Ministry of Agriculture and Land Reclamation
Desert Research Center

Strategy

of

Desert Research Center

2030

Egypt Vision 2030

With us we can build a better future

Desert Research Center (DRC) is one of the oldest scientific institutions dedicated to the study of the desert environment. DRC has got many specializations distributed in four research divisions, comprising 23 scientific departments that are further divided into 45 research units for the fine scientific specialties. In addition to the presence of 10 regional research stations distributed in the desert governorates of Egypt, including a station on the northwest coast, a station in Siwa Oasis, Shalatin, Toshki, New Valley, five stations in the Sinai Peninsula and to the Center for Sustainable Development of Matrouh Resources.

DRC embodies Central Laboratory, Gene bank for wild desert plants, Desertification Observatory, Groundwater Drilling Unit, Geographic Information System Unit (GIS Unit), Center for Information and Decision-making Support, Desalination Research Center, Center of Excellence in Saline Agriculture, Corruption prevention and Control Unit, Crises Management Unit, an ancient Library of books and periodicals, Advanced Training Center and DRC issues the Egyptian Journal of Desert Research; an international scientific journal for the dissemination of scientific research in the field of Desert Science.

The institution depends on integrated research teams in their specialties, including elite scientists, experts and researchers in all disciplines related to the study of the desert. DRC, as an independent scientific and research body, is specialized in studies related to water, soil, plant and animal production, human and environment. It also gives consideration in linking these areas of interest to the sustainable development of the Egyptian deserts, and determining how to use them optimally to serve coming up generations.

The desire of the leaders and staff of DRC to keep up with the rapid changes and evolution of construction and development to which the political leadership attaches great consideration. Therefore, it was important to develop a strategy for DRC based on two main axes. The first is internal concerning with the organization of the work within this institution, whereas the second is external regards the nature of external relations of the institution. Both together aim at establishing an environment and atmosphere in which scientific knowledge, capabilities and experiences are launched without restrictions.

Noteworthy to assign that a strategy formulation for DRC is not an end in itself, but a mean to ensure continuity, improvement, intonation, creating space for creativity, innovation and self-challenging atmosphere that help the efforts of building and development in Egypt.

I would like to extend my thanks, appreciation and gratitude to the fellow members of DRC staff and the team of young researchers for their honorable efforts in preparing the strategy of DRC 2030. Also, I invite the young researchers of DRC to mobilize their energies in the spirit of creativity, dedication and work on the implementation of this strategy.

May God bless us for the goodness of our precious Egypt.

Prof. Dr. Naiim Moselhy

President of DRC

Contents

Preface

The current and future status of DRC necessitates the development of a strategy and an executive plan to achieve DRC objectives and mission to ensure that its future is built on an informed and scientific base that will lead it to achieve its research, guidance and society mission and to take its prestigious position at the national, regional and international levels. The edifice, which began to be contemplated in 1930 and inaugurated in 1950 under the name of the “Fuad I Desert Institute”, was issued by a republic degree in 1990, turning its name to “Desert Research Center”.

Based on the successive changes in economic, social, scientific and research conditions, whether at the national, regional or international levels, a strategy for DRC 2030 was required to be formulated within the framework of the Global Sustainable Development Goals 2030 (SDGs) and a realistic and feasible executive plan that keep up with internal and external variables, putting all DRC capabilities to achieve it.

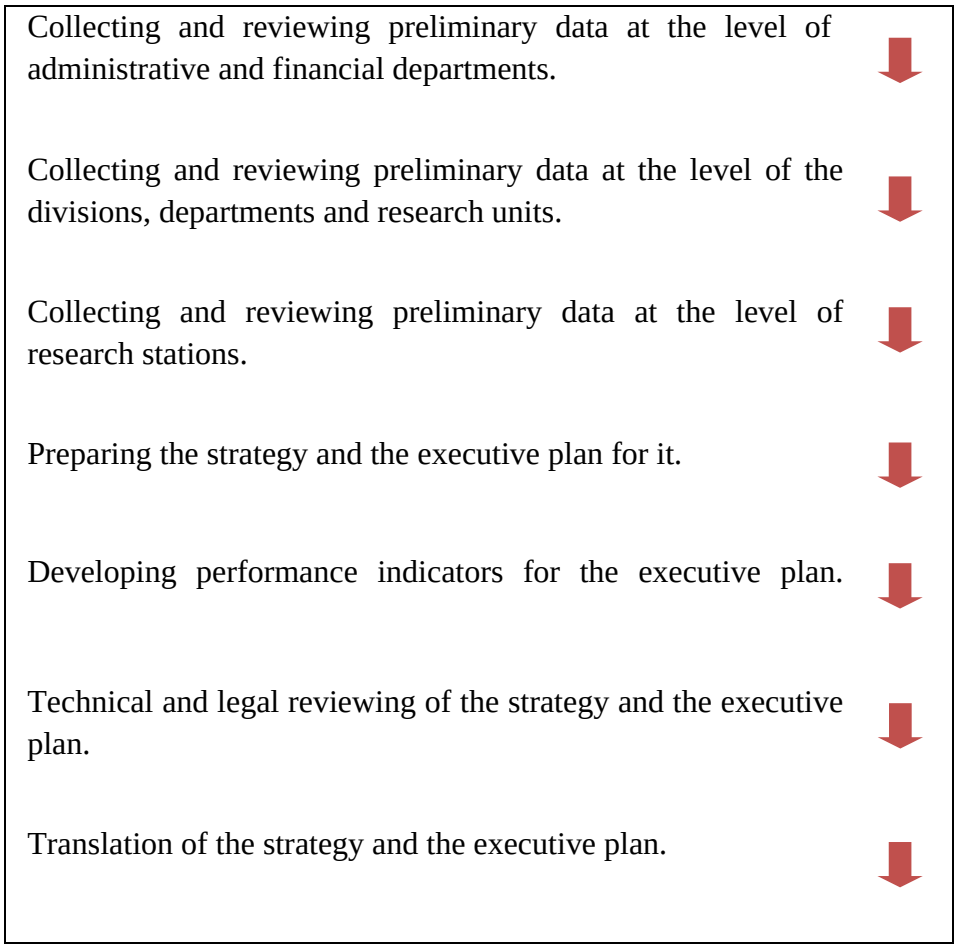
The Strategy of DRC is a document that defines the framework of actions and regulates its priorities by translating DRC future vision into an executive plan that includes a set of clear development goals in terms of quantity and quality. Hence, the plan is capable to direct all duty centers to go ahead in one direction.

Reaching the desired goals is not only limited to quality and efficiency in their formulation, accuracy or skill in determining them, but more importantly the ability to actually implement and reach the desired results on the ground and to set standards by which to measure the extent of success or failure in achieving these goals.

First: The methodology framework of the strategy of DRC

Many strategic planning methodologies are in use, of which SDTP has been applied through the following steps:

1. See: The current situation and the gap between it and the hoped situation and its causes have been studied, through the analysis of the internal and external environment and evaluation of the current situation.
2. Draw: The ideal desired image/situation has been drawn, the way to achieve it has been defined and he vision and mission of DRC has been formulated.
3. Think: Appropriate measures have been taken to bridge the gap between the current and the desired situation.
4. Plan: Activities have been planned to achieve the objectives and mission of DRC. In addition, the development of the mechanisms of the executive plan has been given great consideration.



A form that demonstrates the methodology of the work during the stages of preparing and drafting the strategy and the executive plan

This methodology can be outlined as follows:

1. A structured institutional approach for the preparation of the strategy ensures the participation of all beneficiaries and customers.
2. Commitment to combine both ascending and descending approaches in strategic planning to ensure the effective participation of all parties that is represented in;
   - An educational and training experiences that ought to be exchanged between the different generations at DRC.
   - Deep integration and active participation of private stakeholders and a superficial view in the formulation of the strategy.
   - Creating a strong sense of the specificity of the strategy.
   - Positive competition between the different entities at DRC.
3. Taking into account the time and technical framework for preparing and drafting the strategy and the executive plan.

Guarantees of success in formulation, implementing and following-up DRC strategy 2030

1. The belief and commitment of the leadership to change and build with transparency in all procedures.
2. The participation of the beneficiaries in the formulation and implementation of the strategy and follow-up through a clear action plan that can be implemented.
3. Monitoring continuous progress in implementation using clear and specific performance indicators.
4. Integration of vision, mission, goals and objectives.
5. The availability of staff trained in implementation mechanisms.

Constraints and risks

There is a number of risks that should be considered in the different phases of the strategy implementation, which are as follows:

1. Irregular cash flows.
2. Resistance to change by some beneficiaries.
3. Confliction of the financial and administrative decisions.
4. Gaps that may exist in some regulations and legislation.

Second: Phases of the strategy and executive plan preparation

The process of preparing DRC strategy involves several key steps; namely the preparation, the analysis of the current status (where are we?), the desired future status (what do we want?), the phase of the policies of DRC, then the formulation of the strategy and executive plans and finally the formulation of the follow-up and evaluation mechanisms.

1. Phase of preparation

1.1. Creating reasonable atmosphere and advertising dialogue

To start developing the strategy of DRC, it was important to work on the principle of institutional participation of all the employees of the center, so the leadership was keen to direct the strategy preparation team to manage an institutional dialogue to define the importance of developing and formulating a strategy for the institution through several discussions, meetings and workshops.

