Kuwait Status Report

First Coordinating Board Meeting

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State of Kuwait
Overview

- Background
- Diversity status
- Conservation measures
- Conclusion

Introduction

Natural

- Harsh environmental conditions
- Scarce water resources, insufficient drainage
- Poor soils
- Sand storms
- Urban pollution
- Coastal air borne salt spray

Technical and Administrative

- Poor management practices, limited application of new and emerging technologies
- Lack of public awareness

Climatic & Biophysical Data

- very erratic rainfall < 20 mm to 250mm/yr
- temperature range minus 10o to 50oC
- 246 million ha agricultural land

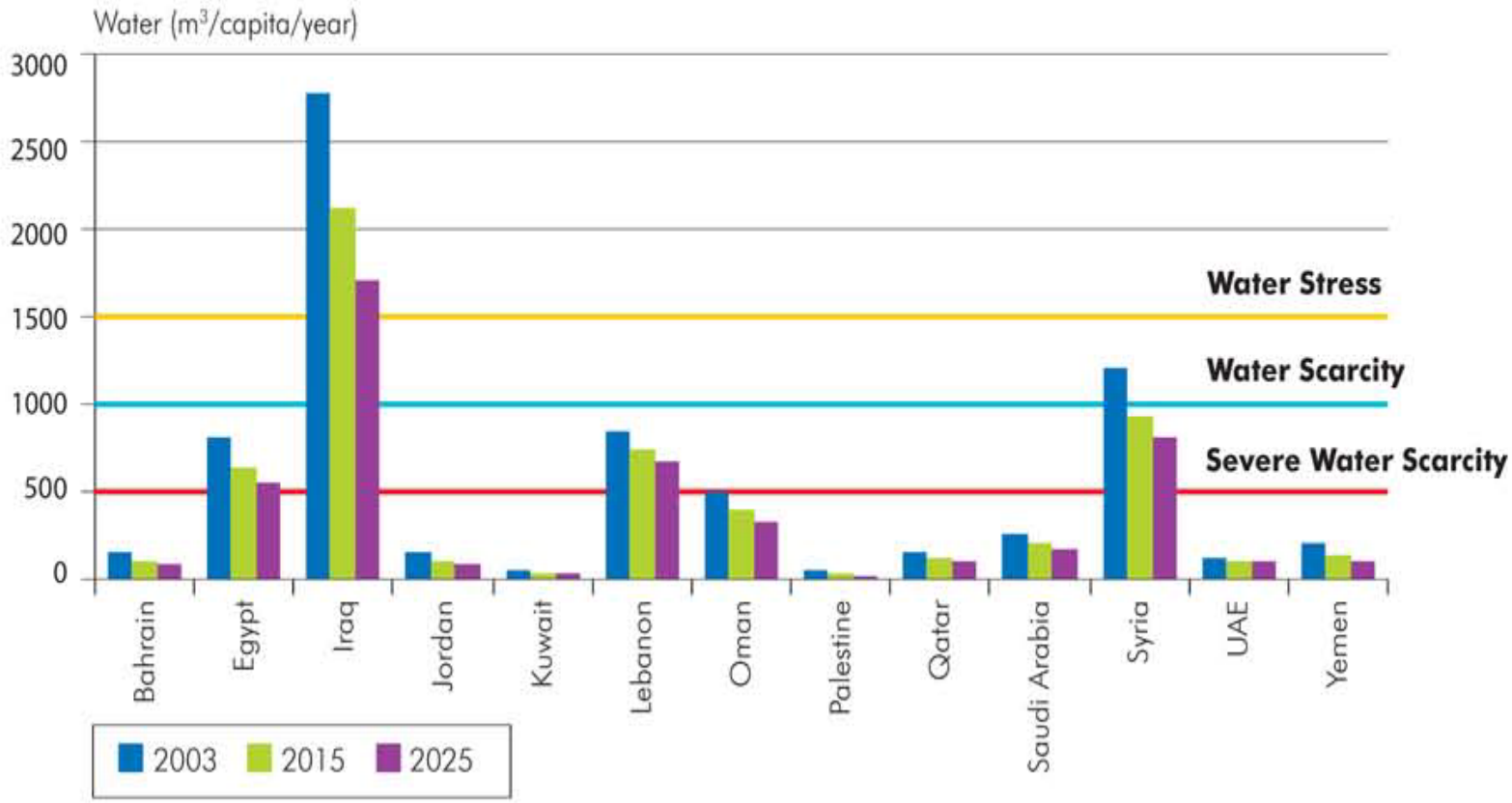
  - 2% cultivated

  - 50% rangelands

- 375 plant species
- 24 million sheep & goats
- 1 million camels
- open-access grazing

FIGURE 1

WATER STRESS, WATER SCARCITY, AND SEVERE WATER SCARCITY IN THE ARAB COUNTRIES IN THE YEARS 2003, 2015, AND 2025



Source: Proceedings of the Symposium on challenges facing water resources management in arid and Semi-arid regions. American University of Beirut, Oct 7-9, 2004. (CD Publication).

