Oweinat	8.00
West Delta	4.4		
Total		262.1	

Source: Embabi N.S. (2000)

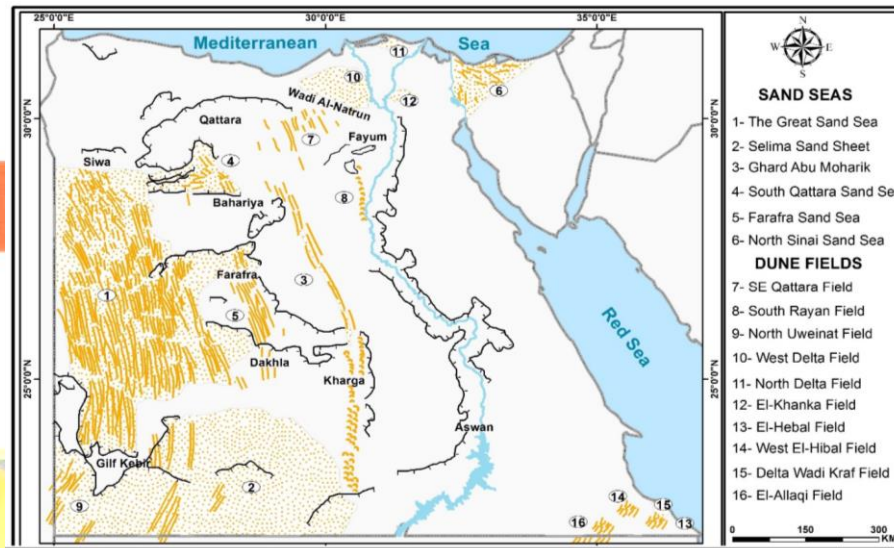


Fig. (4-3): Distribution of sand seas and dune fields in Egypt

Source: Bubenzer, et al. (2020)

4-2-7 Sand and Dust Storms (SDS)

Sand and dust storms are considered one of the natural hazards that losses of life and property, and damages the infrastructures. They have a significant impact on both civilian and military operations and also cause problems to human health, agriculture, aircraft and automobiles engines, electro-optical systems. The SDS are the most significant natural hazards in Egypt. The frequency, intensity and socioeconomic impact of the mentioned hazards are remarkable. In this regard, Egypt is among the country parties that are affected by SDS as well as, it is among the countries that are classified as SDS source area. Sources of SDS in Egypt are distributed in the Western Desert, Sinai and Nile valley and Delta. **Figures (4-4) and (4-5) show** the local and regional sources of SDS affecting Egypt.

SDS are frequent during most of the year. However, the main dust activity during the year is found from northwest to southeast. The maximum activity is observed during winter and spring seasons with strong activity in March-April. It is concluded that the maximum SDS frequency is recorded at the North West of Egypt (Matrouh Governorate), Southeast at Aswan and North-East at Sinai. The SDS frequency is increasing with strong southern wind associated with strong activity in cyclone. While, Rising Sand Frequency (RSF) is increasing with active northern and southern wind without in cyclone. The interval with increase of SDS associated increase cyclone activity by strong southern wind. On the other hand, **Figure (4-6) shows** some events of SDS from 2008 to 2012.



It is found that desert and Mediterranean depressions have maximum frequency with 46% and 24%, respectively, while high pressure and scale system have minimum occurrence with 10% and 6%, respectively and the Red Sea mountains has a moderate frequency of 14%.

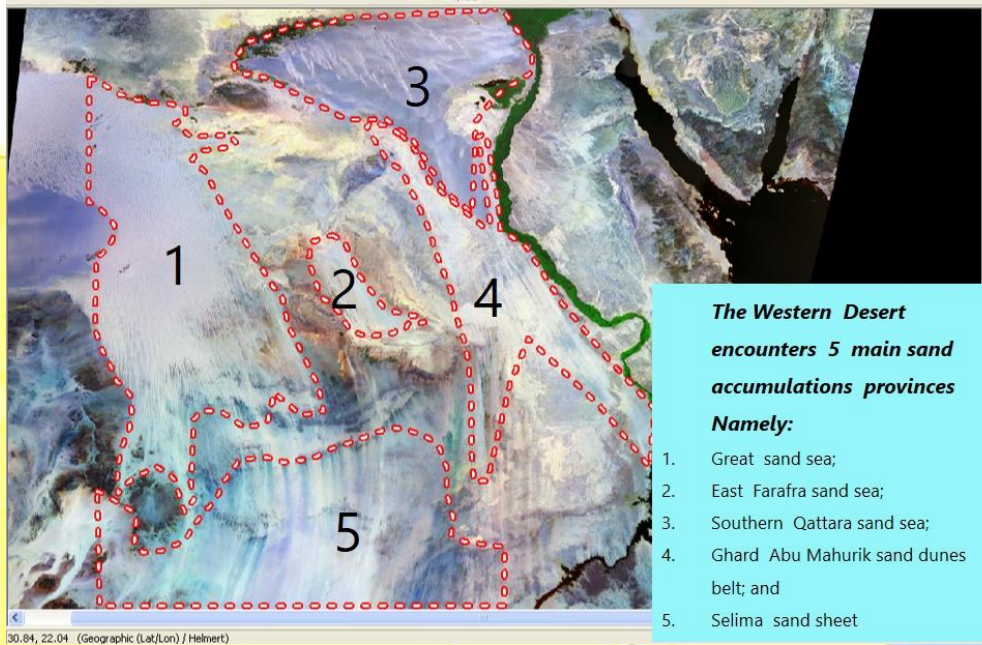


Fig. (4-4): Sources of SDS in Western Desert 9 (El-Gamily et al., 2010)

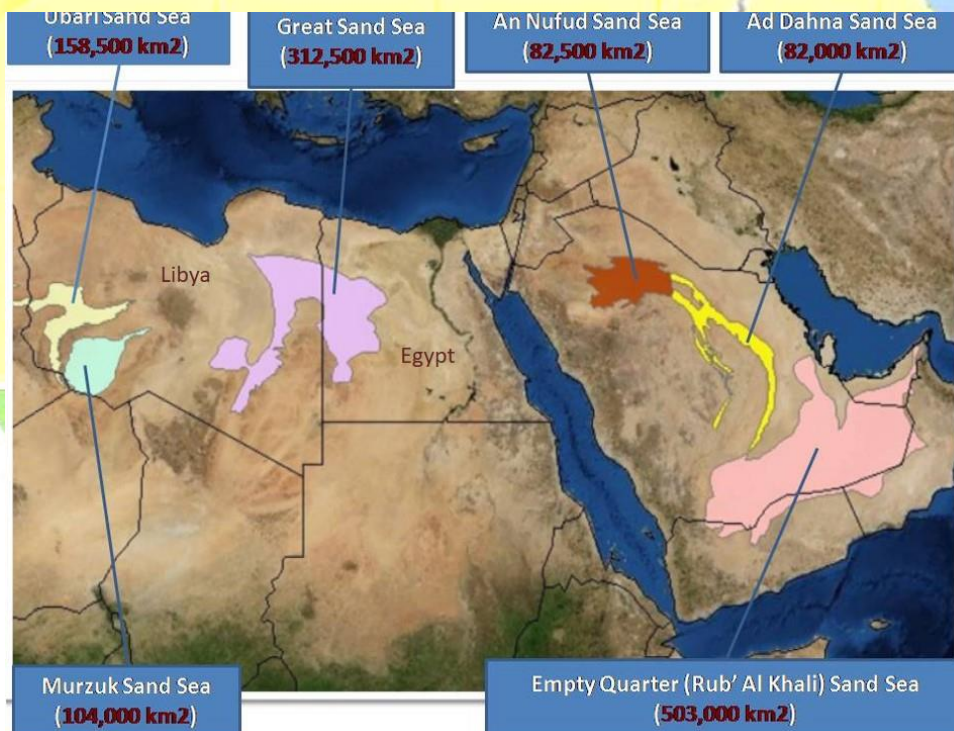


Fig. (4-5): Regional sources of SDS affecting Egypt (El-Gamily et al., 2010)

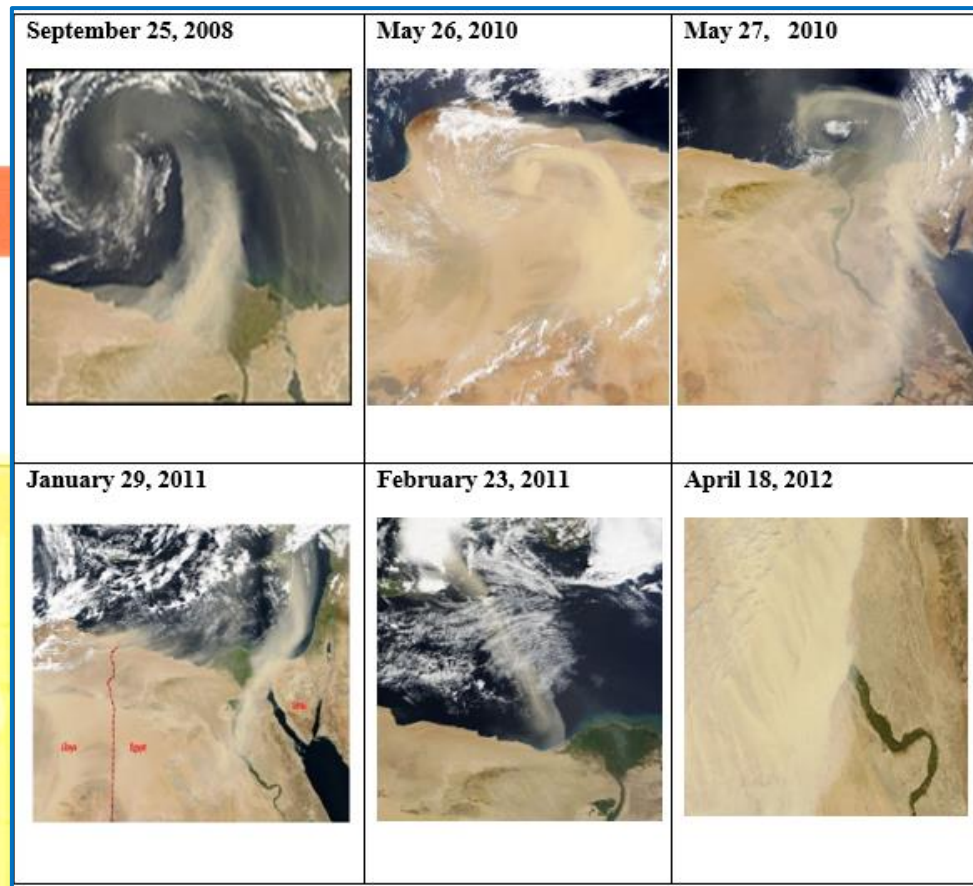


Fig. (4-6): SDS events of 2008-2012

4-2-8 Coastal erosion

The Egyptian Coasts extend for more than 3,000 km along the Mediterranean Sea, the Red Sea, and the Gulfs of Suez and Aqaba. More than 32 million people live on these coasts; most of them are located in the Northern Delta between the Rosetta and Damietta Branches (275 km²). These coasts have a unique diversity of ecosystems that include coral reefs, mangroves, sand dunes, sea grasses, etc. The Mediterranean coast, which extends for more than 1000 km, differs from the Red Sea coast. The Mediterranean Coast is characterized by deltaic sediments, sand formations, lakes, depressions, mudflats, salt marshes, and rocky beaches. As for the Red Sea Coast, it is mountainous, of limited depth, and home to coral reefs and mangrove forests.

The Egyptian coasts, especially the northern ones, are exposed to numerous problems, including beach erosion, deterioration of coastal depressions, intensive use in some areas, oil pollution, and climate change-induced sea level rise (Masria *et al.*, 2014).



Given the geological, geomorphological, and geographical conditions of the Red Sea Coast, the risks to which these beaches are exposed are limited to the deterioration of plant and animal biodiversity. As for beach erosion, it does not constitute a great danger in the long term.

With regard to the northern coast, it is divided into four sectors: first, the northwestern coast from Salloum to the city of Hammam, the second from Hammam to Abu Qir, the third from Abu Qir to Port Said, and the fourth from Port Said to Rafah, the easternmost Egyptian Border. This coast is exposed to the risks of various degrees of beach erosion (Hereher 2015), as follows (Fig.4-7):

- Beaches not exposed to erosion risks, extending in the Northwest Coast from Salloum to Alexandria and from Arish to Rafah.
- Beaches with limited exposure to erosion risks, located in North Sinai from west of Al Arish to west of Bardawil, with a length of 100 km, in addition to another sector with a length of 25 km east of Alexandria.
- Beaches with medium exposure to erosion, extending for a distance of 190 km in four regions in the northern Delta and east and west of the Suez Canal.
- Beaches highly exposed to erosion risks, located in the following places: In the middle of the Delta, at the exits of the Rosetta and Damietta branches, East of the Suez Canal exit, and at Al Arish Valley Exit.