1.2. Affirming commitment to the strategy

The leaders of DRC were keen from the very first moment to put forward the idea of formulating DRC strategy, to keep pace with the successive economic, social, organizational and research developments. This will be achieved only with a clear strategy and an executive plan that contains implementable and measurable activities in line with Egypt vision 2030.

This concern has crystallized in the following:

- A decision was issued by the President of DRC to entrust a team to prepare the strategy to adopt this task.
- Forming different teams to manage the process of preparing DRC strategy.
- Continuous support and follow-up have been given by DRC leadership for activities of the different teams.

1.3. Teams formation to prepare the strategy and executive plan

1. A team for the preparation of the strategy and executive plans.
2. A team for the performance of SWOT analysis.
3. A team to develop the performance indicators of the executive plan.
4. A team for the translation of the strategy and executive plans to English language.

Team preparing and formulating the strategy and its executive plan	
Prof. Dr. Naiim Moselhy	President of DRC
Prof. Dr. Abdallah K. Zaghloul	Vice President of DRC
Prof. Dr. Tarek A. Aggour	Chairman of Water Resources and Desert Soil Division
Prof. Dr. Fatma A. Ahmed	Chairman of Ecology and Dry Land Agriculture Division
Prof. Dr. Raafat E. Khidr	Chairman of Animal Production and Poultry Division
Prof. Dr. Mohamed M. Samy	Chairman of Socio-economic Studies Division
Mr. Magdy R. Salem	Supervisor of Information and Decision-making Support
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Prof. Dr. Mohamed S. Abdel Ghaffar	Professor - Socio-economic Studies Division
Dr. Ahmed I. Sayed	Associate Professor - Ecology and Dry Land Agriculture
Dr. Ahmed S. Ahmed	Researcher - Water Resources and Desert Soil Division
Team performing indicators for the executive plan	
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Prof. Dr. Samy E. Abu Ragab	Professor - Socio-economic Studies Division
Dr. Taher M. Hamed	Associate Professor - Water Resources and Desert Soil
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Dr. Ali M. Ali	Researcher - Water Resources and Desert Soil Division
Dr. Mostafa A. Essa	Researcher - Water Resources and Desert Soil Division
Dr. Amr K. Mahmoud	Researcher - Water Resources and Desert Soil Division
Dr. Moharam F. El Basyouny	Associate Professor - Animal Production and Poultry Division
Team reviewing the strategy and executive plan	
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Prof. Dr. Mohamed Y. Draz	Professor Emeritus - DRC
Prof. Dr. Mohamed A. Mabrouk	Professor Emeritus - DRC
Prof. Dr. Hassan M. El Shaer	Professor Emeritus - DRC
Prof. Dr. Mohamed A. Metwally	Professor Emeritus - DRC
Prof. Dr. Hosny M. Ezz El Din	Professor Emeritus - DRC
Prof. Dr. Mahmoud I. El Desouky	Professor Emeritus - DRC
Prof. Dr. Magdy M. Abu El Ela	Professor Emeritus - DRC
Prof. Dr. Farouk A. Abdel Aal	Professor Emeritus - DRC
Prof. Dr. Mohamed F. Shahin	Professor Emeritus - DRC
Team translating the strategy and executive plan	
Prof. Dr. Sayed Abd El-Ghafour	Professor Emeritus - DRC
Prof. Dr. Ghada Abd El-Moneim Hegazi	Professor - Ecology and Dry Land Agriculture

2. Phase of analyzing the current status

2.1. The establishment of Desert Research Centre

DRC is the oldest specialized center concerned with the study of desert resources and sciences. In 1930, King Fouad I put forward the idea of its establishment and was officially inaugurated in 1950 with the name of Fouad I Institute for Desert Sciences. In 1990, the Republican decree was passed for the establishment of DRC.

2.2. The main objectives of DRC

DRC in general aims to explore the natural resources in the Egyptian deserts and how to use them optimally and safely to sustain them in order to preserve the rights of future generations, through the following:

1. Conducting academic and applied research in various fields related to the development of natural resources in the Egyptian deserts and new reclamation areas, especially in relation to water, soil, plant, animal, human and non-traditional energy.
2. Studying the environmental challenges that hinder the development of natural resources in the Egyptian deserts and new reclamation areas, the most important of which are desertification, sand dunes and climate change.
3. Proposing public policy for the most appropriate ways to exploit Egyptian deserts, whether agriculturally or industrially by analyzing the results of the study on natural resources in Egyptian deserts.
4. Exploring groundwater in the Egyptian deserts, designing and drilling wells in accordance with scientific principles that help in overcoming their depletion. Also, establishing scientific and practical systems for harvesting and collecting rainwater and designing scientific irrigation systems to reduce waste of irrigation water in the Egyptian deserts.
5. Publishing the output of the research work and provide expertise and consultation in the agricultural field for the benefit of the community in desert environments.
6. Strengthening the scientific and research links and joint cooperating with local and international bodies in the areas of concern to DRC.
7. Contributing in developing scientific and applied plans for the reclamation, cultivation and development of desert areas in accordance with the results of researches and applied studies conducted by DRC, within the framework of the policy and sustainable development plan of Egypt.
8. Effective contribution in studying and planning national projects in the field of land reclamation and development of desert areas, in accordance with the directions of the country and the Ministry of Agriculture and Land Reclamation.
9. Establishing a national database of natural and human resources in the Egyptian deserts to contribute to the ministry's efforts in the field of encouraging agricultural investment in desert areas, helping to create jobs for youths and serving decision-makers.
10. Studying and following-up the desertification and climate change and proposing appropriate means to reduce negative impacts and reduce their risks.

11. Organizing and implementing multi-purpose training programs at different levels for those interested in the reclamation and cultivation of desert areas.
12. Interacting and responding to the requirements of the desert governorates to solve their problems and establishing models of desert development.
13. Developing and implement programs and extension fields as an application of the research results and supporting them with extension caravans of all disciplines that deal directly with the farmer in the field to discuss his problems and develop solutions to them.

2.3. The organizational structure of Desert Research Centre

The objectives of DRC are achieved through four research divisions, each of which is responsible for a scientific research orientation concerning the development aspects of the Egyptian deserts. These divisions include 23 scientific departments, which in turn are divided into 45 research units, each of which represents a specialty in each department. Also, there are 10 research and extension stations distributed to desert areas and representing different geographical regions, including five stations in Sinai (South of Eastern Qantara, El Sheikh Zuweid, El Maghara, Ras Sidr and Baloza), Maryut Station, Al-Kharga Oasis Station, Siwa Oasis Station, Shalatin Station, Toshki Station, in addition to the Center for Sustainable Development of Matrouh.

DRC includes a Central Laboratory for scientific analyses (water, soil, plant ... etc.), Desalination Research Center, Center of Excellence in Saline Agriculture, Groundwater Drilling Unit and Geophysical Studies, Gene bank for wild desert plants, Desertification Observatory, Geographic Information System Unit (GIS Unit), Information and Decision-making Support Center, Internal Control Unit, Corruption prevention and Control Unit, Crises Management Unit and an ancient library of books and periodicals, Advanced Training Center and DRC issues the Egyptian Journal of Desert Research; an international scientific journal for the dissemination of scientific research in the field of Desert Science.

2.3.1. Research divisions

The organizational structure of DRC contains four research divisions, covering all disciplines that are interested in the development of desert areas through specialized scientific departments and more specialized research units, namely:

1. Water Resources and Desert Soil Division
2. Ecology and Dry Land Agriculture Division
3. Animal Production and Poultry Division
4. Socio-economic Studies Division

Research Divisions of DRC

Water Resources and Desert Soil Division

Due to the limited water and soil resources in light of the urgent demand for food as a result of the annual excessive population increase, the objectives of the Division of Water Resources and Desert Soils has been formulated in coincidence with the reclamation and cultivation of the desert areas applying modern technologies, to ensure use of available resources and obtaining the highest possible return and benefit from these areas. This is in an attempt to get out of the narrow valley into the new desert areas, with the aim of creating new development communities, which contributes to the transfer of part of the population densities of the valley and delta, where 95% of the population of the Republic lives, to these new desert communities. This Division gives consideration in its research and development axes, the selection of different geographic areas and environmental systems as well as attention to all factors of success, whether human, devices, equipment, laboratories and well-thought-out plans ready to be implemented when requested and providing the necessary funding.

Objectives of Water Resources and Desert Land Division

1. Geological survey to determine the lithological and geomorphological units in distinguishing the sedimentary and structural basins.
2. Exploring and evaluating water resources; determining the extension and thickness of water bearing layers and defining the optimal positions for drilling wells.
3. Designing and drilling groundwater wells.
4. Studying rainwater management by estimating their quantities, flow and losses. Also, it concerns with determining the flood gravity in order to avoid its risk and setting water harvesting systems to utilize its water in the development of rain-fed agricultural farms.
5. Studying and managing both the surface and underground water resources by using mathematical models and determining the withdrawal rate of water from deep wells.
6. Evaluating water for various purposes. On the other side, this division is concerned with researches related to water treatment and desalination and manufacturing of reflex pressure membranes used in desalination filters (OR).
7. Studying the new and renewable energy sources as alternative to traditional ones in different applications.
8. Studying soil genesis, formulation and classification. Preparing soil maps through the field work using photo-interpretation, satellite imagery and GIS.
9. Evaluating of land (soils) capability and land use classification in their natural environment through the morphological studies accompanied with the interpretation of the origin and the prevailing environmental conditions, then the assessment of priorities of their exploitation.