Plant diversity in Kuwait

- Kuwait native plants list includes 375 species
- Recently, new species has been added to this list: *Cleome amplyocarpa* (Um Romel) and *Lasiopogon muscoides* (Kuraishat Aljedy).

Kuwait Plant Communities and Ecosystems

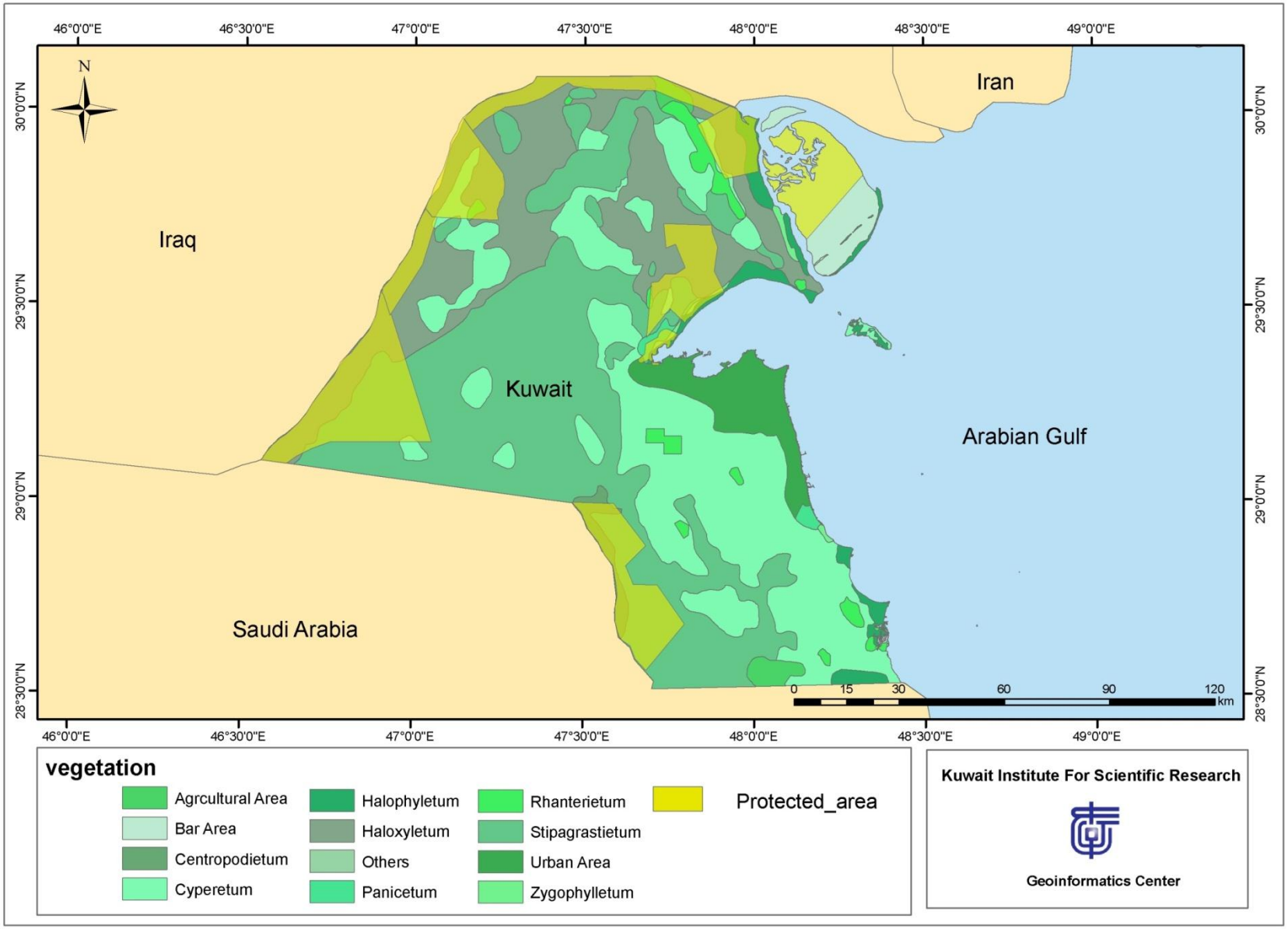
Vegetation Communities

- Haloxyletum
- Rhantereitum
- Cypertum
- Stipagrostietum
- Zygophylletum
- Centropodietum
- Panicetum
- Halophyletum

Ecosystems

- The costal plain and lowland ecosystem
    - a) Salt marsh and saline depressions
    - b) Sand dunes, ridges and terraces
- The desert plain and lowland ecosystem
- The alluvial fan ecosystem
- The escarpment, ridges and hilly ecosystems
- The wadi and depression ecosystem
- The barchan sand dune ecosystem

Vegetation Map



Haloxyletum

Rhantereitum

Cypertum

Zygophylletum

- The community is dominated by *Zygophyllum qatarense*,
- It is a medium-sized shrub commonly found in coastal areas and depressions.
- It has 0.3% distribution.
- The community is associated with salt-tolerant annuals and perennials such as *Salsola imbricata*, *Cressa critica* L., and *Aizoan hispanicum* L.