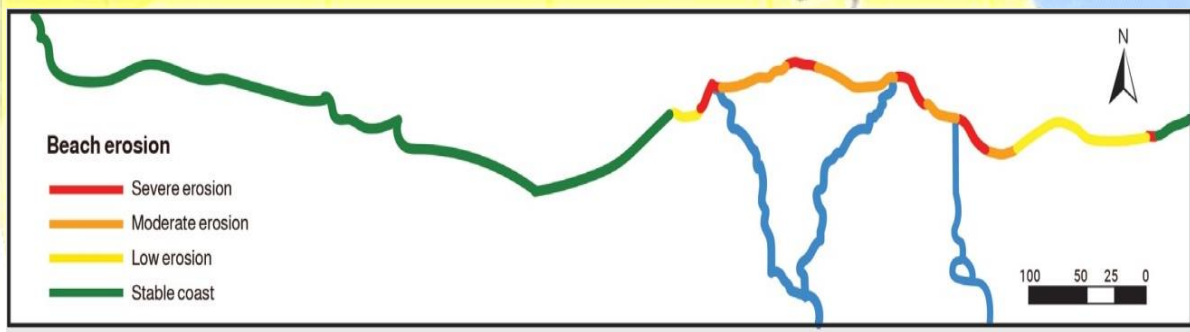


Fig. (4-7): Coast erosion risks on the northern coasts

4-2-9 Climate change and drought

Egypt has a high degree of risk to natural hazards and is highly vulnerable to climate change impacts. Egypt's Nile Delta is recognized as one of the world's three 'extreme' vulnerability hotspots. Future projections indicate that Egypt will suffer from sea level rise, water scarcities and deficits, as well as an increase in the frequency and intensity of extreme weather events such as heat waves, sand and dust storms, flash floods, rock slides and heavy rains.

The country is expected to become generally hotter and drier under a projected future climate. Egypt is already severely impacted by and susceptible to droughts, which are expected to be more frequent and pronounced.

Additionally, sea level rise is projected to lead to the loss of a sizable proportion of the northern part of the Nile Delta due to a combination of inundation and erosion, with consequential loss of agricultural land, infrastructure and urban areas. Key sectors impacted include water resources, agriculture, fisheries, health, housing, biodiversity, telecommunications, energy, tourism, and coastal zones (UNDP, 2018).

Egypt is considered highly vulnerable to climate change due to its primary dependence on the Nile River, which serves needs for potable water, agriculture, industry, fish farming, power generation, inland river navigation, mining, oil and gas exploration, cooling of machinery and power generation. This dependence on the Nile River's water makes the country vulnerable to rising temperatures, reduced rainfall for the upper Nile Basins as well as the reduction of rainfall on the east Mediterranean coastal zone (Egyptian Environmental Affairs Agency, 2016).

Egypt submitted its Nationally-Determined Contribution (NDC) and Third National Communication (NC3) to the UNFCCC in 2016, in support of its efforts to realize its development and economic goals and increase its adaptive capacity to climate change. The country is particularly vulnerable to the impacts of climate variability and change, particularly with respect to water security, agriculture and livestock, increasingly adverse conditions to health, human settlements, and energy demand and supply. Egypt's NDC is consistent with the country's overall goals of reducing vulnerability and poverty, and achieving long-term sustainable, economic development. Key areas of focus include the sustainability of the environment, water resources, energy, sustainable land management, agriculture, and health.

Concerning the drought, Egypt is prone to drought for several reasons, such as the lack of rainfall, which worsened because of the rise in temperatures caused by the increase in greenhouse gases. This also helps change the path of water precipitation. Climate change and temperature rising also lead to evaporation of water and a decrease in the levels of lakes and rivers in Egypt.



Current (based on historical climate conditions and recent trends, generally over the past few decades), rainfall variability within Egypt is almost inconsequential, given that the country receives very little rainfall, as well as the fact that its agriculture is irrigated and not rain-fed. Variability in Nile flows are moderated by the High Aswan Dam. The dam has one year's worth of storage capacity, to help in handling periodic droughts, although Egypt remains vulnerable to multiyear droughts.

Future: 2020-2049

Estimates are highly uncertain and information is not readily available. Consider future drought conditions based on the most extreme past experience.

Future: 2040-2059

There is considerable uncertainty with regard to the projections of rainfall, both over Egypt as well as over the principal headwaters of the Nile. There is agreement across climate models that temperatures are projected to increase significantly under climate change, increasing the possibility of enhanced water losses from evapotranspiration, particularly given the arid climates of Egypt and Sudan, which might imply reduction in stream flows and stored water.

4-2-10 Economic losses of land degradation

Historically a reduction in productivity (usually plant yield) and subsequent economic cost was a main constituent used to define the severity of land degradation. A more robust constituent now exists that places land degradation into the context of issues that matter the most to humans-estimating the monetary value associated with a persistent reduction of ecosystem goods and services. For example, in absolute terms, the monetary value of the total global ecosystem goods and services- the terrestrial ecosystem services value (ESV) which includes, food, feed, water availability, timber, air and water purification, soil formation, storage of carbon, flood mitigation and pollination-was estimated to be 125-145 trillion US \$/years while losses due to land degradation ranged from 43 to 20.2 trillion US \$/ years. The economics of land degradation initiative, which is a global initiative that promotes an awareness of economic consequences of land degradation, and the value of the sustainable land management, estimates the value of ecosystem services lost due to land degradation, is equivalent to 10-17% of the global GDP.

Monetary valuation goods and services such as those should nonetheless

be considered as rough approximation. There are numerous reasons for this, including:

- a- The lack of a universally accepted pricing system.
- b- The lack of cost-benefit economic analysis at local scale and in data poor areas.
- c- Many physical or environmental linkages that support or maintain ecosystem functions are difficult to quantify and thus remain hidden.
- d- Most ecosystem services are interdependent, interactive and function on long time scales, which make their economic valuation extremely challenging. In spite of these shortcomings, the monetary valuation of ecosystem service has many benefits from raising awareness to supporting decision makers who are considering the economic benefits of sustainable land management. Economic data at the local scale has the potential to impart insights into the cost-benefits of alternative strategies as well as the monetary value of adopting a specific land management practice (WAD, 2019).

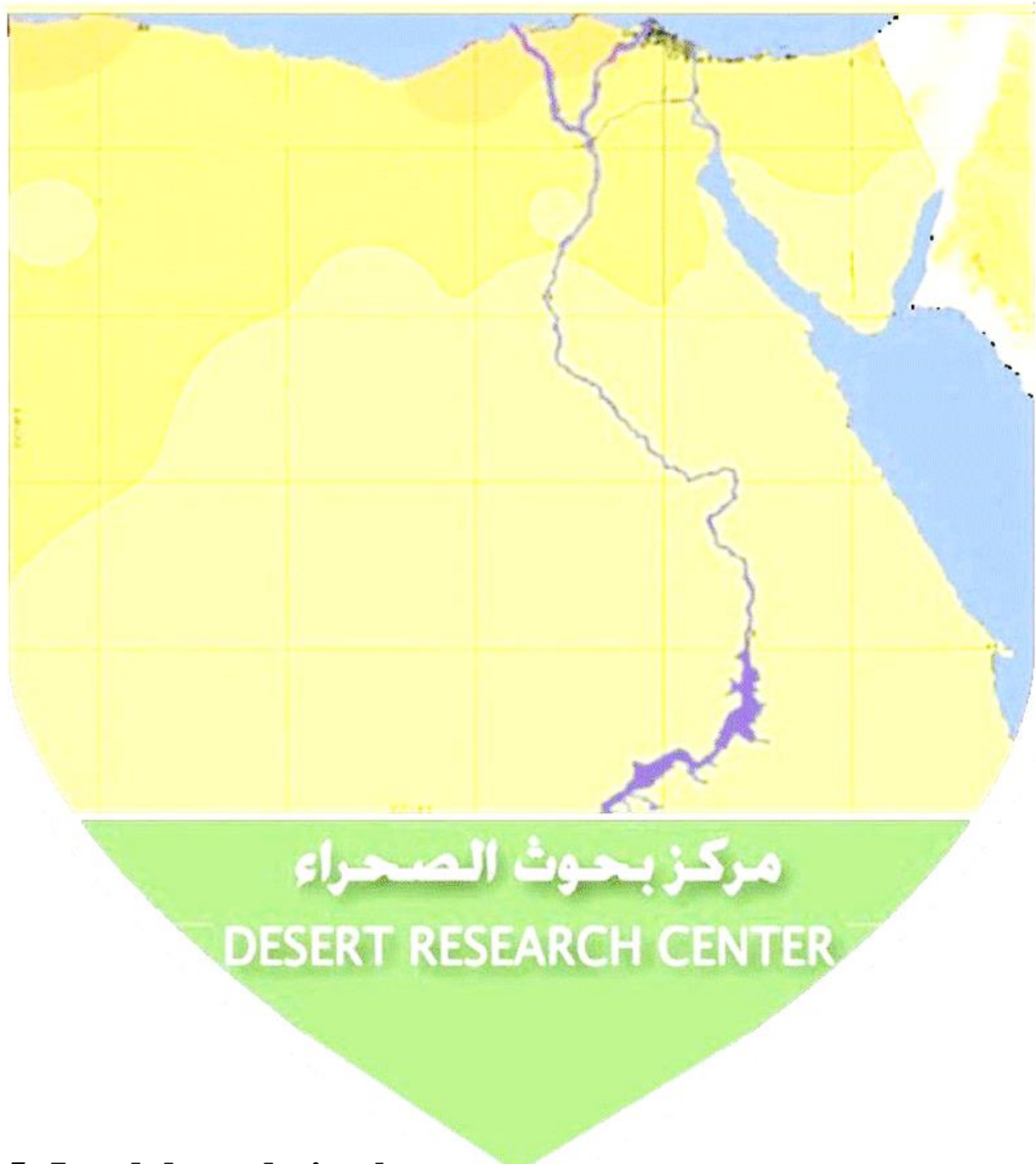
In Egypt, the cost environmental degradation in 1999 is estimated at LE 10-19 billion per year or 3.2-6.4% of GDP, with a mean estimate of LE 14.5 trillion, Or 4.8% of GDP (World Bank, 2002) . In addition, the damage cost to the global environment is estimated at 0.6 of the GDP. Estimated damage cost has been organized by environmental categories. In this concern, the cost to health and quality of life is about 2.6% of GDP, followed by 2.2 for natural resources as follows (Table 4-8).

Table (4-8): Annual cost of environmental degradation (mean Estimate)

component	Million LE per year	Percent of GDP (%)
Air	6.400	2.1%
Soil	3.600	1.2%
Water	2.900	1.0%
Coastal zones and Cultural heritage	1.000	0.3%
Waste	600	0.2%
Sub-Total	14.500	4.8%
Global environment	1.900	0.6%
Total	16.400	5.4%



On the other hand, the total agriculture areas in Egypt that affected by land degradation due to sand encroachment are estimated to be 1.8 million acre, which represent around 20% of the total cultivated areas. Consequently the economic losses are estimated at 25% of the average productivity (DRC 2018).



5- Land degradation hot spots

Land degradation prevails over a vast portion of the terrestrial ecosystem of Egypt. Such portion is dotted by high number of land degradation hot spots. A hot spot is severely degraded area where land degradation indicators are observed.

Table (5-1) shows the hot spots of the various types of degradation in the different Agro-Ecological Zones.

Table (5-1): Hot spots of land degradation types in the Agro-Ecological Zones

Types of land degradation	Location of hotspot	Agro-Ecological Zone
Sand and Dust Storms	North Sinai	Northern Coastal Zone
Soil erosion	North Sinai, NWCZ	
Water and soil salinization	North Sinai, NWCZ,	
Deterioration of rangeland	NWCZ	
Beach erosion	North Sinai, NWCZ	
Sea Level Rise	North Sinai, NWCZ	
Water and soil salinization	The governorates of: Alex., El-Beheira, Kafr El Sheikh, El-Dakhalyia, Damietta, Port Said and El-Fayoum	Nile Delta and Valley
Water logging	The governorates of: Alex., El-Beheira, Kafr El Sheikh, El-Dakhalyia, Damietta, Port Said and El-Fayoum	
Urbanization	Governorates of Nile Valley and Delta	
Sand encroachment	Western fringes of the Nile Valley and Delta, The governorates of: Alex., El-Beheira, Kafr El Sheikh, El-Dakhalyia, Damietta and Port Said.	
Beach erosion	The governorates of: Alex., El-Beheira, Kafr El Sheikh, El-Dakhalyia, Damietta and Port Said.	
Sea Level Rise	The governorates of: Alex., El-Beheira, Kafr El Sheikh, El-Dakhalyia, Damietta and Port Said.	
Pollution	Governorates of Nile Valley and Delta	Western Desert,
Sand and Dust Storms	East Oweinat, Dakhala, Kharga, Farfra....ect.	
Soil erosion	East Oweinat, Dakhala, Kharga, Farfra....ect.	
Water and soil Salinization	Oases of the Western Desert	Inland Sinai and the Eastern Desert
Sand and Dust Storms	Middle Sinai, South eastern Desert	
Soil erosion	Middle & South Sinai, Wadis of Eastern Desert	
Water and soil Salinization	Middle & South Sinai	

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6- Responses and efforts to combat desertification and neutralize land degradation



Restoring degraded lands and combating desertification are of a vital important for human endeavor in the face of growing needs for food, health and security. Yet, it remains challenging, particularly reducing pressure on land resources because of increasing human socio- economic activities and inadequate commitment from stakeholders to halt the process. To successfully restore degraded land, a wide variety of approaches are required. Restoration, reclamation and rehabilitation are essential in reserving land degradation processes and desertification. Programs and projects designed to combat desertification must effectively address challenges associated with the root causes of problem connected to its socio-economic sources.