10. Studying and evaluating of the physical, chemical and mineralogical soil properties and the effect of the mineral composition on soil characteristics and water on soil and plant.
11. Evaluating the fertility of desert soils and determining their fertilizer needs, introducing bio-organic farming systems and bio-wasting recycling. In addition, a great concern is given to the production of biovaccines, biofertilizers and biopesticides to protect field crops, vegetables and medicinal plants from diseases in new reclaimed lands to improve the growth and productivity of the plant under different stress conditions.
12. Studying of land resources management, the use of agricultural mechanization in desert lands, identifying causes of soil erosion, land degradation and depletion of ts fertility and productivity. Also, the management of irrigation and drainage systems under desert conditions.
13. Monitoring and combating desertification, such as land degradation, salting of water and land, low groundwater level and other factors.
14. Organizing training and providing agricultural extension services for people and investors in the activities of development areas in deserts.
15. Publishing and sharing experiences with local, regional and international organizations and institutions concerned with specialties related to the development of desert areas.

Scientific Departments of Water Resources and Desert Land Division

The Division of Water Resources and Desert Land consists of nine scientific departments, each with many micro-disciplines in a total of twenty-nine specialized units, including five scientific departments representing the specialties of water resources, while the four others represent the specialties of the desert lands, which are as the following:

1. **Department of Geology:** The department specializes in studying geomorphological and geological conditions, whether surface or subsurface, and clarifying the relationship between them. This is in order to prevent the dangers of floods and to benefit from their water and to establish harvesting systems. Also, to identify the structural conditions as well as to identify the rock features of water bearing layers. The department has four specialized units: Geomorphology Unit, Field Geology Unit, Sedimentary Rocks Unit and Geology of Groundwater Reservoir Unit.

2. **Department of Geophysical Exploration:** The main goal of this department is exploring water resources in the Egyptian deserts, especially groundwater, because it is the most important resource in deserts. Through various geophysical methods which measure the electrical resistance of rocks and through which water bearing layers can be identified. Also, magnetic methods to determe the thickness of sedimentary layers above the base rocks. Also, seismic methods for identifying subsurface geological structures and electrical induction, which greatly contributes

in monitoring and designing wells. In addition to metastatic scan that determines the minerals inside the earth. There are four specialized units belonging to this department; Electric Stimulation Unit, Well Mining Unit, Magnetic Scanning Unit and Heavy Scanning Unit.

3. **Hydrology Department:** The department is concerned with the movement of water and the resulting effects, as well as the exploration, evaluation and studying groundwater reservoirs and their relationship to surface water resources in desert areas, the running-off behavior in the valleys and methods of water harvesting. The department has three specialized units; Surface Hydrology Unit, Field Hydrology Unit and Mathematical Models Unit.

4. **Department of Hydrochemistry:** The main concern of this department is conducting scientific studies and researches to realize the objectives of the strategic plan of DRC in line with the country interest to develop water sources. Additionally, the department specializes in studying and evaluating water chemistry for utilizing it in various purposes, as well as defining the causes of pollution and suggesting means of remedy and treatment methods. In addition to desalination of water and the manufacture of RO filters, which are used in water desalination, which is a new achievement that has never been done before. The department is followed by four specialized units: Water Chemistry Unit, Water Pollution Unit, Water Desalination Unit and Fixed Isotopes Unit.

5. **Department of Modern and Renewable Energy:** The department is interested in researching new and renewable energy in all its forms and types such as solar, wind, thermal and hydropower energy to achieve excellence at the local and regional levels. Due to Egypt's dependence of 95% capacity on petroleum sources and gas, the department seeks to provide the best services in various areas of energy through studies, strategic analysis and high-level solutions to strengthening the role of DRC in this field. The department is follows by four specialized units; Solar Energy Uses Unit, Wind Energy Uses Unit, Geothermal Uses Unit and Wave Energy Uses Unit.

6. **Department of Pedology:** The department specializes in studying the soil as an independent natural body in terms of different aspects namely, origin, formulation, development and classification. This department is interested in defining the pedological, physical and chemical characteristics through both field survey and laboratory studies that help in determining land capability and the reasonable land use pattern. The department is followed by two specialized units: Soil Survey and Classification and Arial Photo-Interpretation Unit and Land Evaluation and Utilization Unit.

7. **Department of Soil Physics and Chemistry:** The department aims to study, evaluate and improve the physical, chemical and mineralogical soil properties and the relationship of soil and plant with water under the different environmental and

geographical conditions of desert areas. In order to determine the possibilities and priorities of the reclamation and exploitation of these lands. In addition to assessing and rationing the water requirements of different crops under desert conditions and under the conditions of different quantities and types of irrigation water and raising the efficiency of their utilization under different environmental conditions. The department is followed by four specialized units: Soil Chemistry Unit, Soil Mineralogy Unit, Soil Physics Unit Water Needs and Irrigation Requirements Unit.

8. **Department of Soil Fertility and Microbiology:** The mission of this department is to prepare research cadres at scientific and technical levels consistent with scientific and research developments. Also, they should be qualified to work in the field of the sustainable use and development of soil and water resources, capable to participate effectively in national projects to improve productivity of these resources and their preservation from pollution, degradation and depletion by identifying the fertile and vital characteristics of the soil. As well as the production of various fertilizers and vaccines, which contribute to increasing the productivity of the plant. There are three specialized units belonging to this department; Soil Fertility Unit, Soil Microbiology Unit and Plant Nutrition Unit.

9. **Department of Soil Conservation:** The department aims at conducting studies and research and their applications in the fields of soil conservation, maintaining soil productive capacity against various degradation factors as well as to conduct applied research in the field of soil management, agricultural mechanization and the use of soil enhancers. In addition to applications of irrigation techniques and increasing irrigation efficiency, study the means and techniques that achieve the use of rainwater and surface runoff in agricultural exploitation and soil maintenance of drifting factors of water and wind. In addition to studies neutralizing the impact of land degradation. The department has five specialized Unit units; Erosion Unit, Irrigation and Drainage Unit, Dams and Water Distribution Agricultural Mechanization Unit and Soil Amelioration Unit.

Ecology and Dry Land Agriculture Division

This division is directly responsible for achieving agricultural development on the ground in terms of food and medicine production and adaptation to the desert environment, in an integrated framework of DRC to achieve sustainable development in desert areas. Through departments and specialties of the Division, the productivity of crops (such as field crops, forage crops, vegetables, fruits, medicinal and aromatic plants ...etc.) grown in desert lands is improved. Studies and research works are concerned with improving the quality and safety of food and also maximizing the utilization of natural plant resources as well as pastoral resources, forage plants, food industries suitable for the environment and desert communities throughout the Republic. The division has gained advanced expertise in the utilization of natural resources and the development of agriculture in desert areas, particularly those depend on rainfed agriculture or those utilizing groundwater in addition to newly reclaimed areas irrigated with surface water or treated wastewater.

Objectives of Ecology and Dry Land Agriculture Division

1. Improving the productivity of land and water units under climatic changes in desert areas.
2. Cognitive documentation and maximizing the sustainable use of wild plant genetic resources.
3. Conservation of plant genetic resources and plant biodiversity in the desert.
4. Domesticating, adapting and propagation of wild medicinal and aromatic plants and maximizing the benefit of them.
5. Developing bioorganic farming systems to ensure the food safety.
6. Developing food processing technology for products of desert environments.
7. Development of natural pastoral resources in the Egyptian deserts.
8. Protecting infrastructure and integrated development areas from the dangers of sand encroachment and sandstorms.
9. Strengthening ties and communication with governmental and non-governmental institutions in the field of sustainable development in desert governorates.

Scientific Departments of Ecology and Dry Land Agriculture Division

The Division of Ecology and Dry Land Agriculture consists of six scientific departments, comprising 26 specialized units. They are as following:

1. **Department of Plant Production:** The department aims at conducting studies and research and their applications in the field of improving and developing the productivity of field crops and vegetable and fruit crops using modern irrigation techniques and calculating the actual irrigation water requirement (related to the actual consumption) for each crop under the conditions of various environmental

stress in the desert regions. This department is also concerned with organizing training programs for farmers on various agricultural processes and agricultural manufacturing. The department is followed by five specialized units; Vegetables Unit, Fruit Crops Unit, Field Crops Unit and Agricultural Manufacturing Unit.

2. **Department of Medicinal and Aromatic Plants:** The department aims to conduct studies, research works and their applications in the field of monitoring and tracking natural vegetation, the full description of vegetation of each plant type and their chemical components and uses in folk medicine or in the pharmaceutical industry, development of the production of cultivated medicinal and aromatic plants using modern techniques to raise the productivity of the area unit under the conditions of water stress, salinity and heat. The department includes three specialized units; Medicinal and Aromatic Plants Unit, Plant Chemistry Unit and Natural Products Unit.

3. **Department of Plant Protection:** The department aims to conduct studies and research works and their applications in the field of protection of plant resources from diseases and economic pests. Also, the protection of the desert environments and reclaimed areas from contamination by chemical pesticides and to predict the status, spread and risks of diseases and pests. The department has five specialized units; Pesticide Unit, Insect Unit, Nematodes Unit, Plant Pathology Diseases Unit and Animal Pest Unit.

4. **Department of Sand Dunes:** The department is interested in conducting studies and research works and their applications in the field of controlling sand movement towards the development areas, through conducting climate and environmental researches and studying the characteristics of granules and forms of surface. In addition, the department gives consideration to develop appropriate plans to control sand movement using mechanical, chemical and biological means, also to the study of the spatial distribution of air deposits and their impact on urban projects and economic activities. The department is followed by three specialized units; Dune Environment Unit, Dune Sourcing Unit and Bio-installation Mechanics Unit.

5. **Department of Genetic Resources:** The department is concerned with conducting studies and research works and their applications in the field of developing new plant genetic structures with high productivity under the conditions of the desert environment. The department also aims at conservation of plant genetic resources by propagation and protection of wild and natural plant genetic resources. Also, providing genetic and chemical information of new and natural wild genetic resources, particularly those of the Egyptian deserts. In addition to introducing modern technology to increase production, multiplication, conservation, protection and improving the adaptation capabilities to desert conditions. The department included five specialized units; Plant Breeding Unit, Genetics and Cytology Unit, Tissue Culture Unit, Acclimatization Unit and Biochemistry Unit.

6. **Department of Ecology and Range Management:** The department aims to conduct studies and research works and their applications in the field of surveying and classification of plant resources (natural and cultivated plat resources) and maximize their utilization. Also, studying the characteristics of plant communities and vegetation cover and maintain them to combat climate change. This department is also interested in preparing plant integrated maps of desert areas, modernization and organization of plant groups and the flora of Egypt in the Herbarium, the development of natural pastures under environmental conditions and stresses of pollution The development and development of natural pastures under environmental conditions and stresses of pollution, drought and salinity. The department consists of five specialized units; Plant Ecology Unit, Pasture Unit, Ecophysiology Unit, Plant Taxonomy Unit and Pollution Unit.

Animal Production and Poultry Division

The Division of Animal Production and Poultry aims to develop the productivity of livestock and poultry in desert and newly reclaimed areas by working to improve the environmental conditions affecting their growth, in order to the increase of productive efficiency in many areas of Egypt representing different desert environments, including the areas of natural pastures, cultivated pastures and oases. Therefore, each area has its own specificity and production system that is not likely to generalize. The fact that ensures the diversity of research and extension activities between the different areas targeted by research and development plans in light of the general strategy of DRC.

Objectives of Animal Production and Poultry Division

1. Monitoring the livestock and fodder resources in different desert areas and identifying the obstacles that may limit their development and propose the appropriate ways to overcome these disabilities or mitigate their effects.
2. Developing proposals and scientific and applied research to achieve the optimal use of resources for development, while conserving their renewal and sustainablility.
3. Preparing qualifying and training programs to train technical staff capable of applying modern scientific concepts in use and management of natural environmental resources.
4. Scientific cooperation with local and international organizations to transfer advanced technologies in the field of animal and poultry production, with the aim of accelerating the achievement and raising the rates of livestock development in the desert areas of Egypt.
5. Implementing research and training programs in cooperation with the other divisions of DRC with the integration of various disciplines of DRC divisions.
6. Trying to make the research units productive and capable of realizing sufficient developmental return for the targeted desert areas.
7. Taking the advantage of advanced technology and modern applied techniques in the field of genetic improvement and increasing the productivity of animal and domestic herds and keeping up with the scientific development in this regard, in proportion to pastoral and forage resources in the desert environment.
8. Finding alternative sources of financial funding for research and studies, such as encouraging special (productive) units and deepening international cooperation with donors.
9. The clarity of the research vision of the researchers to give consideration to the research work, studies and development programs dealing with the problems of breeders in order to create a quality of credibility that works to achieve maximum sustainable development under the conditions of these areas.

10. Deepening the role of animal and poultry production as an effective tool in dealing with global developments such as climate change, desertification, pollution and biodiversity.

Scientific Departments of Animal Production and Poultry Division

The Division of Animal Production and Poultry consists of five scientific departments, each with fine disciplines in total of 18 specialized units. They are as following:

1. **Department of Animal and Poultry Nutrition:** The department specializes in monitoring, evaluating and developing the fodder resources, improving the nutritional status of animals and poultry under different ecosystems and introducing non-traditional fodder sources to cover any fodder needs and find practical solutions to overcome the problems of natural salt range plants and unpalatable plants in different grazing areas. The department comprises three specialized research units; Ruminant Feeding Chemistry Unit, Ruminant Feeding Physiology Unit and Poultry Feeding Unit.

2. **Department of Animal and Poultry Breeding:** The department pursues in conducting studies leading to maintain the livestock sources and poultry as well as upgrading their productive efficiency through genetic improvement of animal and domestic species and the application of modern and advanced technologies to improve productive and manufacturing qualities of animal products of meat and dairy. The department comprises four specialized research units; Animal Husbandry Unit, Poultry Breeding Unit, Meat Production and Technology Unit and Dairy Production and Technology Unit.

3. **Department of Wool Production and Technology:** The department specializes in improving productivity, developing and evaluating the quality of fiber and animal skins by introducing a system of sorting, grading and using histological and histochemical methods to determine the impact of various environmental factors on the structure of animal fiber follicles. The department comprises three specialized research units; Wool Production and Technology Unit, Histology Unit and Wool Biology Unit.

4. **Department of Animal and Poultry Physiology:** The department concerns with studying the adaptation of animals and poultry to desert environmental conditions, improving their reproductive and physiological performance through the development and application of artificial insemination and embryo transfer technique to overcome reproductive problems and speed up the genetic improvement, studying biodiversity and biological balance through monitoring environmental models of living organisms. This department comprises four

specialized research units; Regional Physiology Unit, Reproductive Physiology Unit, Poultry Physiology Unit and Desert Animal Environment Unit.

5. **Department of Animal and Poultry Health:** The department concerns with improving the health status of animals and poultry by overcoming health problems and pathogens that animals are exposed to, through accounting and diagnosing the pathogens of bacterial, viral, fungal and food shortage diseases of animals in desert environment and reclamation lands. In addition, this department is interested in using extracts of some natural plants as effective substances for disease prevention and treatment and study the pharmacological and toxic effects of natural desert plants. The department comprises four specialized research units; Parasites Unit, Infectious Diseases Unit, Food Shortage Unit, Toxicology Unit and Environmental Pollution Unit.

Socio-economic Studies Division

The Strategy of the Division of Socio-economic Studies emerges from the strategy of sustainable development and the vision of Egypt 2030. In addition to what has been implemented at DRC of surveying natural resources in desert areas and what has been implemented by the departments of this division from research works and field surveys in order to identify the most important real field problems (technical, economic and social) facing desert communities from the point of view of both beneficiaries and agricultural service providers in those areas and identify the most pressing problems to discuss solutions to overcome them, while keeping up with the country concern.

Objectives of Socio-economic Studies Division

1. Performing social, economic and environmental research and studies in desert communities.
2. Conducting economic, social and environmental impact assessment studies for development projects in desert areas.
3. Performing studies to assess the effects of climate change, desertification, drought and declining biodiversity.
4. Preparing economic feasibility studies for small and micro projects in desert areas.
5. Developing the methodology of the agricultural extension system in desert areas.
6. Building a database and information systems for development needs, analysis forecasting systems for risks and crisis in desert areas.
7. Organizing training courses in various fields that contribute to actualize of sustainable development plans in desert areas.
8. Rehabilitation and raising the abilities of women in desert areas and encouraging them to play an active role in improving the income of the family.
9. Disseminating the applications related to appropriate crop structure in various desert areas.
10. Spreading information about applications of organic farming techniques and agricultural practices appropriate to marginal conditions.
11. Encouraging the formation of associations of common interest and farmers' unions in desert areas.
12. Establishing a directory for investors that identify the possible investment opportunities in desert areas.
13. Studying the economic feasibility of new and renewable energy production in desert governorates.
14. Raising the efficiency of the development process factors for the sustainable development in desert areas.
15. Spreading agricultural manufacturing technology in desert governorates.
16. Development of farm management systems in desert areas.
17. Developing the administrative and organizational structures of the division and qualifying the research staff to obtain higher scientific degrees.

Scientific Departments of Socio-economic Studies Division

The Division of Socio-economic Studies of has three research departments; Department of Economic Studies, Department of Social Studies and Department of Agricultural Extension.

1. **Department of Economic Studies:** The department specializes in working to achieve economic renaissance of the desert system, through an optimal utilization of the available natural and human resources, in the desert areas, in a sustainable and effective manner, with the aim of raising the economic level of the residents of the desert and to eliminate or even reduce poverty. That can be accomplished through the preparation, implementation and marketing of economic research and studies aspiring to contribution to the sustainable development of all resources in desert and new areas. Of prime importance is identifying investment opportunities within the available resources. In addition to studying their current and expected uses to identify and allocate investments with continuous identification of the most important economic problems facing the development processes to develop solutions and recommendations.