In Egypt, the notion of combating desertification includes activities which are part of the integrated development program in view of Egypt' vision 2030 and the national commitment to combat desertification and sustainable use of natural resources aiming at: (I) prevention and /or reduction of land degradation, (II) rehabilitation of partly degraded land, and (III) reclamation of degraded land. In this context, the most important activities of relevant ministries to combat desertification in view of Land Degradation Neutrality (LDN) can be presented as follows:

6-1 Land Degradation Neutrality (LDN)

In view of the abovementioned commitments, Egypt in 2017 set the necessary national goals and measures to land degradation neutrality to be achieved by 2030 as one of the world's distinguished countries in combating desertification at the global level. The goal of land degradation neutrality in Egypt, according to Egypt's Vision 2030 was to preserve productive land resources, increase their areas, and improve their productivity, in line with the priorities of sustainable national development which is direct aim for increasing land productivity and sustainability to meet the raising demand for food or product necessary for agricultural manufacture without increasing in land degradation while preserving and developing it (DRC, 2018).

- Land Degradation Neutrality target setting, within a proposed timeline has been identified at different levels.
- At the national scale, LDN aims to achieve no net loss by 2030 as compared to 2015. Additionally, LDN aspires to achieve a net gain of about 10% of the national territory.

- At the sub- national scale, LDN would be achieved in the land degradation Hotspots: Kafr El Sheikh Governorate, Damietta Gov., Rasheed area, El Minia Gov., Sohag Gov., Al Fayoum Gov., 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).
- In order to effectively combat land degradation at the country level, the government is committed to achieve the neutrality of land degradation by 2030 with the following specific targets:
 1. Restoring and increasing the productivity of 11666 sq km (2800000 Feddan) of cropland using the modern agricultural techniques included on farm irrigation development and Sustainable Land Management (SLM) practices in the northern areas, western and eastern fringes of reclaimed lands of Nile Delta and El Tina Plain area by 2030;
 2. Rehabilitating and increasing the productivity of 8000 km² (1.92 million Feddan) of rangeland and rainfed areas using SLM practices in the north coastal areas (rangeland and rain-fed farming areas) by 2030,
 3. Regarding the reclaimed areas in the western desert fringes of the middle and upper Egypt, the government is committed to rehabilitate and increase the productivity of 7500 km² (1.8 million Feddan) of cropland using SLM practices by 2030, in addition to reclamation and cultivation of 6300 sq. km (1.5 million Feddan) of virgin land in reclaimed desert soils at different locations in the western desert of Egypt by 2030.
 4. Furthermore, great considerations have been focused on rationalizing water consumption by growing drought-tolerant crops and adopting modern irrigation systems for around 1000 km² in some Oases in the Western Desert of Egypt by 2030;
 5. Halting the conversion of crop land to other different cover classes by 2030;
 6. Controlling or alleviating soil erosion by runoff water, construction of cemented dykes and development of watershed areas for water harvesting to be utilized for agricultural activities for an area of about 2500 km² in the North Western Coastal Zone of Egypt by 2030;
 7. Increasing the tree cover/ forest cover by 25%, through agro-forestry and SLM in the existing forests by 2030 as compared to 2015.

In relation to the LDN policy measures, some presidential decrees pertaining policy measures have recently been outlined through a national campaign for the various encroachments on the arable lands to restore and



rehabilitate their productivity through putting the long standing legislations into effect, the case meaning that actions will be taken by a high level authority designated to enforce such measures in order to achieve LDN targets.

A UNCCD National Coordination Committee was reformulated and activated by decree from the Minister of Agriculture and Land Reclamation to undertake well defined tasks, namely; following up policies, programs, projects in terms of their priority in achieving combating desertification/ LDN targets ; approving and following up the regional and international agreements and coordinated projects towards combating Land Degradation (LD) and their implementation at national and sub-national levels; developing coordinated mechanisms for local and international funding and realizing active coordination and exchange of experiences, data and outcomes among ministries institutions at the national level.

6-2 National interventions to combat desertification, land degradation and drought

In this context, the commitment of Egypt has under taken a number of activities with several objectives to achieve the development goals and combating desertification through the designated ministries, made a strenuous effort to achieve these goals, each in its own field, as follows:

6-2-1 Ministry of Agriculture and Land Reclamation

Entities and institutions affiliated with the Ministry of Agriculture and Land Reclamation have accomplished the following:

a- Protection from urban sprawl

As previously mentioned, the population growth and the rise in demand for housing have had negative repercussions represented in increasing urban sprawl on agricultural land, undermining its ability to produce food and provide job opportunities and livelihoods in the rural sector. To curb this phenomenon, the state has taken a number of measures, including: (a) legislative measures: Issuance of Law No. 166 of 1983 to criminalize and toughen penalties for encroaching on agricultural lands, and (b) removing encroachments on productive agricultural lands.

In this regard, as previously mentioned, the total encroachments on agricultural lands during the past ten years amounted to about two million cases of infringement on an area of 90 thousand Feddans. Since 2011, the encroachment

on agricultural lands has begun to increase. It peaked in 2012 to reach 365 thousand cases, then the numbers began to gradually decrease as of 2015 until it reached about 55 thousand cases in 2020 (Fig. 6-1).

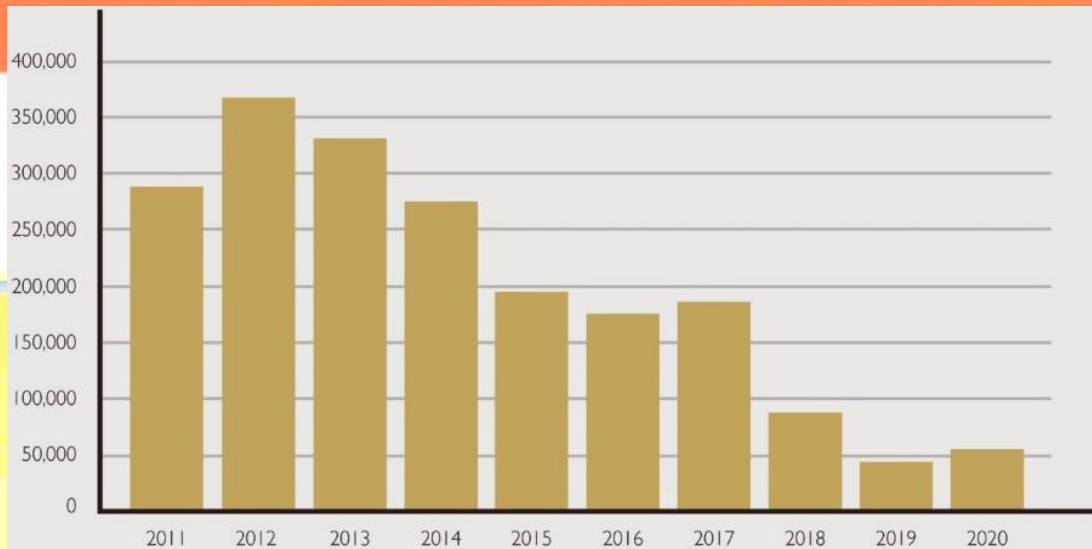


Fig. (6-1): Development of the number of encroachment cases on agricultural lands

Source: CAPMAS, 2022, Ref. No. 71-22128-2021

The Central Administration for Land Protection at the Ministry of Agriculture and Land Reclamation, in cooperation with the relevant ministries and agencies, has removed about 645.6 thousand cases, representing 32 % of the total number of encroachments on an area of about 36.3 thousand Feddans (Fig. 6-2). These agencies continue their removal campaigns in all governorates of the Republic.

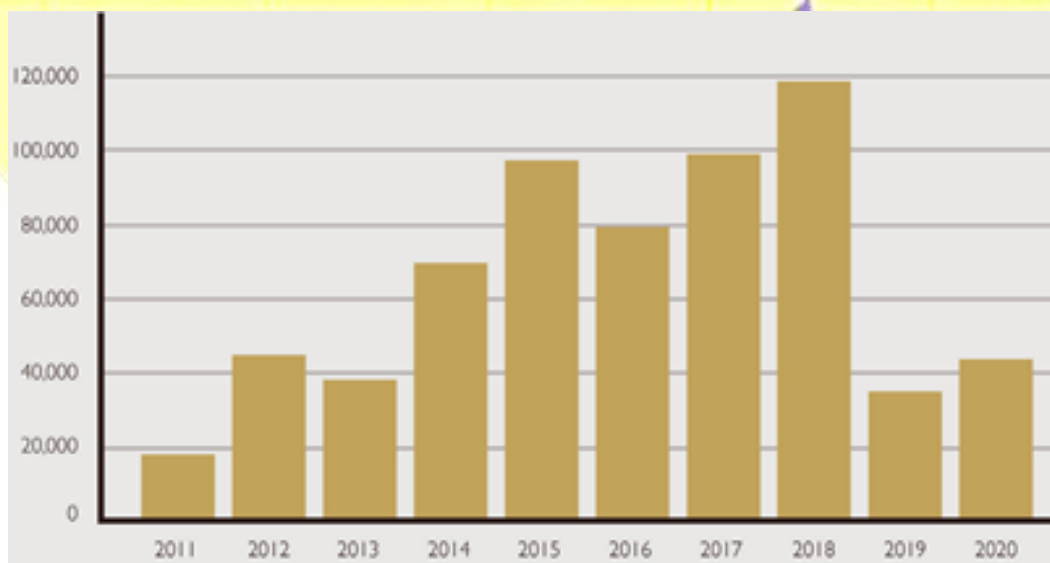


Fig. (6-2): Development of the number of encroachment removals on agricultural lands



Source: CAPMAS, 2022, Ref. No. 71-22128-2021

b- Developing agricultural land

Executive Authority for Land Improvement Projects (EALIP) carried out a number of processes aimed at improving the productivity of agricultural lands through: applying some effective practices and procedures i.e. adding agricultural gypsum to reduce soil salinity; plowing beneath the soil to improve drainage; laser leveling to improve surface irrigation efficiency; and cleaning of waterways.

Some studies indicated that these practices and procedures have positive repercussions on soil and productivity as follows: (1) reducing soil salinity from 19 to 60 %; (2) reducing alkalinity from 10 to 25 %; (3) cracking the solid layers beneath the soil; (4) reducing the groundwater level; (5) increasing the productivity per area unit from 10 to 20 %; and (6) saving about 20 % of irrigation water.

c- Land reclamation

The government is implementing a number of massive land reclamation projects to establish agro-industrial communities, provide new job opportunities, alleviate pressure on land resources in the Valley and Delta, and to reduce land degradation. Such degradation is caused by either encroachment or pollution resulting from intensive agricultural exploitation or the overuse of fertilizers and pesticides to increase agricultural production and meet the growing demand for food. These mega projects include the following:

- 1- Egyptian new countryside project with a total area 1.5 million-Feddans. This project aims to reduce the food gap, increase the number of Egyptian inhabited areas and create more job and agricultural investment opportunities. It is concentrated in Upper Egypt, the Western Desert, Sinai, and the Western Nile Valley in El Menia Governorate based on groundwater. About 350 thousand Feddans were reclaimed and cultivated till 2023.
- 2- The New Delta Project, which is established on an area of more than 2 million Feddans, located at the new road axis of Rod el Farag / El Dhabaa, near from Cairo, Alexandria, El Beheira Governorates and New City of El Alamain. This project aims to accommodate the population increase in the valley and the old delta in new communities with modern developed agriculture systems, and to compensate the loss of agricultural old lands. The project, depending on reuse water resources of treated agriculture drainage throughout

establishment a big station for water treatment with capacity 6.5 million m³/ day, in addition to using underground water. The project already started in 2021 under supervision of the Egyptian Future Agency for Sustainable Development (EFASD) and the reclaimed and cultivated area reached to more than 500 thousand Feddans by the end of 2023. It is planned to complete the infrastructure to increase the reclaimed and cultivated area to 1 million Feddans by end of 2025 (Fig. 6-3).