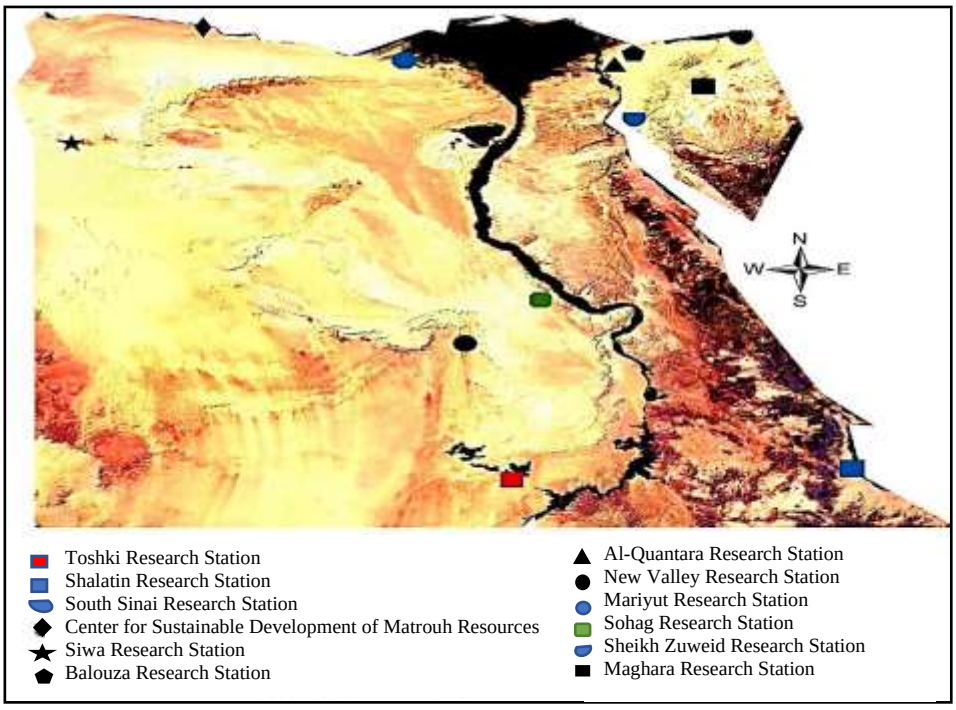
2. **Department of Social Studies:** The vision of this department is to prepare human staff of researchers and assistants, who have the scientific knowledge and skills to study social phenomena and implement research programs and projects for the development of desert communities. Also, the department specializes in improving and developing research methodologies in the field of rural development issues by preparing research studies, programs and projects that improve the quality of life in desert communities for social prosperity.

3. **Department of Agricultural Extension:** The vision of this department is to improve and develop the methodologies of research work in the field of extension, through conducting scientific research studies, programs and projects for the extension work systems in desert areas. Also, developing the various targeted agricultural human resources, including Bedouins, investors, young graduates and other beneficiaries, through organizing training programs for each group. The department also aims at providing decision-makers and those interested in development, with information on ecosystems and development needs in desert areas to help in the formulations of policies and plans.

2.3.2. Research stations

The organizational structure of DRC includes three general departments representing the desert areas, where ten research stations of DRC are located, in addition to the Center for Sustainable Development of Matrouh Resources ... They are:

1. The general administration of the stations of Sinai Sector and located within the scope of five research stations, which are South Al-Quantara Sharq Research Station, Balouza Research Station, Sheikh Zuweid Research Station, Ras Sudr Research Station and Maghara Research Station.
2. The general administration of the stations of the north-west coast sector and the scope of which is located Mariyut Research Station, Siwa Research Station and the Center for Sustainable Development of Matrouh Resources.
3. The general administration of the stations of the southern Sector of Egypt is located within the scope of New Valley Research Station, Toshka Research Station and Halaib and Schalatin Research Station.



Distribution of the research stations belonging to DRC in the desert provinces

Statement of research stations of the DRC

Research stations in the Sinai sector				
No.	**Station**	**Location**	**Area in acres**	**Comparative advantage**
1	South Al-Quantara Sharq Research Station	located east of Quantara city, 35 km away on the tributaries of the Al-Salam canal, branch no. 4.	500	Providing integrated agricultural models under modern irrigation systems in desert areas.
2	Balouza Research Station	located on the terrace of Al-Salam canal and follows Balousa village, which is 35 km east of Quantara city.	500	Agriculture in the sand dunes habitat and high salinity lands.
3	Sheikh Zuweid Research Station	located in Sheikh Zuweid in the northeast of Al-Arish city and away from it by 35 km.	20	Preservation and propagation of genetic resources and important horticultural varieties of the Egyptian desert plants.
4	Ras Sudr Research Station	the station's headquarter is in Ras Sudr, and is away from the martyr tunnel Ahmed Hamdi at a distance of 50 km by tunnel road - Tor Sinai - and the station has a branch in Tor Sinai city and another in Saint Catherine and Nuebaa.	30	experience in the cultivation of lands and water affected by salinity.
5	Maghara Research Station	located away from Al-Arish city at a distance of 90 km in the direction of the southwest and 60 km south of Bir Al-Abd city and the area administratively belongs to Hassana Center, North Sinai Province.	70	Model of agricultural development under drought conditions.
Research stations in the north-west coast sector				
No.	**Station**	**Location**	**Area in acres**	**Comparative advantage**
1	Mariyut Research Station	located south of Alexandria in the ancient Nasiriya city and away from Cairo of about 180 km.	60	Development of livestock and agriculture in the limestone lands.
2	Siwa Research Station	located in Siwa Oasis, 300 km southwest of Marsa Matrouh city on an area of 30 acres in Khamisa farm and 40 acres in the Tagzerti farm.	70	Model for the rehabilitation of degraded old lands and agriculture in sand dune habitats.
3	Center for Sustainable Development of Matrouh Resources	from Foca region in the east to Al-Salloum in the west, 320 km long and up to 70 km deep south of the areas of Siwa Oasis.		A regional center includes various technical specifications that serve the development of areas and valleys located in the geographical range of the center.

Research stations in the southern sector of Egypt				
1	New Valley Research Station	located 12 km north of Al-Kharga city.	15	Agricultural development under salinity and alkaline conditions.
2	Toshki Research Station	located 17 km from Abu Simbel city, which is 4 wells dug out of the total of 85 wells in the area and the rains of one well is 100 acres.	400	Agricultural development under heat stress conditions.
3	Halaib and Shalatin Research Station	located in the far south-east of Egypt on the Red Sea coast in Halaib, Shalatin and Abu Ramad.	55	Pastoral (Range) development under water stress conditions.

The research stations are considered one of the most important pillars of scientific research and scoring scientific achievements within the research and development plan of DRC. The distribution of these stations has been taken into account the simulation of the different ecological conditions characteristic, so that they entirety represent most ecosystems in Egypt. The research stations aim to provide the appropriate conditions, place and infrastructure suitable for conducting research studies and experiments in all the research fields assigned to DRC. In addition, the research stations provide technical and scientific support and technology and its acclimation transfer to be suitable to the desert ecological conditions and assistance in developmental projects in each region as a leading guiding model simulating the conditions of the region of each station. In accordance with the objectives of DRC and the plan of Egypt for sustainable development, the following targets are being achieved:

1- Creating the conditions and infrastructure suitable for conducting research and studies in accordance with DRC plan, people's programs and research departments for each time phase.
2- Establishing model farms and extension fields to provide technical and training support to farmers and investors to achieve the targeted development.
3- Conservation of plant diversity through the Egyptian Desert Bank for wild plant genes and optimizing the genetic improvement programs of plant species of economic importance.
4- Acclimatization and propagation of economic plant varieties of horticultural crops and medicinal and aromatic plants and their dissemination under different desert habitat conditions.
5- Maintaining ecological balance by establishing concepts and methods of clean agriculture in order to increase production and improve quality.
6- Training and raising the skills of workers, especially youth, as well as small farmers and investors in desert areas.
7- Organizing and implementing training courses for university students of universities and schools of technical education in accordance with the different areas of cooperation between DRC and various scientific institutions and bodies.
8- Providing technical support to governmental and non-governmental institutions working in various fields of development in desert and coastal areas.

9- Research stations work to reduce the factors causing desertification, climate change and conserve biodiversity and limit the degradation of desert land productivity.
10- Maximizing the utilization of available land and water resources through the concept of the economic returns of the land and water units in the desert areas.
11- Providing agricultural services, the work of veterinary convoys, extenstion caravans and technical support in the field of optimal use of water resources, whether surface or underground, for beneficiaries and investors and means of rationalizing use and raising the efficiency of irrigation in desert areas.
12- Training and raising the skills of women in desert communities in the fields of small and micro enterprises such as bird breeding, food industries and handicrafts... etc.
13- Implementation of some programs and sustainable development projects related to the development of rainfall areas, valleys, the harvesting and storage of rainwater, as well as the development of natural pastures, rain-fed areas, livestock in pastoral areas and the application of biocontrol techniques, water desalination techniques, groundwater well drilling, assessment of groundwater reservoirs, applications of sand dune stabilization, afforestation, road protection, soil maintenance and improvement, erosion reduction and the development of Bedouin women through the use of planning in partnership with local communities.

2.4. The relative advantage of DRC

DRC is an outstanding house of expertise in the field of natural resources exploration in the desert and an advisory destination, that helps decision makers and executive leadership in the development of strategies and policy making for the development of natural resources in the Egyptian deserts, as well as designing programs and supervise the implementation of development plans for sustainable development.

The comparative advantage of DRC is represented by the following:

1- DRC includes many scientific disciplines (specifications) and practical experiences in the field of desert science studies and research, which includes several aspects and not just the agricultural aspect to serve its objectives and strategic directions. The comparative advantage of DRC in terms of the integration of these disciplines and experiences, where the principle of the team prevails (work), which distinguishes DRC from other research centers.
2- The Egyptian desert is mostly very dry and dry in the northern coastal areas or the far south-east of Egypt, and these areas, which fall within the purview of DRC, are considered to have geopolitical, economic and social considerations.
3- There are three international agreements signed by Egypt that overlap with each other and intersect with the work of DRC, which are Convention of Combating Desertification, Convention on Biodiversity and the International Convention on Climate Change, and DRC is Egypt's national focal point for the UN Convention on Desertification.
4- The participation of local communities, especially in the border provinces and their specificity in national projects, depends on the success of DRC and its experts in providing the studies and accurate data necessary for preparing development plans

in such areas, as DRC has the expertise needed to deal with Bedouin communities and residents of border areas.

5- Contribution of DRC and its expertise to the project of reclamation and development of one and a half million feddans with many specialized studies in the fields of soils, water, plant genotypes and protected agriculture. Also, DRC, through participation in activities and themes that serve its strategic objectives, contributes to the realization of Egypt's vision 2030.

6- DRC through its experts, who have worked in many regional and international organizations in different fields, can formulate a package of policies and programs that suit the requirements of Egypt at present and future for sustainable development, considering the issues facing the countries of the region. Also, the scope of work should be extended geographically to include Arab and African countries with the same environmental conditions, which helps to achieve Egypt's leadership and protect its interests in these countries.

2.5. SWOT analysis of the internal and external environment of DRC

SWOT analysis (s: strengths, w: weaknesses, o: opportunities, t: threats) is one of the useful tools in complex situations characterized by the nature of strategic decisions. Business institutions and organizations are interested in analyzing and evaluating all internal factors, with the main purpose of identifying the strengths and weaknesses of each internal factor, using the results of external factors analysis to make their strategic decisions, and to choose the appropriate alternatives.

The main objective is to clarify the role of SWOT analysis in the strategic decision-making process. SWOT relies on qualitative data, which by converting them into quantitative data, will help strategic decision makers to reach the right and rational decisions as soon as possible. Delays in this type of decision may lead to a loss of performance and effectiveness in the work.

This study aims to identify the strengths and weaknesses of DRC, in order to develop a strategy aiming at upgrading DRC work and trying to strengthen those points that characterize DRC and improve the opportunities facing it, in addition to reducing the weaknesses and the risks or threats facing DRC in the strategy to be developed. This study has been done so that these points are clear to the strategists, and this strategy would be based on a correct scientific approach that reflects those points correctly emanating from the opinion of the staff of DRC, whether from the research or general staff or from the general staff, either from the administrators or technicians.

In this part of the study, the opinion of the total staff of DRC, whether research or general staff, will be identified about the most important strategic factors affecting the internal and external environment of DRC and affecting its overall strategy.

The matrix of internal strategic factors (strengths and weaknesses) for the total staff of DRC

Internal strategic factors	Relative weight	Degree	Weighted weight	Comment
Strengths				
The acquisition of scientific expertise capable of implementing research plans, programs and projects.	0.10	٤	0.40	Maintaining these experiences significantly, which leads to raising the level of DRC scientifically, skillfully and increasing competitiveness.
The historical situation and role of DRC compared to other research institutions.	0.10	٤	0.40	An important factor that has certainly led to have experiences and continuous important communication with the local community.
The determination and seriousness of researchers in carrying out research projects.	0.10	٤	0.40	An important characteristic that must be preserved and strengthened.
Carrying out appropriate training for residents of desert areas for introducing the importance of DRC and good practices to utilize resources.	٠,٠٩	٣	٠,٢٧	Maintaining that point in a great way, where DRC is given importance in delivering its mission and doing its work well in the desert areas.
Possessing the experiences of community communication in the scope of DRC work at the institutional and personal levels.	٠,٠٩	٣	0.27	Working to increase this advantage as it is one of the elements that introduce the researcher to the reality of the desert environmental conditions as well as desert community, which is basic and targeted from all the work of DRC.
Weaknesses				
The lack of specific budget for supporting and financing the international or local scientific publication.	٠,١١	٢	٠,٢٢	More budget must be provided to support local and international scientific publication.
The lack of a mechanism to provide health and security for researchers and workers during their work.	٠,١١	٢	٠,٢٢	An important factor for the researcher to feel safe during his work, especially in the desert where he faces a lot of risks.
The lack of a mechanism to motivate employees at a neutral and fair level.	0.10	٢	0.20	It is necessary to look for a mechanism to motivate employees in a neutral and fair manner not only financially but also morally.
The lack of rising the administration skills to form a second row of senior administrative staff.	0.10	٢	0.20	Attention to the refinement of the skills of the administrative staff through training courses for the refinement of management skills.
The lack of an effective, sustainable and secure official website for DRC.	0.10	٢	0.20	Running the official website of DRC as it is an important factor that communicates DRC and its staff with the outside world whether in Egypt or the Arab region or Overseas.
٢,٨				**Total weighted weights**

Source: Calculated and collected from the questionnaire - July 2018

The matrix of external strategic factors (opportunities and threats) for the total staff of DRC

External strategic factors	Relative weight	Degree	Weighted weight	Comment
Opportunities				
The existence of a republic decision to establish DRC since 1950.	٠,١١	٤	٠,٤٤	Such a decision has led to the protection of DRC from being subordinate to other entities other than the Minister of Land Reclamation as stated in that republic decision.
The country's interest in major developmental projects, especially since most of these projects are in the desert areas.	٠,١١	٤	٠,٤٤	As a result of the interest of Egypt in recent years to projects in the desert areas, so DRC should be interested in them, not only in the field of agriculture, but in all sectors of economic and social activities aimed at promoting the desert system.
Openness to research centers and other universities locally and internationally**.**	٠,١٠	٤	٠,٤٠	This leads to the expansion of the knowledge of the workers and researchers in DRC with the most important modern scientific developments and make a joint scientific communication with those scientific institutions and most notably international ones.
Adapting the used techniques to the local conditions of desert areas.	٠,٠٩	٣	٠,٢٧	This is due to the openness of DRC staff to research centers and other universities locally and internationally, in addition to the researchers understanding of local conditions in desert communities that differ from the old regions old in the valley and delta.
The support of the political leaders to national projects in which DRC participates.	٠,٠٩	٣	٠,٢٧	This result is positive from the point of view of DRC staff, where most of the young employees see that the political leaders support DRC in national projects, which indicates that they are informed of national projects on one hand and the work of DRC in those projects on the other hand and that many of them works on these projects through DRC.
Threats				
The reduction of the general country budget allocated to support the activities of research centers.	0.11	2	0.22	Negotiation should be done with the Ministry of Finance and the Ministry of Agriculture and Land Reclamation to increase the financial allocations of DRC in the general budget, especially since DRC works in desert areas and in many national projects that the country recently is interested in and most of these projects are in the Egyptian desert and part of DRC interests.

External strategic factors	Relative weight	Degree	Weighted weight	Comment
The multiplicity of stakeholders involved in implementing sustainable development plans within the scope of DRC work in the desert areas.	0.10	1	0.10	This can lead to a decrease in the efficiency of DRC mission in the desert areas. DRC is not present in all the national projects carried out by the country related to sustainable development.
Misuse and waste of resources and randomness in the management of natural resources by the local community.	0.10	1	0.10	Attention should be paid to the holding of training courses and community guidance seminars to the local community and raise awareness of the importance of the desert environment, while evaluating these guidance courses to see how the local community benefits from them.
The lack of public or executive control over many works and projects in desert areas that lead to the waste of resources.	0.10	1	0.10	This can be attributed to the weakness of local government units in desert areas, in addition to the failure of the executive bodies to do their work properly. Consequently, DRC should continuously and constructively communicate with various executive bodies with the holding of courses and seminars guiding them in coordination with the executive bodies and local community leaders.
Interference in the work and research activities of other research and academic institutions within the scope of DRC work.	0.10	1	0.10	This can lead to reduce the competence necessary to carry out the work at the national level, which can be attributed to the lack of complete coordination between DRC and the other research and academic bodies that work in the desert system.
2.4				**Total weighted weights**

Source: Calculated and collected from the questionnaire - July 2018

The results of DRC total staff, which reflect the most important strengths and weaknesses (strategic factors) show that the weighted weight reached 2.8, which indicates the closeness of this result to 3. This shows that DRC has the ability to compete from the point of view of the DRC staff in general and the effect of the strength factors is relatively more than the impact of weaknesses. Also, the total weighted weights of opportunities and threads reached about 2.4, which indicates a distance of 3. This shows that the threats may be a factor that has a greater impact than opportunities for the external environment from the point of view of the total staff of DRC, which indicates a lack of competition. After completing the matrix of internal and external strategic factors of DRC in various categories of special staff (members of the research body and their assistants) and various categories of general staff (directors of the general staff and employees of different departments, research stations and technicians), it is indicated that the strategic institutional situation of DRC is medium in general and therefore the appropriate strategy for DRC is that concerning with development and continuous improvement of internal factors, coupled with working to develop and improve conditions in external factors that need to be taken care and the ambitious strategy is to expand DRC work in the future. The strategy should include some of the main areas with the following:

1- Appropriateness to the objectives and activities of DRC and the nature of its work in the service and development of desert region.
2- General compliance with the sustainable development plan of the Country.
3- The possibility of implementation and the need to keep up with current and future progress in information technology.

3. The stage of drafting the strategy of DRC

3.1. Vision

It is mainly concerned with leadership and innovation in scientific research in the fields of desert resources and sciences and benefiting from its applied results on sustainable development of desert and new reclamation areas.

3.2. Mission

An ambitious strategy of DRC to cope with the accelerating changes and developments at the scientific, economic, social and political levels and put an executive plan based on two main axes, the first revolves internally around organizing the nature of the institution work and achieving its objectives. The second axis is concerned externally with the nature of DRC external relations with different institutions and supporting them with all the scientific data and visions that help the decision-maker on comprehensive development of desert areas.