- 3- North and Central Sinai Development Project aims to reclaim and cultivate about 450 thousand Feddans using mixed water (fresh and agriculture drainage water) with capacity of 2 million m³/ day with another source of treated agricultural drainage water with capacity of 5.6 million m³/ day from west Suez Canal through El Sheikh Gaber Al-Sabah Canal (El-Salam Canal). This project started and the reclaimed and cultivated area reached to up 185 thousand Feddans by 2023. Also, there is another area of 75 thousand Feddans east of the New Suez Canal based on treated agriculture drainage water pumped from El Mahsama Siphon with capacity of 1.3 million m³/ day.

d- Sand dunes fixation

Most of the development projects are located within the dune fields and sand seas of Western Desert and North Sinai. Such projects which implemented by different ministries and authorities include land reclamation, settlements and new communities, industrial areas, infrastructure etc., are of a direct threat to the shifting sand and sand dunes migration.

In this context, and in view of Egyptian Experience in the control of sand encroachment and dunes migration which started at the beginning of the twentieth century (1929), the Desert Research Center in the recent years carried out a number of projects aiming at the control of sand movement.

Such projects were implemented on a pilot and small scale to gain more experiences, information and economics and the efficiency of the mitigation measures which needed for carrying out a national project for sand encroachment control on the national development projects in the desert areas.

When discussing the recent activities that have been under taken to control sand movement, reference can be made to the following projects:

1. Sand dunes fixation of 100 feddan in Siwa Oasis using agriculture drainage water (DRC and Social Fund for Development “2000-2002”).



2. Protection of the connection road between Darb-Arbean and Toshka Depression from sand encroachment (DRC and the Authority of High Dam and Aswan Reservoir, 2003).
3. Green belt for the control of shifting sand along Toshka Canal, south of Egypt (DRC and Faculty of Engineering, Cairo University "2000-2003").
4. The control of shifting sand along El Salam Canal, North Sinai (DRC and Faculty of Engineering, Cairo University "2006-2012").
5. The control of shifting and along South Quantara Canal, Ismailia Governorate (DRC and Faculty of Engineering, Cairo University "2004").
6. Sand encroachment control on Shahaïem Drainage Canal, Siwa Oasis (DRC and Arab Center for the Studies of the Arid Zones and Dry Lands, "2014-2017").
7. Adaptation to climate change in the Nile Delta through integrated coastal zone Management, (Ministry of Irrigation, Shore Protection Authority and DRC, (2017-2019).

In view of the achieved results, it could be concluded that:

- The efforts regarding sand dunes stabilization are considered very limited and are not in proportion with the severity of the problem.
- The inhabitant's role in the efforts of dune stabilization was limited compared to that of the governmental and international authorities and institutions. This may be due to some technical, economic and social constrains.
- There are a lot of techniques used to control sand encroachment in the desert areas. Such techniques are different in terms of materials, duration, efficiency, costs and environmental effects.
- The absence of sustainable management programs for the vegetated dunes, resulted in the deterioration of large areas of the vegetation cover. This lead to the shifting sand and sand encroachment.
- There are insufficient reliable data and information necessary to assess the issues related to the desertification control and sand dune stabilization.

Consequently, the following policies and plans are recommended:

- Scientific and executive institutions and authorities should work on planning for a national program for sand encroachment control and setting the priorities for implementation this program. Such priorities can be

achieved on the basis of the physical characteristics of the aeolian deposits, climatic conditions ... etc.

- Adequate financing should be allocated with the aid of local, regional and international institutions and authorities.
- Paying attention to the training of technical staff to enhance the skills as regard the planning and implementation of sand dune stabilization programs.
- Sand dunes stabilization should be included in the topics of environmental education programs in desert areas.
- Increase the awareness of the local inhabitants concerning the hazard effects of the sand movement and methods of sand encroachment control, through demonstration programs in the desert areas.
- Paying attention to the experiences of some countries in the field of inhabitant's participation (India – China, etc.) in the field of desertification control.
- Low cost and effective techniques, which are successfully applied in other countries, can be introduced.
- Scientific institutions and authorities have to adopt an intensive research program regarding the sand dunes stabilization maintenance and management of the vegetated areas.

e- Improvement of rangelands

The efforts devoted to rangelands improvement were started in the fifties of the last century when the Desert Research Center started a project for restoration of about 5000 Feddan in Ras El Hekma at the North Western Coastal Zone of Egypt. Such efforts were continued in different zones in Egypt, i.e., North Western Zone, North Sinai and South Eastern of Egypt.

Recently in view of the National Strategy for Sustainable Development, Egypt' Vision 2030 aiming at increase the inhabitant's areas to reach 25% of the total surface area of the country, DRC has cooperated with various national and international organizations to achieve LDN target in the degraded natural rangelands through implement some projects related to rehabilitation and restoration the degraded areas of natural rangelands. Reference can be made to the following:



Fig. (6-3): The New Delta Project along El Dabaa axis

- **Matrouh Resources Management Project (MRMP)**

The Egyptian Government represented by the Ministry of Agriculture and land Reclamation supported economic, social and developmental of Matrouh Governorate through (1994 - 2003) programs, as well as successive promotion

and contribution to the implementation of development that was funded by international organizations.

MRMP project is funded by the World Bank and the Egyptian Government. It has several objectives : Some of these are implement Government's strategy for natural resource management in the NWCZ by implanting program of sustainable natural resources management (in order to conserve water, land vegetative resources of the area, alleviate poverty , improve the quality of life of the local Bedouin population to protect biodiversity and combat desertification).

The implementation of **activities is based on the participatory approach** and the involvement of the target beneficiaries in the project interventions for Promoting ownership by the local population. MRMP included: Water Harvesting and Management, Extension, Adaptive Research, Women in Development, Gender activities and extensive training.

The Sustainable Development Center for Matrouh Resources (SDCMR) has been started in 2003 and still ongoing now for the DRC.

For importance of rangeland management and improvement, the following activities are implemented:

- 1- Total of 12000 Kg of indigenous seeds were collected from multiplicities and distributed to the members of the local communities.
- 2- Providing support for the establishment of 48 plastic houses for producing the fodder shrubs and tree seedlings in the local communities.
- 3- Planting of 6.32 million of fodder trees and shrubs for increasing the supply of cheap forages, to available green forage materials in the summer time and reducing dependence on costly concentrates. They are planted using 3 different approaches as follow:

Activity/approach	Subs (million)	Area (Feddan)	No. of beneficiaries
Small non-fenced areas	2.90	8212	2997
Large fenced areas	3.12	6250	250
Enter planting by barley fields	0.30	6750	965
Total	6.32	21212	4212

- 4- Introducing new forage species, 47 feddan of spineless cactus for 80 beneficial.



5- Reseeding of 2485 Feddan of deteriorated communal rangelands by perennial Fodder shrubs have reduced the concentration and feed expenses by 37% on average for about 40% of the beneficiaries.

- **Promoting Resilience in the Desert Environments (PRIDE) in Matrouh Governorate**

The PRIDE project is funded by IFAD and it aims at reducing poverty and enhancing food and nutrition security through remunerative, sustainable and resilient livelihood in climate change-affected areas by improving productive capacities of poor rural households and assisting communities in enhancing the productive potential of the newly reclaimed lands as well as improving nutrition and socio economic status of women and children. This project started in 2021 and will be continue till 2026, the main technical components include a sub component for livestock and rangelands development.

Through the participatory approach with local communities, the project introduced two models to improve the degraded rangelands. The first one includes the application of Hema System (protected area) on 10000 Feddans in 40 locations (250 Feddans per each location) with beneficiary group of 25 households in each location. Such system aims at increase the density of the natural vegetation cover. The second model includes the application of intercropping system through cultivation of fodder shrubs and barley. The project started the implementation in an area of 1200 Feddans distributed in 24 sites. Different water harvesting systems (cisterns and dykes) were established in each site. The evolution of such models is currently ongoing.

- **Healthy Ecosystems for Rangeland Development project (HERD)**

The HERD project is funded by the Global Environmental Facility (GEF) and implemented by IUCN Regional Office West Asia and UNE in cooperation with Desert Research Center and CEDARE.

The project objectives are the promotion of rangeland rehabilitation and sustainable development operations by providing ecosystem services and bio-diversity protection. The project covers an area of about one million Feddan in both Barani and Ras El Hekma districts. The project has the following four components: (1) Provide knowledge-based technical assistance (promote the evidence-based decision-making mechanism); (2) Knowledge management in terms of rangeland sustainable management and dissemination on regional and

international levels; (3) Up scaling application of rangeland sustainable development best practices; and Institutional upgrade to strengthen rangeland governance.

Under the four project components, more than 30 activities were implemented including socio-economic studies, training courses, rangeland restoration, supporting activities ... etc.

The main achievements of the project can be presented as follows:

- 1- Establish the revolving fund aiming at support the pastoralists and herders during the dry season by allowing soft in kind loans to obtain fodder and financing micro-enterprise for women to diversify sources of income for poor pastoralist's families. The capital fund is 3 million Egyptian pounds which provided by HERD project and Matrouh Governorate. At the end of 2022 about 87 beneficiaries were benefited from the fodders loans and 44 women from the small enterprises loans, with a recovery rate ranging between 90-100%.
- 2- Formulation of the first Egyptian law to organize and manage the sustainable use of the rangeland. The law includes 19 articles that include defining responsibilities and the administrative structure necessary for development, management and exploitation rangeland. Also the law includes the rights of the pastoralists and controls for sustainable use of rangelands. Currently, the law is discussed in the Ministry of Agriculture and Land Reclamation to proceed.
- 3- Establish of 14 demonstration rangeland plots (50 Feddan per each), in which the Hema (conservation) rules were applied and pastures were developed. Under project area conditions the plant cover increased from 35% to 73% due to conservation.
- 4- Upgrading the skills of 15 the governmental employees as regards the modern technologies for monitoring and evaluation through 5 training courses on GIS and remote sensing.

6-2-2 Ministry of Water Resources and Irrigation

The Ministry carried out projects aimed at increasing the water use efficiency in the different sectors including the agriculture lands. The most important of which are the following:

a- Field irrigation development project

The project aims to develop field irrigation in old lands established by the Ministry of Agriculture and Land Reclamation, in cooperation with the Ministry of Water Resources and Irrigation. This is accomplished through improving field irrigation systems by shifting from traditional flood irrigation to developed irrigation



(sprinkler and drip), maximizing the use of the land and water unit, and ensuring equitable distribution of water among farmers. The development of field irrigation contributes to reducing rural poverty, improving livelihoods by increasing and upgrading agricultural production, as well as saving about 25 % of water uses. Field irrigation has also led to a 20 % rise in agricultural production, in addition to increasing water productivity from 36 to 68 %. Ministry of Agriculture data indicates that about 285 thousand Feddans in several governorates have been converted from traditional irrigation to drip or sprinkler irrigation at a cost of LE 2.8 billion, since the inception of work in 2017 until the beginning of 2021.

b- Agricultural drainage projects

These projects aim at developing the national economy through the establishment and maintenance of infrastructure projects in the field of general and covered agricultural drainage. This keeps the groundwater level away from plant roots to ensure the provision of adequate soil aeration, the preservation of soil fertility, improvement of its chemical and natural properties, as well as reduction of its salinity. This leads to a 25 % increase in agricultural production.

The authority's strategy includes establishing, deepening, and expanding open public drains on an area of 8.5 million Feddans in Lower and Upper Egypt and the newly reclaimed areas. About 7.2 million Feddans and 0.8 million Feddans have been respectively developed in the reclamation areas. As for the covered drainage, the Authority aims to implement networks on an area of 6.4 million Feddans in Lower and Upper Egypt, and about 6 million Feddans have been already enhanced.

c- Coastal protection projects

The coastal protection program, implemented by the Egyptian General Authority for Coastal Protection, aims to confront climate change effects, stop the decline of the shoreline in areas suffering from severe erosion, and restore the beaches lost as a result of such erosion. This contributes to increase tourism income in coastal areas.

The program also works to preserve historical monuments in coastal areas such as Qaitbay Citadel in Alexandria, safeguard agricultural lands located behind the protection work, and endeavor to stabilize tourist areas and acquire new spots for tourism purposes. Furthermore, the program seeks to protect some villages and low-lying areas from the dangers of seawater inundation, such as the area east of Rosetta Branch estuary and until Burullus strait, as well as west of

Port Said. In addition, the protection work contributes to the development of fisheries in the northern lakes by upgrading the straits and protecting Nile River estuaries at Damietta and Rosetta branches to face problems related to erosion and sedimentation.

In this context, several massive projects are being implemented to protect the city of Alexandria, Qaitbay Citadel, the ancient sea wall, the city of Ras El-Bar, the coastal area north of Berket Ghalioun, as well as El- Obeid and Marsa Matruh beaches in Matrouh Governorate with the other projects at a cost of around LE 180 billion.