3.3. Goals

Strategy of DRC is generally closely linked to the international objectives of the Agricultural Development Strategy and the Agriculture Sector Strategy 2030, which aims to achieve sustainable development to provide food security and promote development programs and national plans, especially under desert conditions and marginal areas.

The strategy aims to plan to achieve the main objectives of DRC to explore natural and human resources in the Egyptian deserts and how to use them optimally and safely to sustain them, so that these areas can be rehabilitated and work for their sustainable development, through the following:

1- Conducting scientific and applied studies in various fields related to the development of natural resources in the Egyptian deserts and new reclamation areas, especially in relation to water, soil, plant, animal, human and non-traditional energy.
2- Studying the environmental challenges that hinder the development of natural resources in the Egyptian deserts and new reclamation areas, the most important of which are desertification, sand dunes and climate change.
3- Proposing the policy of the most appropriate ways utilizing the Egyptian deserts, whether agricultural or industrial utilization by analyzing the results of the study of natural resources in the Egyptian deserts.
4- Publishing and exchanging the results of research and working to benefit from them and provide expertise and advise in the agricultural fields to serve the community in desert environments.
5- Exploring groundwater in the Egyptian deserts, designing and drilling wells in accordance with scientific principles that ensure that they are not drained, establishing scientific and practical systems to harvest and collect rainwater in the Egyptian deserts and designing scientific irrigation systems to reduce the waste of irrigation water in the Egyptian deserts.
6- Strengthening scientific and research joint cooperation with local and international external bodies in activities and areas of DRC interests.

7- Providing a database for the Egyptian deserts that contributes to encouraging investment, creating jobs for Egyptian youth and serves decision-makers at the national level.
8- Contributing to the development of scientific and practical plans for the reclamation, cultivation and development of desert areas in accordance with the results of research and studies carried out by DRC within the framework of the policy and the country plan for sustainable development.

3.4. Values

The system of values and governing ethics is the set of values from which DRC draws guidance in all its activities, choices and its general, research, cultural, social and economic provisions, with the aim of raising the level of scientific research outputs as a strategic goal. Seeking to develop and achieve creativity in all aspects of institutional life. The strategic plan of DRC (2030) adopts the following system of values and governing ethics:

Belonging

Expresses the value of the individual's love and concern for his community and his interaction with all its members to achieve national belonging, the cohesion of society and its success in achieving its security and the success of its developmental plans to achieve his well-being. The value of belonging also addresses the keenness of the society members to highlight the culture of dialogue and disagreement and to make the national interest prominent to all. The value of forgiveness in dealing between individuals, unless it harms the security of the country, is an important part of the values of national belonging. Maintaining intellectual, social, economic and technological security an important part of the individual's belonging to the society.

The value of belonging is achieved through the following practices:

- Including the training programs to address the problems of the society with national or local dimensions with the essential participation of DRC staff in offering solutions.
- Including case studies on society problems through the formation of multidisciplinary teams, allocation of time to discuss innovative solutions in a scientifically competitive way and prizes can be allocated to the most innovative and scientifically accepted solutions.
- Activating the role of DRC employees in serving the local community and developing the environment.

Quality

The 11th article of the Declaration of the World Conference organized by UNESCO, held in Paris in October 1998, emphasized the importance of qualitative evaluation dealing with all the functions and activities of scientific research. This article accentuated the importance of self-study and external evaluation in the field of scientific research. The declaration also assured the importance of considering the institutional, national and regional context in setting those standards and levels.

The value of quality and excellence in DRC is achieved through the following:

- Applying international quality standards to all financial, administrative and technical procedures.
- Realizing the quality and safety of buildings, facilities, tools and instruments.
- The mechanization of the documentary cycle on scientific grounds.
- Perfecting quality of scientific researches and applied services provided to the local community.

Transparency and clarity

In light of the definition of the United Nations Development Program/Governance Program in the Arab countries, the concept of transparency refers to sharing the opportunity and providing it to those who have an interest in a matter and collecting information about it and acting in an open manner, which helps to resolve the detection of disadvantages and protect interests. The bodies with transparent systems have clear procedures for public decision-making and open channels of communication between stakeholders and officials.

The value of transparency and clarity in DRC is achieved through the following:

- Using ICT for all members of the institutional community and the growing believe in the right of all parties to know in an open manner, in the light of what the low of information exchange freedom allows.
- There are clear procedures for how to make decision-making at the institutional level.
- Clarity, integrity and non-fraud in research, field studies, reports or projects.
- Allowing others to know the truth, without attempting to hide or mislead meaning or alter reality to show things better.

Accountability

Is the recognition and tolerance of responsibility for actions, decisions and policies, including management, governance and implementation within the frame of job role and includes a commitment to reporting, interpretation and taking responsibility for the consequences of not achieving the goals.

The professional perspective of accountability attributes any improvement in the performance of DRC to the leaders, members of the research and the administrative bodies, who are more familiar with the nature of the work than others and are better able than others to set standards, gather information on the performance of their institution, diagnose the causes of shortcomings and develop plans for treatment. Accountability is about reforming and developing the system, so it is an essential mechanism for change, not punishment.

The value of accountability in DRC is achieved by the following:

- The existence of reference criteria governing the work of the organization.
- Identifying indicators and evidences of achieving goals.
- Identifying measurement methods and methods of information analysis and presenting them.

- Evaluating the performance of everyone who belongs to the organization.
- Identifying a feedback system to provide information on the performance of everyone who belongs to the organization.

Equality and non-discrimination

Everyone has the right for education and training at all levels, discrimination of all kinds is a violation of rights, and the Egyptian Constitution and laws prohibit all forms of discrimination and inequality and support equal educational and training opportunities for all.

The value of equality and non-discrimination in DRC is achieved by the following:

- Providing members of a research body at the same level, who have specialization and experience.
- There are clear and specific criteria for evaluating the performance of employees.
- Freedom of thought and expression through the legal framework.

Intellectual property

Egyptian law no. 82 of 2002 approved the intellectual property rights in all its forms such as patents, utility models, undisclosed information, trademarks and commercial data, geographical indicators, industrial designs and models, copyright of the author and related rights and plant varieties. Egypt has joined a number of important treaties and conventions in this vital area to confirm its credibility and keenness to provide protection to all types of intellectual property rights in line with its various international commitments.

Intellectual property rights in the research community are achieved through the following:

- Establishing specific and clear criteria derived from the university organizating law and intellectual property rights law no. 82 of 2002 to regulate authorship, printing and publishing.
- Expanding the use of information technology for all individuals in the research community.
- Including training programs related to intellectual property rights in the light of law no. 82 of 2002.

3.5. Policies

3.5.1. Scientific research Policies

Scientific research is considered one of the main pillars that distinguish the objectives and functions of DRC, so DRC has been keen since its inception to provide a favorable environment for the members of the research body and their assistants to conduct scientific research and publish it in scientific journals and conferences at the local, regional and international levels.

DRC has identified the priorities of scientific research to be consistent with the priorities of scientific research identified by Vision of Egypt 2030 and encouraged its affiliates to focus on applied researches related to the development of desert and new reclamation areas through the implementation of the following policies:

1. Commitment in scientific research policies to the approved research plan and emphasize the importance of joint research by focusing on the practical aspect of to benefit the society in general.
2. Attention to the quality of researches and excellence more than quantity through the dissemination of practical research culture, the achievement of quality standards and the publication of scientific research outputs in prestigious scientific journals.
3. Emphasizing that all members of the research body and their assistants at DRC are committed to the ethics and rules of scientific research and are charged with active participation in the completion and performance of scientific research that serves the aspirations and objectives of sustainable development.
4. Developing the capabilities of scientific research and innovation in areas of national and international importance, while providing sufficient funding according to the available budget for scientific and applied scientific research that are globally competitive and of a national nature.
5. Establishing a database of published scientific research of the DRC members of the research body and constantly update the statistics of that researches for the purpose of establishing a reference framework for decision-makers both on the organizational and marketing aspects of applied researches.
6. Strengthening relationships with donors and supporting scientific research institutions and maximizing the benefits of scientific and cultural agreements related to higher education with Arab and foreign countries.
7. Developing the institutional structure and the existence of a modern research structure to cope the developments of scientific research such as technological development centers, specialized research centers of excellence, virtual scientific research networks and technological incubators.

3.5.2. Policies of research and applied projects

Research projects at DRC are considered one of the important pillars to encourage innovation. DRC has a methodology for implementing the policies of research and applied projects and follow-up the implementation of the plan of those projects and the executive action plans that are emerging through the implementation of the following policies:

1. Preparing research programs, scientific studies and applied researches to study the conditions of natural and human resources in desert areas and areas of reclamation, where it considered the coverage of the geographical area of DRC work.
2. Establishing development plans and programs in accordance with the elements of development and considering the demographic and geographical conditions and variations of each region.
3. Develping a mechanism to enable DRC to benefit from the recommendations of these programs and in order to achieve the objectives of DRC and in favor of the directions of the country towards comprehensive development in desert areas.

4. Applying and publishing the results of applied research with the creation of means and mechanisms for the transfer of technology to desert areas and areas of reclamation.