6-2-3 Ministry of Environment

Ministry of Environment has assigned great attention to protect the environment and natural resources and alleviating pressures thereon. In this regard, the General Administration of Environmental Economics is making tremendous efforts to address encroachments on the environment and the misuse of natural resources, and to achieve Egypt's sustainable Development Goals.

a- Green economy

The green economy is one of the essential mechanisms for achieving sustainable development, as it may involve various opportunities such as encouraging innovation, establishing new markets, creating job opportunities, and contributing to poverty reduction.

The green economy is an opportunity to apply advanced technologies to achieve food security, ensure rural areas' access to energy, and provide clean water supplies, housing, sanitation facilities and public transportation. All this contributes to providing job opportunities and poverty reduction. The General Administration of Environmental Economics is following up on the concerned authorities' efforts to shift to a green economy in the following fields:

Energy

- Increasing new and renewable energy contribution by about 20 % of the total consumed energy,
- Investing in electricity generation from solar energy and the economic exploitation of the Western Desert in this regard,
- Correcting the price structure of petroleum products and restructuring the energy sector.



Transportation

- Cooperation is established between the Ministry of Environment, the Ministry of Finance, and Nasser Social Bank to replace Cairo Taxi to use gas fuel to reduce carbon emissions,
- The Ministry of Environment is implementing an ambitious program to convert government cars to run on natural gas to reduce emissions,
- Working with the Ministry of Trade to ban two- stroke motorcycles and replace them with four- stroke ones to reduce air pollution,
- Supporting mass transit systems,
- Attracting investments in the energy sector to adapt to climate change effects.

Industry

- The Ministry of Environment implements programs for industrial pollution control and environmental protection for the Private and Business Sectors,
- Encouraging the transition to industries that rationally consume energy, natural resources and water,
- The tendency towards increasing industry localization in new cities,
- Expanding support for small and medium industries in the field of the environment,
- Water reuse and control of industrial drainage.

Agriculture

- Sustainable use of natural agricultural resources,
- The use of integrated agricultural management techniques,
- Raising water use efficiency in agriculture, improving irrigation and drainage systems, and cultivating less water-consuming varieties,
- Expanding the reuse of agricultural drainage and sewage water after treatment

Institutional measures

- Amending environmental legislation and developing environmental management systems,
- Orientation toward green economic development less dependent on carbon,
- Completing the institutional framework for managing efforts to adapt to climate change impacts,
- Inclusion of environmental dimension in development projects,

- Adopting financial policies that encourage and support environment-friendly establishments, and toughening penalties for environmental violations.

b- Protected areas (Natural reserves)

Since the enactment of the Law No. 102 of 1983, thirty-one areas have been declared as protected areas in Egypt, covering more than 15% of the country's area.

The network of natural protected areas includes most of the habitats and ecosystems in Egypt. There are also other important areas that will be included in this network in the future.

Over the past decades, the United Nations Development Program (UNDP) has worked with the Egyptian Ministry of Environment and participated in encouraging and managing the network of protected areas and enhancing the care and support of its local communities.

The network of natural protected areas includes biological species, distinct natural areas, and geological formations. Local people, their cultures, and their eco-tourism are also considered important components of protected areas.

A lot of resources and efforts have been invested in managing the natural protected areas to achieve their desired goals. Nowadays many of these sites have effective management plans, infrastructure and appropriate equipment operated by a distinguished specialized team. **Table (6-1)** and **figure (6-4)** show the distribution and the characteristic of the protected areas in Egypt.

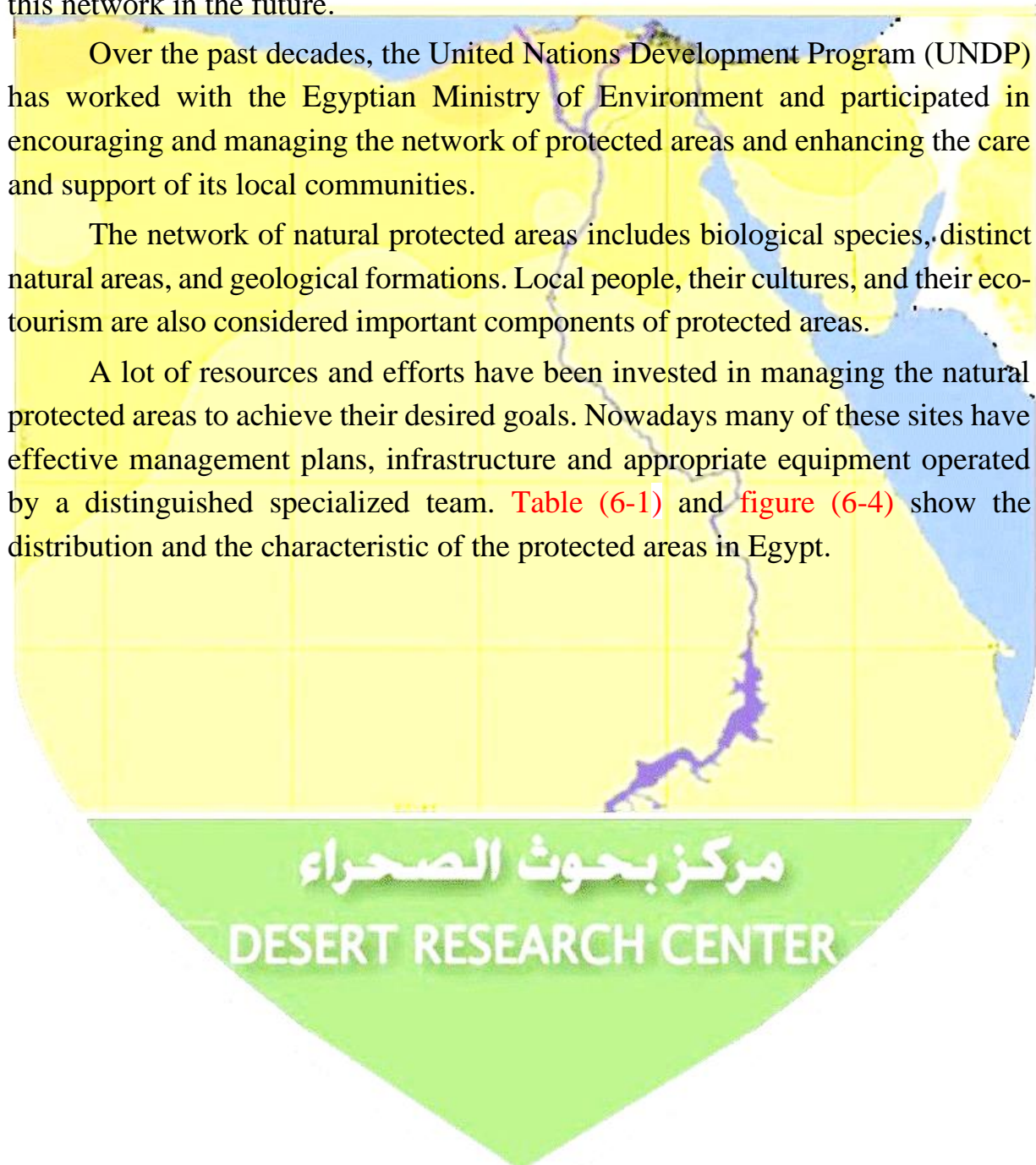


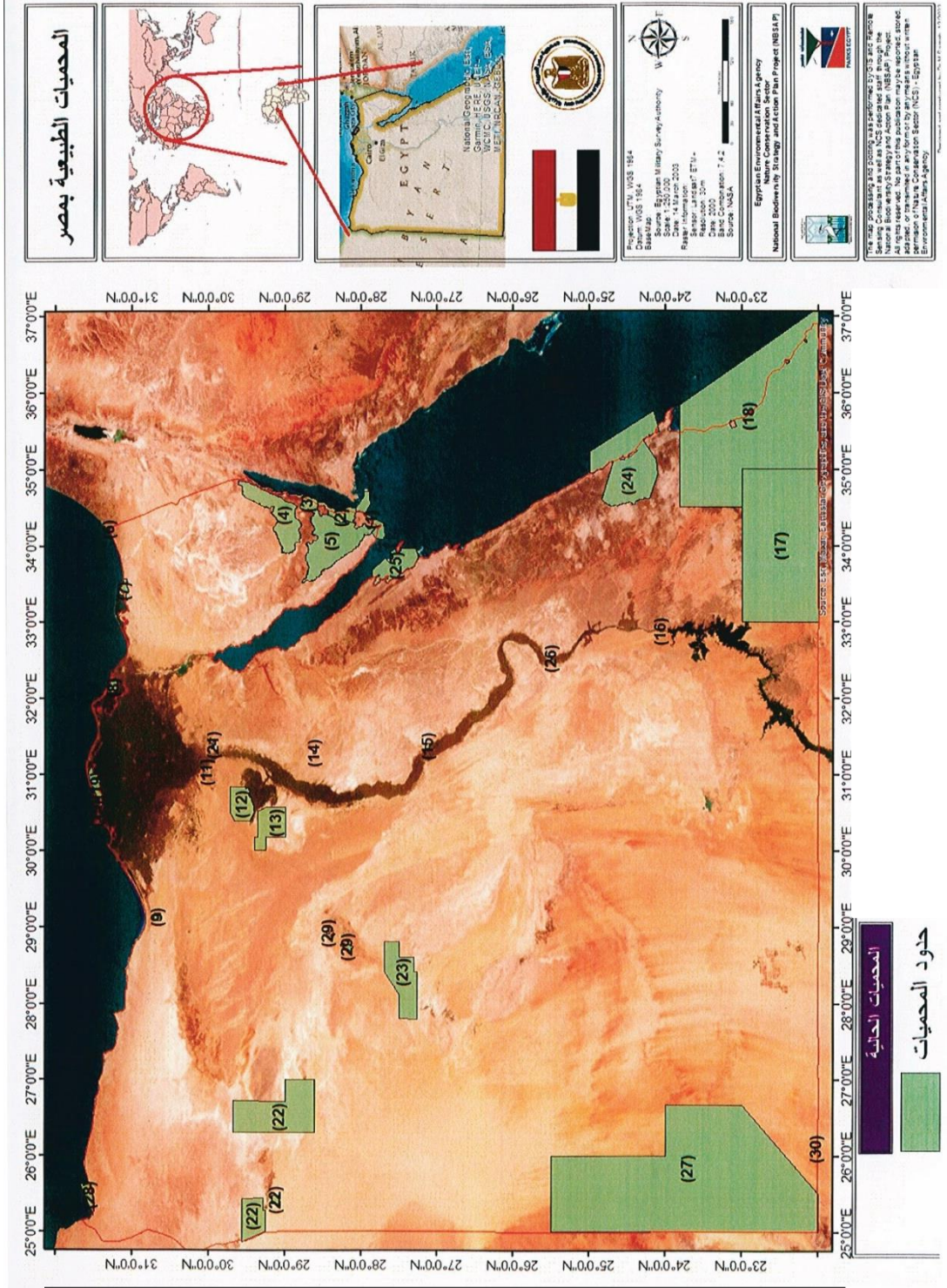


Table (6-1): Classification and areas of natural reserves (protected areas) in Egypt

No	Protected	Date of announcement	Governorate	Type according to IUCN classification	Area km ²
1	Ras Mohamed and Tiran & Sanafir islands	1983	South Sinai	National park	778.2
2	El Zaranig	1985	North Sinai	Sources management	226
3	El Ahwash	1985	North Sinai	Natural Scenes	3
4	El Amed	1986	Matrooh	Biosphere	692
5	Olba protected	1986	Red Sea	National park	30462
6	Saloga &Gazal Islands	1986	Aswan	Habitat Management	0.4
7	Saint Katrine protected	1988	South Sinai	Land Natural Scenes	4483
8	Ashtoon El Gamil	1988	Port Said	Sources management	171
9	Karoon	1989	Fayoum	Sources management	1341
10	El Rayan Valley	1989	Fayoum	National park - Sources, management	1756
11	El Alaqi Valley	1989	Aswan	Biosphere	22779
12	El Asyuti Valley	1989	Asyut	Habitat Management	35
13	Kobat El Hasana	1989	Giza	Natural monument	2
14	Fossilized Forest	1989	Cairo	Natural monument	3
15	Wadi Snor cave	1992	Beni Suef	Natural monument	12
16	Nabaq	1992	South Sinai	Sources management	519
17	Abou Galom	1992	South Sinai	Sources management	426
18	Taba	1998	South Sinai	Natural monument	2825
19	El Borolos	1998	Kafr El Sheikh	Sources management	911
20	Nile Islands (144)	1998	Various governorates	Sources management	140
21	Wadi Degla	1999	Cairo	Land Natural Scenes	37
22	Siwa Protected	2002	Matrooh	Sources management	7733
23	White Desert	2002	New Valley	Land Natural Scenes	3734
24	Camels valley	2003	Red Sea	Sources management	6729
25	Red Sea North Islands	2006	Red Sea	National park - Natural Scenes	1710
26	El Galf El Kabir	2007	El Wadi El Gadid	National park	48525
27	El Dababiya	2007	Luxor	Natural monument	1
28	Saloom	2010	Matrooh	Habitat Management	390
29	El Wahat El Bahariya	2010	Giza	Natural monument	103
30	Gabal Kamel Meteorite	2012	El Wadi El Gadid	Astronomical information of global scientific significance	77
31	Whales Valley	2008	Fayoum	Natural Heritage Reserve (UNESCO)	400

Source: CAPMAS, 2022, Ref. No. 71-22301-2020

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Fig. (6-4): Location of protected areas in Egypt



c- Afforestation by use sewage water

In the mid of nineteen's, the national program for the "safe use of the treated Sewage Water for Afforestation" was launched, by Ministry of Agricultural and Land Reclamation with the supervision of the Holding Company of Water and Waste Water and a technical support also from the Egyptian Environment Affairs Agency (EEAA). Such program aiming at improves the prevailing conditions by:

- Making use of unutilized sewage water (4.4 BCM), which is of a hazard for the Environment.
- Establish forests plantations to support the effort for minimizing the concentration of the greenhouse gases in the atmosphere within the frame work of such program some 60 man-made forests covering an area of about 11195 Feddan located in 16 governorates. **Table (6-2)** shows the distribution of the forests among the different governorates.

The planted species includes: *Acacia*, *Casuarina*, *Cupressus*, *Eucalyptus*, *African Mahogany*, *Neem*, *Pinus*, *Populus*, *Jatropha*..., *Jojoba*... etc.

Table (6-2): Relative distribution of forests areas using treated sewage water in 2019

Item	Relative distribution (%)	Area (Feddan)
Giza	4.5	500
Alexandria	0.5	60
Suez	3.5	400
Ismailia	4.5	500
Dakahlia	1.3	150
Monufia	4.5	500
Beni Suef	4.5	500
Asyout	0.3	40
Suhag	17.9	2000
Qena	4.5	500
Aswan	19.5	2185
Luoxr	15.2	1700
The New Valley	11.6	1300
South of Sinai	4.1	460
North Sinai	1.8	200
Red Sea	1.8	200
Total	100.0	11195

Source: CAPMAS, 2022, Ref. No. 71-22301-2020

6-2-4 Ministry of Housing, Utilities and Urban Communities

The ministry of Housing, through its various agencies, developed and established new urban communities to redistribute the population in the Nile Valley and Delta into the desert in order to protect the agriculture land from urban sprawl.

Table (6-3) shows the new communities from 1977 till today.

Establishing new cities is one of the important axes designed to limit encroachment on agricultural lands, as the new cities meet the escalating demand for housing in light of the steady population increase. The country has adopted this trend since the 1970s by building several generations of new cities as follows:

Table (6-3): Distribution of the new communities

First Generation	1977 - 1982	10 th Ramadan – New Borg El Arab – 15 th of May – New Damietta – 6 th of October – New Salhia – Sadat
Second Generation	1982 - 2000	New Cairo – Sheikh Zayed City – Badr – Obour – New Beni Suef – New Minya – New Nubariya – El Shorouk
Third Generation	2000 - 2014	New Asyut – New Tiba – New Sohag – New Aswan – New Qena – New Faiyum – New Akhmim
Fourth Generation	2014 - now	New Administrative Capital – New Alamein – New Mansoura – New Toshka – New Farafra – East Port Said

The number of new cities is expected to reach more than 44 in 2052 to accommodate the projected population increase.

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7- Women's role in activities to combat desertification and sustainable development



Regarding to the UNCCD strategy, women and girls are vital agents of change in efforts to minimize, stop and reverse desertification and land degradation. Women's access to, ownership of, and control over the land is key to their economic empowerment and full enjoyment of their human rights. Not only does land ownership increase their economic security, it also increases their decision-making power within communities and families. When women and girls have equal land ownership and tenure rights, they tend to invest in soil conservation and sustainable land management practices. Accordingly, women are critical to reversing desertification and land degradation, as they restore, protect, nourish and care for the land while simultaneously caring for their families and communities. Therefore, gender transformative actions are required to address unequal power structures, gender gaps and human rights violations, including: "socio-economic inequality and the persistence of poverty; inequitable control of and access to natural resources (including land); lack of or limited access to markets, capital, training, technical assistance, financial services and technologies; patriarchal, discriminatory and violent cultural patterns; the sexual division of labor and the unfair social organization of care; and the concentration of power and hierarchical relations that prevail in the public domain, where institutional decision-making structures in the field of sustainable development demonstrate women's limited access to the exercise of power and decision-making processes. Gender transformative actions are steps capable of changing the norms and systems that perpetuate gender inequality, and addressing the root causes of gender-based discrimination.

One of the core principles of the UNCCD is that the participation of women in environmental decision-making is critical to addressing desertification and land degradation. Empowering women and girls as landowners, increasing their participation in decisions about the land, and increasing their access to education training and financial resources are essential actions for accelerating land restoration and making progress towards Land Degradation Neutrality (LDN).

In 2018, the CCD published a Gender Action Plan, which mandates gender mainstreaming to advance state efforts in achieving their land degradation neutrality targets. The Gender Action Plan identifies critical areas for women's engagement in LDN programs, including i) increasing participation in the design and implementation of programs; ii) integrating women's economic empowerment in implementation activities; iii) strengthening women's land

rights and access to resources; and iv) enhancing capacity-building, education and public awareness.

The 15th session of the UNCCD Conference of Parties (COP 15), which occurred in Abidjan 2022, approved a road map to accelerate implementation of the Gender Action Plan through gender-responsive and transformative approaches.

In 2023, under the theme “Her Land, Her Rights”, the World Day to Combat Desertification and Drought highlights women’s land rights as a key element of achieving both LDN and gender equality. Objectives include raising awareness about the gendered impacts of desertification, land degradation and drought on women and girls, highlighting women’s contributions to sustainable land management, and mobilizing support to advance land rights for women and girls around the world. The key takeaway of the 2023 theme is that “investing in women’s equal access to land and associated assets is a direct investment in their future and the future of humanity”.

As with empowering women and girls through stronger land rights, safeguards their human rights and empowers them to protect healthy land and restore degraded land. When these groups own or manage land, they enjoy increased decision-making power and can engage in participatory land management planning. This enables the integration of women and girl's knowledge with modern science and helps to provide these communities with access to social services and economic opportunities. Integrating women and girl's knowledge and participation in land management is imperative for stopping desertification and land degradation, restoring damaged ecosystems, and respecting, protecting and fulfilling the human rights of these groups. Studies show that when Indigenous and community knowledge - including from women and girls - is incorporated in decision-making, this is an effective way of restoring land and enhancing the quality of life of these groups (Boyd, 2023).

7-1 The current state of women in the agriculture sector

The role and status of women in the agriculture sector indicated the followings (Balbaa and Mansour, 2023):

- Egypt’s agriculture sector is a cornerstone of the country’s economy, contributing significantly to employment and food security.
- Agricultural extension services are one of the most common and effective programs for providing farmers (men and women) with information about



useful new practices and technological techniques. They play a crucial role in disseminating knowledge, providing technical assistance, and facilitating the adoption of modern agricultural practices. Extension services enable farmers to enhance productivity, increase their yields, improve their livelihoods, and adapt to the repercussions of climate change. Such services are especially vital for small-scale farmers in low- and middle-income countries.

- These programs can be operated through top-down or bottom-up approaches. Top-down approaches typically involve training and visits, whereas bottom-up approaches encourage the establishment of agricultural field schools or peer farmer learning. However, extension services in Egypt predominantly target male farmers, and not neglect the particular needs and circumstances of women farmers.
- Empowering women farmers is a vital step toward achieving sustainable agricultural development. It is imperative to enhance agricultural extension services and implement policies that support women farmers, enabling them to contribute fully to food security, poverty reduction, and economic growth.

7-2 Contribution of women in the agriculture sector

A major contributor to female employment in Egypt is as the followings:

- The agricultural sector employs around 45% of Egyptian Women in the labor force. Informality is prevalent in the agricultural sector, with up to 94% of agricultural worker's is dependent on informal employment. While women work in both the formal and informal agricultural sector, they are concentrated in the latter. About 28% of the labor force is formally employed in agriculture, only 20% of them are women. Put another way, 5.6% of women in the work force are formally employed in the agriculture sector, compared to 22.4% of men.
- Women work in various agricultural sub-sectors such as crops, livestock, and fisheries, and they are extensively involved in labor-intensive activities, including harvesting, manual pest control, and weeding. About 94% of the harvesting in Upper Egypt is done by women and 67% in Lower Egypt. In Upper Egypt, common crops such as wheat, sugarcane, and forage crops generally require hand harvesting, particularly in cultivated small areas. This process can be complex and requires labor-intensive and more contribution of women.

- Women in rural areas have limited access to information and technological practices offered by agricultural extension services' centers. Furthermore, these services are primarily focused on crops like maize, cotton, wheat, and rice, while vegetable and fruit crops, which claim the majority of female labor, receive limited services.

7-3 Supportive policy practices

Agricultural extension services act as a bridge between farmers, research institutions, and policymakers, but these services often fail to adequately reach and cater to women farmers' needs and circumstances. Inclusive, comprehensive policy practices should thus be considered to foster an enabling environment for female farmers.

7-4 Gender responsive approach

Agricultural extension programs should adopt a gender-responsive approach that targets women farmers, recognizing their specific needs, roles, and challenges. They can incorporate capacity-building programs that specifically address women's disadvantaged circumstances. Training programs should be designed to enhance women farmers' skills and knowledge, enabling them to adopt sustainable agricultural practices, improve productivity, and diversify their income. Moreover, entrepreneurial training is crucial for empowering women to actively participate in various activities.

7-5 Access to information and technology

Promoting the adoption of technology can enhance women farmers' efficiency, leading to increasing yields. Women farmers should have access to up-to-date agricultural information and modern farming practices. This can be achieved through mobile applications and online platforms for young farmers that provide relevant and easily accessible resources.

7-6 Achievements of women empowerment, related to desertification

Within the framework of the SDGs 2030, Egypt launched the National Strategy for the Empowerment of Egyptian Women 2030, in an effort to achieve economic empowerment for women by developing women's capabilities to expand their work options, increase their participation in the labor force and achieve equal opportunities in employing women in all sectors, including the private sector, entrepreneurship and holding key positions in public bodies and



companies. This is done by creating opportunities for greater social participation for women. The economic empowerment of women is one of the most important Egyptian National Priorities, in accordance with what was stated in the Egyptian Constitution of 2014, which emphasized the principle of non-discrimination and gender equality in obtaining opportunities in all fields.

Under this axis, many achievements have been achieved, including: Egypt is the second country in the world to launch the Gender Equality Seal Award, and the Small, Medium and Micro Enterprise Development Agency won it as the first entity to obtain the seal in Egypt and the Arab Region. The Central Bank of Egypt signed an unprecedented memorandum of understanding globally with the National Council for Women, and the country launched the catalyst for bridging the gender gap with the World Economic Forum is a platform for cooperation between the government and private sector to support women's empowerment.

The financial savings program was launched under the title "The Model of Savings and Loans Groups in Villages" and more than 18,000 women benefited from it. Awareness campaigns were launched for Egyptian Women in all governorates of Egypt about financial and banking products and a media campaign dedicated to financial inclusion and increasing financial knowledge and culture to change the misguided societal culture. The project "Empowering Women and Promoting Financial and Economic Inclusion in Rural Egypt" was launched: (I) response to Covid-19. It aims to develop a digital model for saving and lending and enhance women's economic empowerment and entrepreneurship; (II) the unemployment rate among women also decreased to 21.7%, the percentage of women holding bank accounts increased threefold, those who own private companies and those who invest in the stock market increased to thirty percent, and women benefited from project loans; and (III) the rate of women's participation in the labour force reached 18%, and the rate of women's default on loan repayments was less than 1%.

Improving the Egyptian Countryside was a dream, but it has become a tangible reality through the "Decent Life Program," which is the largest and most important presidential initiative to develop the Egyptian countryside, as it aims to change the lives of more than 58 million citizens included women, create a comprehensive boom in infrastructure and basic services, and improve the quality of citizens' economic, social, and cultural lives. In addition to, bring about a positive change in the standard of living, and create a new reality of

comprehensive sustainable development for these local rural communities. The economic role of rural women has increased by supporting the empowerment of women in making productive decisions in agriculture. They have also played a major role in planning and scheduling family consumption, as rural women have the ability to create and sustain life.

During the past ten years, the Egyptian state has been able to increase communication with women in local Bedouin communities in the desert areas, to provide technical and in-kind support, and encourage Bedouin women to participate in agricultural activities and apply the good agricultural practices. Large groups of women have benefited from extension programs and the distribution of seedlings of fruitful horticultural crops and good seeds for vegetable crops and medicinal and aromatic plants. Also, implementing many training courses for Bedouin women was achieved in many desert areas. Introducing veterinary convoys to desert communities to provide veterinary service for animals and birds that women raise as income-generating activities, which contributed to increasing the income of Bedouin families.