3.5.3. Policies of community service and desert environment development

Community service policies and desert environmental development are in line with DRC policies and strategic plan. Eleven research stations are following DRC that are geographically distributed through desert areas to represent most ecosystems. These stations serve as DRC arms in implementing its strategic objectives to serve these communities. This is done through a range of policies that are aimed at serving the community and developing the desert environment as following:

1. Policies to account for problems that hinder the implementation of comprehensive development in desert areas and develop practical solutions to these problems through specialized scientific studies.
2. Policies to support community participation systems in the planning and implementation of development projects effectively to serve the desert community and develop its environment through distinguished service activities consistent with the actual needs of the surrounding community through following the methodology of planning by participating.
3. Policies to strengthen the role of DRC in the production and transfer of knowledge and skills to serve the community and develop the desert environment through the development of infrastructure and the implementation of field and guiding experiments in research stations.
4. Policies to organize and implement veterinary convoys in desert areas to find out the causes and ways to treat these specific problems related to livestock and poultry.
5. Providing technical advice to solve the urgent environmental problems that farmers and investors may exposed to in desert areas.

3.5.4. Administrative and financial policies

Administrative and Financial policies are considered as major trends, that illustrate ideas and possibilities of development and good performance in contemporary institutions. Today, they are developing the strategy of all the work carried out by the institution in a transparent manner and represent real guides at work and also uses criteria to measure the success of the organization, its leaders and the rest of its employees.

DRC is not far from adopting these administrative and financial policies that will develop the work and unify its procedures through the following policies:

1. Establishing a culture of innovation and belonging in the institutional work environment and emphasizing teamwork, integration and coordination between administrative and financial disciplines.
2. Strengthening the institutional capabilities of DRC and increasing their efficiency and effectiveness through the development of relevant legislation, human development policy and training.

3. Developing the documentary cycle system through the mechanization of the processes and procedures of administrative and financial units and the use of ICT.
4. Promoting the trends and values of integrity, transparency and justice and ensuring that all administrative and financial services are provided in accordance with the standards and systems of comprehensive quality management.
5. Commitment to apply the laws and regulations governing the documentary cycle in the administrative and financial aspects.

3.5.5. Technological policies

The overall view of the development of DRC required the need to provide a wide range of data and information on all related inputs, activities and outputs. All of which requires preparing many data in advance and providing a range of programs to analyze these data and translate information supporting decision-makers from the leaders of DRC, which has led to the activation of the role of the general administration.

There is no doubt that the existence of a sound information system within DRC helps in its development as a result of the increased degree of accuracy, objectivity and transparency that affect all its decisions, especially those related to planning, follow-up and control processes.

The most important technological policies for the development of the work system of DRC are as follows:

1. Application of electronic sip systems, recall and circulation of information and documents by electronic means.
2. Localization of the integrated financial system to manage the resources of the institution, which is a leading system in the field of integrated financial and administrative solutions, where it performs all the functions and processes necessary to plan and manage human and financial resources of DRC.
3. Establishing scientific research databases at DRC and linking them with their local and international counterparts.

3.5.6. Public Policies

- The Center is bound by its establishment law no. 90 of 1990 and its operational regulations and the provisions of the laws and operational regulations of law no. 49 for the organization of universities and law no. 81 for the civil service.
- Members of the research body of DRC should spend at least 25% of their time in work related to scientific research and away from their traditional work.
- The policy of DRC in the next phase is to have the first place in the ranking of research centers in the Arab Republic of Egypt.
- Adopting the regulations of the state monitoring authorities to ensure greater transparency and combat corruption, while implementing the operational regulations governing accountability.

- Commitment to work on the continuous evaluation of institutional capacity and effectiveness, which ensures the provision of scientific solutions to national problems, while adhering to international quality standards.
- DRC adopted a periodic and renewed plan for the development of buildings, laboratories and instruments.
- Supporting and developing DRC specialized centers of excellence.
- Encouraging joint scientific research cooperation between the members of the research body of DRC and their colleges in the faculties and scientific research centers in Egypt and abroad.
- Encouraging the members of the research body to participate in research projects in order to improve the quality of services provided to the society.

4. The phase of drafting the executive plan of the DRC strategy

Reaching the desired goals is not limited to quality and efficiency in its formulation or accuracy or ingenuity in determining them, but more importantly is the ability to actually implement and reach the desired results and the presence of indicators by which success or failure to achieve these goals can be measured.

It was, therefore, necessary and important that the executive plan of DRC strategy be linked to the comprehensive development plans of Egypt. The executive plan for this strategy is based on two main axes, the first internally and revolves around organizing the nature of the work of this institution and achieving its objectives, while the second externally and cares about the nature of DRC external relations with different ministries, bodies and institutions and supporting it with all scientific data and visions, which help the decision-maker on the overall development of desert areas.

4.1. Internal axis (Development of the working environment internally) by achieving the following objectives:

The first target: Development and repair of institutional construction

The first goal is to adopt the development and repair the institutional structure of DRC by modernizing the organizational structure, issuing the operational and complementing regulations of DRC, establishing the new headquarter of DRC, modernization of research stations, establishment of new stations, in addition to the development of the internal control system and the development of the documentary cycle system in accordance with the standards of comprehensive quality.

The second target: Development of financial resources

The second goal is to strengthen and diversify the resources of funding for both applied studies and research and to develop diverse and sustainable self-resources, while encouraging self-efforts to support and develop the research process at DRC and to make the best use of those financial resources. In order to achieve DRC mission and objectives, it is necessary to bring in donor-funded projects to strengthen financial resources.

The third target: Developing the information and technology system

The third goal seeks to develop the information and technology system by implementing plans and programs related to the latest means of ICT. Also, raising the efficiency of infrastructure, achieving integrated mechanization of documentary cycle, upgrading the capabilities of DRC staff to deal with it through targeted and continuous training and support decision-making by achieving the fluidity of the circulation of information effectively and efficiently.

The fourth target: Developing capacity-building and human resources development:

The fourth goal includes developing the capacity-building system, developing human resources working at DRC, to develop the gained knowledge and skills, targeting building creativity, increasing technology and innovation to develop and strengthen skills, talent, capabilities, procedures and resources needed by the administrational, financial and research process to ensure the achievement of the strategic objectives of DRC.

The fifth target: Developing the scientific studies and research system

The fifth goal is based on the development of the study and research system at DRC by developing plans and programs, to develop the research activity to raise the efficiency of creativity and innovation and link those plans and programs to actual societal problems.

4.2. External axis: (Development of the working environment externally) by achieving the following objectives:

The sixth target: Developing the community service system and the desert environment

The sixth goal is to develop plans, activities and programs to serve the society and the desert environment to achieve integration and active participation in the development through the use of scientific research outputs, especially those applicable. Also, achieve the satisfaction of the beneficiaries becomes possible through transferring the technology to desert communities.

The seventh target: Maximizing the use of DRC field expertise in desert environments

The aim of the seventh goal is to maximize the use of DRC field expertise in desert environments, through a training plan to spread the culture of the desert, develop scientific solutions to the problems of integrated development in desert communities and the establishment of a national database of natural and human resources in the Egyptian deserts.

The eighth target: Developing and coordinating external relations between DRC and the relevant authorities

The eighth goal is to develop and coordinate the external relations of DRC with the relevant entities and institutions, whether at the local, regional or international levels.

4.3. Annual executive plan models

Model (1) Mechanisms for implementing the activities of the annual executive plan

Axis: ----------

Target: ----------

Goal ( ): ----------

Operational activity	Mechanisms for the implementation of the activity	Responsibility for the implementation	Time span for implementation				Targeted to achieve	The governing performance indicators	Estimated budget
			1-3	4-6	7-9	10-12			

Model (2) Follow-up and evaluating the performance of the implementation of the annual updated executive plan

Operational activity	Follow-up the percentage of achievements			Percentage of exploited water resources	
	Targeted percentage of implementation	Actual percentage of implementation achieved	Reasons for not achieving the target	Approved	Dismissed

Model (3) Evaluating the performance of the annual executive plan

Operational activity	Governing performance indicators	Relative weight of performance indicator	Targeted achievement in the evaluation year	Performance efficiency in the evaluation year	Total performance efficiency in the evaluation year	The ratio achieved relative to the targeted in the evaluation year.

DRC is the oldest specialized center concerned with the study of desert resources and sciences. In 1930, King Fouad I put forward the idea of its establishment and was officially inaugurated in 1950 with the name of Fouad I Institute for Desert Sciences. In 1990, the Republican decree no. 90 was passed for the establishment of DRC.

DRC has many specialties distributed in four divisions, each of which is responsible for a scientific research orientation concerning the development aspects of the Egyptian deserts. These divisions include 23 scientific departments, which in turn are divided into 45 research units, each of which represents a specialty in each department. Also, there are 10 research and guidance stations distributed to desert areas and representing different geographical regions, including five stations in Sinai (South of Eastern Qantara, El Sheikh Zuweid, El Maghara, Ras Sidr and Baloza), Maryut Station, Al-Kharga Oasis Station, Siwa Oasis Station, Shalatin Station, Toshki Station, in addition to the Center for Sustainable Development of Matrouh.

DRC includes a Central Laboratory for scientific analyses (water, soil, plant ... etc.), Desalination Research Center, Center of Excellence in Saline Agriculture, Groundwater Drilling Unit and Geophysical Studies, Gene bank for wild desert plants, Desertification Observatory, Geographic Information System Unit (GIS Unit), Information and Decision-making Support Center, Internal Control Unit, Corruption prevention and Control Unit, Crises Management Unit and an ancient library of books and periodicals, Advanced Training Center and DRC issues the Egyptian Journal of Desert Research; an international scientific journal for the dissemination of scientific research in the field of Desert Science.