In this context, DRC which is affiliated with MALR has implemented various programs to raise the standard of living for Bedouin female breadwinners in the desert environments affected by climate change, desertification, and drought, such as NWCZ; Oases of Siwa; Al-Jara; Dakhla; Al-Kharga; Southern Red Sea region; and Sinai. Where, applied training courses were implemented for women on handicrafts; agricultural processing; and poultry production, benefiting 4,000 women annually. Implementing farm and non-farm income-generating activities for the benefit of women and applying participatory methodology in desert communities. The number of projects for women reaches 800 projects annually. Also, DRC achieve 450 training and skills-raising workshops for 20,000 women target groups that aim to encourage women working in the field of agricultural investment and the private sector. Women and men were also involved in implementing 5,000 model demonstration fields of annual crops such as wheat, quinoa, maize, vegetables, and medicinal and aromatic plants, in addition to home gardens for women in the desert communities. Also supporting women's capabilities and raising skills in the field of preserving the natural vegetation cover in the desert environments, and raising awareness for prevent the



collect firewood process in natural rangeland to reduce desertification and land degradation of rangeland areas.



8- Policy and legislative to address desertification, land degradation and drought

Relevant legislations have been reviewed in order to address underlying factors and crucial issues relevant to combating land degradation and mitigating the effects of drought to the Egyptians. These legislations include the following and brief discussion on the content of related legislations as indicated in:

- The Egyptian law of punishment No. 58 (1973), Articles Nos.: 162,367,372,378 and 379.
- The Agricultural Law No. 53 (1966), Articles Nos.: 151, 152, 154, 155 and 156.
- The Law No: 124 (1983) concerning fishing, marine, animals and organizing the fish farms, Articles Nos.: 14, 15, and 52.
- The Law No: 4 (1994) and its modification by Law No. 9 (2009) promulgating the environmental Law and its executive regulations, Articles Nos.: 27, 28 and 89.
- The Egyptian Code of Using Treated Sewage Water in Agriculture (2005).
- The Egyptian Law No. 102 for protected Areas (1983).
- The Egyptian Clean Development Mechanism (2005), Articles Nos.: 42 and 45.
- The Supreme Council for the Nile River and Waterways Protection, Article No: 47.
- Decision of Ministers of Housing, Utilities No. 44 (2000) on the exchange of liquid wastes.
- Decision of the Prime Minister and Minister of Agriculture and Land Reclamation No. 602 (2002) on restricting the use of wastewater in the agriculture sector.
- Prime Minister's Decree No. 2603 (1996) for the creation of buildings or doing business in the green areas.
- Regulations of the Law No. 4 (1994) for the environmental impact assessment, Articles No: 19 and 20 and Decree No. 1741 (2005).
- Protection laws for the farmland expanse of infringement and desertification are: Law No. 59 (1978); Law No. 116 (1983); and Law No. 2 (1985).
- Establishment of the Egyptian Desert Gene Bank (1995).
- Egypt joined to the International Union for the Protection of New Varieties of Plants (UPOV) in 2019.

9- Challenges and constraints

9-1 Financial issues



- Limited financial resources to implement long term multi-sectorial NAP Programs.
- Lack of mechanisms to secure funds from national, regional and international sources.
- Inadequate financial allocations from national budgets in support of UNCCD implementation as well as insignificant International financial assistance and technical cooperation.
- Lack of financial support for participation in UNCCD regional and international meetings.

9-2 Technical issues

- Lack of national monitoring programs to track land use changes, trends of land degradation and conditions of affected areas.
- Lack of coordination among the three Rio Conventions (Desertification Biological Diversity and Climate Change)
- Lack of Land Degradation Decision Support Information System (Geo-environmental data base)
- Lack of communication strategy to raise awareness for DLDD issues.
- Inadequate levels of capacity building and public awareness to effectively implement the UNCCD.
- Lack of clarification regarding land tenure and land use systems
- limited technical and financial capacities to implement technical measures stipulated in the NAP.
- Low mainstreaming of DLDD into national development plans.
- Inadequate data collection to establish the requisite baseline information and data to facilitate LDN planning and implementation.

9-3 Logistic issues

- Insufficient coordination among some regional and international agencies responsible for the implementation of UNCCD initiatives.
- Inadequate participation and involvement of Private Sector and Civil Society.
- Insufficient national awareness and understanding of the importance of NAP to sustainable development of the country.

10- Ongoing and proposed projects

This section deals with the ongoing and proposed projects according to the UNCCD Strategic Framework (2018-2030) objectives:

Objective 1: To improve the conditions of affected ecosystems, combat desertification/ land degradation, promote sustainable land management and contribute to land degradation neutrality.

Objective 2: To improve the living conditions of affected populations.

Objective 3: To mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems.

Objective 4: To generate global environmental benefits through effective implementation of the United Nations Convention to Combat Desertification.

10-1 Ongoing projects

Table (10-1): List of ongoing projects

Serial	Title	Stake holder/partner
1	Egyptian Mega projects for land reclamation (5 Million Feddan) in different locations (Western Delta, Western Desert, Tushka, Sinai,etc.).	MALR; MWRI; Egyptian Countryside; Egypt's Future for sustainable development authority.
2	Field irrigation development project	MALR and MWRI
3	Agricultural drainage project	MWRI
4	Establishment and management of protected areas	EEAA
5	Afforestation projects	EEAA, MALR and MHUC
6	Rehabilitating and restoration of 8000 Km ² (1.92 Million Feddan) of rangeland and rainfed areas using SLM practices in the north coastal areas by 2030.	MALR
7	Rehabilitate and land improvement to increase the productivity of 7500 Km ² (1.8 Million Feddan) of cropland areas using SLM practices by 2030.	MALR
8	Program of crop land conservation in the Nile Valley and Delta.	MALR
9	Capacity Building for the Desalination Research Center of Excellence, DRC	MALR
10	The coastal protection program,	MWRI
11	Water harvesting program	MALR and MWRI

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10-2 Proposed projects (2024 -2030)

10-2-1 Proposed projects of strategic objective 1

Table (10-2): List of proposed projects of strategic objective 1

Serial	Title	Concerned area	Duration	Budget Million USD
1	Monitoring, Assessment, and mapping Desertification / land degradation	Egypt	2024-2030	7
2	Develop a Land Degradation Decision Support Information System (Geo-environmental data base)	Egypt	2024	1.5
3	Ecosystem based approaches for minimizing the risk of SDS	Western Desert, North Sinai, West Nile Valley (Beni Suef-Asiut)	2025-2030	9
4	Using ground observations and Remote Sensing for soil salinity/water logging monitoring, mapping and assessment	North Sinai, Nile delta and Nile Valley, Western and eastern Mediterranean Coastal Zones , Western Desert Oases	2024-2025	8
5	Ecosystem based approaches to reverse soil salinization problem in the agricultural land	Nile Delta & Valley , Western and Eastern Mediterranean Coastal zones, north Sinai & Western Desert Oases	2025-2027	12
6	Nature based approaches to restore degraded wetlands	Northern parts of the Western Desert (Qattara - Siwa), north delta, north and west Sinai and Gulfs of Aqaba & Suez and the Red Sea coastal Zone	2026-2028	10
7	Strengthen capacity-building and public awareness for the practices of Land degradation Neutrality (LDN)	Sinai, Western and Eastern Mediterranean Coastal Zones, Western Desert Oases & Eastern Desert	2024-2025	2.5
8	Review Egyptian legislations related to land degradation, drought and Sustainable Land Management (SLM)	Egypt	2024-2025	0.8
9	Ecosystem based approaches for restoring and developing rangeland	Western and eastern Mediterranean Coastal Zones, south east of Egypt	2026-2027	4.5
10	developing a land use map	Egypt	2026-2027	3
11	Groundwater Management and improvement of irrigation techniques	Siwa and Bahriyah Oases, Kharga-Dakhla-Farafra, Western Mediterranean Coastal Zone, Eastern Mediterranean Coastal Zone	2027-2029	10

12	Stabilization of active sand dunes	Western desert Oases	2028-2030	2.5
13	Soil erosion management	Mersa Alam, Red Sea	2026-2027	1.8

10-2-2 Proposed projects of the strategic objective 2

Table (10-3): List of proposed projects of strategic objective 2

Serial	Title	Concerned area	Duration	Budget Million USD
1	Socio-economic development of local communities through rainwater harvesting,	North eastern coastal Zone, North western coastal Zone, South Sinai and Red Sea coast	2025-2030	12
2	Ecosystem based approaches for restoring and developing rangeland.	North eastern coastal Zone, North western coastal Zone, South Sinai and Red Sea coast	2027-2030	12
3	Producing of tolerant seeds for drought and salinity.	North Sinai, West and East Nile delta desert fringes.	2027-2030	3.5
4	Enhancement of living conditions of local communities through innovative saline agricultural systems.	North and West Sinai.	2026-2029	8.5
5	Improving animal health, animal nutrition and breeding improvement.	Matruh-Sidi Barrani	2026-2030	1.8

10-2-3 Projects of the strategic objective 3

Table (10-4): List of proposed projects of strategic objective 3

Serial	Title	Concerned area	Duration	Budget Million USD
1	Fostering partnership for the establishment of drought monitor equipped with early warning system	Egypt	2024-2027	4.5
2	Enhancing capacity building for drought resilience and adaptation	Western Desert Oases.	2025-2026	2.7
3	Promoting storm water and rainwater capture	Arish-Rafah Strip.	2025-2026	6.4
4	Assessing the impact of drought on water quality and availability	North western Coastal zone.	2025-2027	1.6
5	Nature based approaches to adapt for drought & climate change	Western and eastern Mediterranean Coastal Zones	2025-2030	8



6	Drought monitoring and risk assessment,	Mediterranean Coastal Zone (Sallum – Rafah)	2024-2030	4
7	Promoting water reuse and the expansion and development of non-traditional water supplies	North Sinai	2025-2028	3.5
8	Bio-desalination of brackish groundwater of Moghra Formation Aquifer	Wadi El Natrun-Qattara Depression	2025-2030	5.7
9	Road side green belts along new establishment roads.	North Sinai & North Western Coast, west and east Nile Valley	2024-2030	25
10	Groundwater development and management	Farafra-Dakhla-Kharga Triangle, Western Desert Egypt	2024-2030	6.8
11	Improving rainwater infiltration and minimizing surface runoff through innovative soil conservation and protection techniques	Mediterranean Coastal Zone (Sallum – Rafah Strip)	2024-2030	4
12	Establishment of drought contingency plan	North Sinai	2024-2030	1.5
13	Policies and actions to diversify and modernize agriculture,	Western Desert Oases	2025-2030	12
14	Integrating new varieties of drought tolerant wheat, maize and rice into productive systems	Egypt	2025-2030	12
15	Capacity building public for water and soil conservation techniques.	Egypt	2025-2030	2.5
16	Development of Atlas of Drought	Egypt	2025-2030	8
17	Enhancing the drought resilience through investments in early warning systems, water harvesting and shelterbelts and windbreaks	Egypt	2024-2030	8
18	Capacity building for smart water management and development	Nile Delta and fringes	2024-2025	2.5

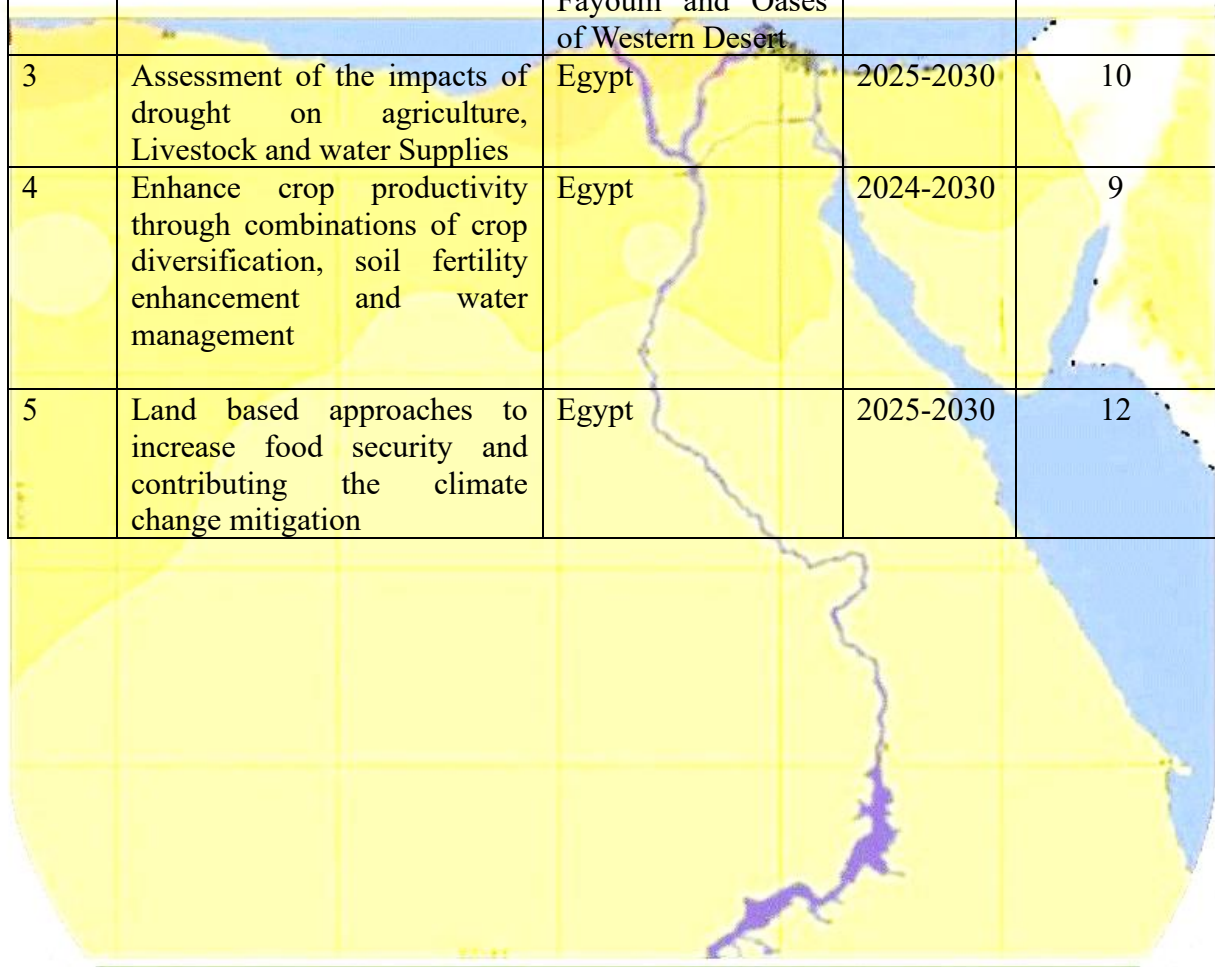




10-2-4 Proposed projects of the strategic objective 4

Table (10-5): List of proposed projects of strategic objective 4

Serial	Title	Concerned area	Duration	Budget Million USD
1	Nature based approaches for restoring and developing mangroves forests.	Red Sea & Gulfs of Suez & Aqaba	2024-2028	12
2	Innovative Saline Cultivation Techniques	North Sinai, North Western Coast, North Delta, El-Fayoum and Oases of Western Desert	2025-2030	3.6
3	Assessment of the impacts of drought on agriculture, Livestock and water Supplies	Egypt	2025-2030	10
4	Enhance crop productivity through combinations of crop diversification, soil fertility enhancement and water management	Egypt	2024-2030	9
5	Land based approaches to increase food security and contributing the climate change mitigation	Egypt	2025-2030	12



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11- Outcomes of the Egypt's NAP

Key Outcomes of the Egypt's NAP include:

- A. UNCCD 2018–2030 Strategic objectives achieved.
- B. Action plan for mitigating sources of sand and dust storms achieved.
- C. Land Degradation Neutrality target setting, achieved
- D. Drought Initiative of the UNCCD achieved
- E. Supportive Outcomes.

A. UNCCD 2018–2030 Strategic objective

The NAP contains **five strategic objectives** that are meant to guide the actions of all UNCCD stakeholders and partners in the period 2024-2030:

Strategic Objectives	Global Indicators	Expected outcomes
<p>Strategic objective 1: To improve the conditions of affected ecosystems, combat desertification/ land degradation, promote sustainable land management and contribute to land degradation neutrality.</p>	<p>1.1. SO 1-1 – Trends in land cover.</p> <p>1.2. SO 1-2 – Trends in land productivity.</p> <p>1.3. SO 1-3 – Trends in carbon stocks above and below ground</p> <p>1.4. SO 1-4 – Proportion of land that is degraded over total land area (Sustainable Development Goal indicator 15.3.1)</p>	<p>1.1 Land productivity and related ecosystems services are maintained or enhanced;</p> <p>1.2 The vulnerability of affected ecosystem is reduced and the resilience of ecosystem is increased.</p> <p>1.3 The measures are identified and implemented, and necessary monitoring systems are established.</p> <p>1.4 Measures for sustainable land management and the combating of desertification / land degradation are shared, promoted and implemented.</p>
<p>Strategic objective 2: To improve the living conditions of affected populations</p>	<p>2.1. SO 2-1 – Trends in population living below the relative poverty line and/or income inequality in affected areas.</p> <p>2.2. SO 2-2 – Trends in access to safe drinking water in affected areas.</p> <p>2.3. SO 2-3 – Trends in Population Exposure to Land Degradation Disaggregated by Sex</p>	<p>2.1 Food security and adequate access to water for people in affected areas is improved.</p> <p>2.2 The livelihoods of people in affected areas are improved and diversified.</p> <p>2.3 Local people, especially women and youth, are empowered and participate in decision-making processes in combating DLDD.</p> <p>2.4 Migration forced by desertification and land degradation is substantially reduced.</p>



<p>Strategic objective 3: To mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems.</p>	<p>3.1. SO 3-1 – Trends in the proportion of land under drought over the total land area</p> <p>3.2. SO 3-2 – Trends in the proportion of the total population exposed to drought</p> <p>3.3. SO 3-3 – Trends in the degree of drought vulnerability</p>	<p>3.1 Ecosystems' vulnerability to drought is reduced, including through sustainable land and water management practices.</p> <p>3.2 Communities' resilience to drought is increased.</p>
<p>Strategic objective 4: To generate global environmental benefits through effective implementation of the United Nations Convention to Combat Desertification</p>	<p>4.1. SO 4-1 – Trends in carbon stocks above and below ground.</p> <p>4.2. SO 4-2 – Trends in abundance and distribution of selected species.</p> <p>4.3. SO 4-3 Trends in protected area coverage of important biodiversity areas</p>	<p>4.1 Sustainable land management and the combating of desertification/land degradation contribute to the conservation and sustainable use of biodiversity and addressing climate change.</p> <p>4.2 Synergies with other multilateral environmental agreements and processes are enhanced.</p>
<p>Strategic objective 5: To mobilize substantial and additional financial and non-financial resources to support the implementation of the Convention by building effective partnerships at global and national level</p>	<p>5.1. SO 5-1 – Bilateral and multilateral public resources.</p> <p>5.2. SO5-2 – Domestic public resources.</p> <p>5.3. SO5-3 – International and domestic private resources.</p> <p>5.4. SO5-4 – Technology transfer.</p> <p>5.5. SO5-5 – Future support for activities related to the implementation of the Convention</p>	<p>5.1 Adequate and timely public and private financial resources are further mobilized and made available to hotspots in Egypt.</p> <p>5.2 Governmental support is provided for implementing effective and targeted capacity-building and “on-the-ground interventions” in the affected areas.</p> <p>5.3 Extensive efforts are implemented to promote technology transfer</p>

B. Action plan for mitigating sources of sand and dust storms

- By 2025 identification and testing mitigation practices and integrate them into national strategies. Mitigation practices include (but not limited to): planting *Acacia saligna* and other plants, mulching using eco-friendly

materials such as Ecomat (100% natural oil palm residues), checkerboard systems in addition to afforestation, (mainly Green belts).

- By 2030 the active sources of sand and dust storms in North Sinai and parts of Western Desert including south Qattara, Kharga-Dakhla strip and peripheries of Lake Nasser are mitigated.

C. Land Degradation Neutrality target setting

- **At the national scale**, LDN aims to achieve no net loss by 2030 as compared to 2015. Additionally, LDN aspires to achieve a net gain of about 10% of the national territory.
- **At the sub-national scale**, LDN would be achieved in the land degradation Hotspots: Kafr El Sheikh Governorate, Damietta Gov., Rasheed area, El Minia Gov., Sohag Gov., Al Fayoum Gov., 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).

LDN planned to be achieved in the land degradation Hotspots: Kafr El Sheikh Governorate, Damietta Gov., Rasheed area, El Minia Gov., Sohag Gov., Al Fayoum Gov., 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).

- In order to effectively combat land degradation at the country level, the government is committed to achieve the neutrality of land degradation by 2030 with the following specific targets:

Restoring and increasing the productivity of 11666 sq km (2800000 Feddan) of cropland using the modern agricultural techniques included on farm irrigation development and Sustainable Land Management (SLM) practices in the northern areas, western and eastern fringes of reclaimed lands of Nile Delta and El Tina Plain area by 2030;

- Rehabilitating and increasing the productivity of 8000 sq km (1920000 Feddan) of rangeland and rainfed areas using SLM practices in the north coastal areas (Range lands and Rain-fed farming areas) by 2030,
- Regarding the reclaimed areas in the western desert fringes of the middle and upper Egypt the government is committed to rehabilitate and increase the productivity of 7500 sq km (1800000 Feddan) of cropland using SLM practices by 2030, in addition to reclamation and cultivation of 6300 sq. km



(1.5 million Feddan) of virgin land in reclaimed desert soils at different locations in the western desert of Egypt by 2030.

- Furthermore, great considerations have been focused on rationalizing water consumption by growing drought-tolerant crops and adopting modern irrigation systems for around 1000 square km in some oases in the western desert of Egypt by 2030;
- Halting the conversion of crop land to other different cover classes by 2030;
- Controlling or alleviating soil erosion by runoff rainfall water, construction of cemented dykes and development of watershed areas for water harvesting to be utilized for agricultural activities for an area of about 2500 sq. km in the north western coastal zone of Egypt by 2030;
- Increasing the tree cover/ forest cover by 25%, through agro-forestry and SLM in the existing forests by 2030 as compared to 2015.

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

D. Drought initiative of the UNCCD

“To mitigate the effects of drought” is one of two overall objectives of the UNCCD as stated in Article 2 of the Convention text and therefore is an essential dimension of the Convention.

The text of the Convention interprets this objective as activities related to the prediction of drought while intended to reduce the vulnerability of society and natural systems to drought. The drought initiative will assist countries in developing national drought policies to mitigate drought risk. The initiative is based on three pillars: (i) monitoring and early warning systems, (ii) vulnerability/impact assessment, and (iii) practical risk mitigation measures. This will also entail an understanding of where and when drought will happen, who and what is vulnerable and why. It will further call for information on the frequency and severity of drought to identify vulnerable groups and geographic regions, and facilitate timely development and implementation of drought impact mitigation actions. Egypt is amongst of the countries that will be piloting this

initiative. The following projects will be implemented under the umbrella of UNCCD during 2024-2030.

E. Supportive Outcomes

- Atlas of Desertification in Egypt.
- Land Degradation Decision Support Information System (Geo-environmental data base)
- Drought Contingency plan

12- Funding mechanisms for the implementation of Egypt's NAP

In terms of Article 20 of the UNCCD, parties to the convention are required to mobilize financial resources for the implementation of the NAP. In recognizing the central importance of financing so as to achieve the objectives of the convention, country parties (taking into account their capabilities) are required to make every effort to ensure that adequate financial resources are available for programmers to combat desertification and to mitigate the effects of drought. The NAP will be funded largely through the Medium-Term Expenditure Framework (MTEF) and other donor-funded programmers and projects such as the Green Fund, Climate Change Adaptation Fund, Global Environment Facility, UNCCD's Global Mechanism and the LDN Fund, amongst others.

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13- Monitoring and evaluation of the Egypt's NAP

Reporting on the NAP and the state of desertification is an international obligation for Egypt, as a signatory to the UNCCD since 1994. Consequently, progress towards achieving the strategic objectives of the NAP will be periodically monitored and evaluated.

Sound monitoring and evaluation are of critical importance for the successful implementation of the Egypt's NAP. Monitoring and evaluation track progress in the implementation of NAP and ensure that the NAP is on track in terms of realizing its strategic objectives. In addition, monitoring and evaluation of UNCCD will ensure that the intended outcomes will be achieved by NAP intervention, .e.g., UNCCD 2018–2030 Strategic Framework

Monitoring of NAP is critical to secure long-term funding. If it is to be implemented successfully, the NAP must be an adaptive management process that can recommend change where desired results are not being achieved either in the implementation process or in the resultant consequences of implementation.

Furthermore, the NAP requires a significant commitment of human and financial resources, for which there are many competing uses. The various outcomes of the NAP are cross-cutting in nature and will require sound monitoring and coordination to achieve the intended results per outcome.

The Committee for the Review of the Implementation of the Convention (CRIC) was established in 2001, as a subsidiary body to the Conference of Parties (COP).

Its goal is to assist the COP in regularly reviewing the implementation of the Convention. CRIC is also an integral part of the Performance Review and Assessment of Implementation System (PRAIS).

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