Zygophylletum

Halophyletum

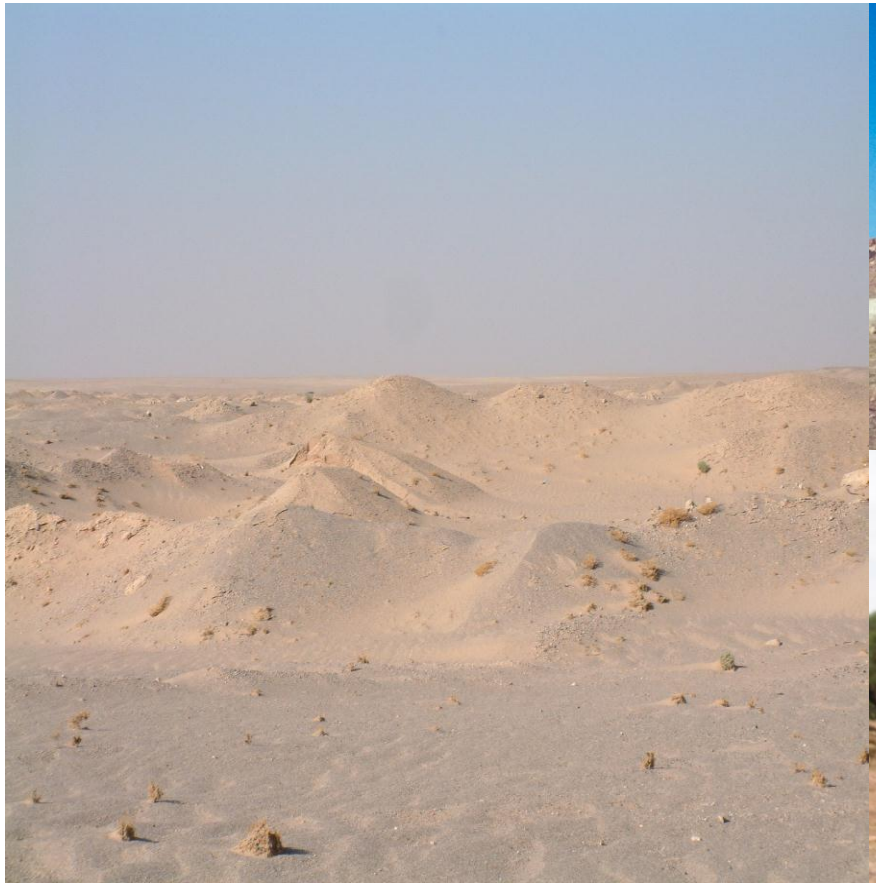
Loss of Native Flora

Natural Causes

- Extreme Temperatures
- Drought
- Salinity

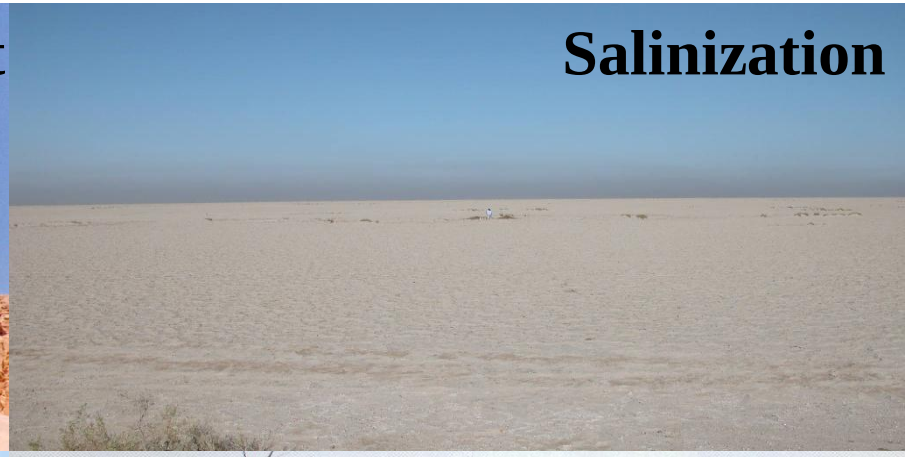
Loss of Native Flora

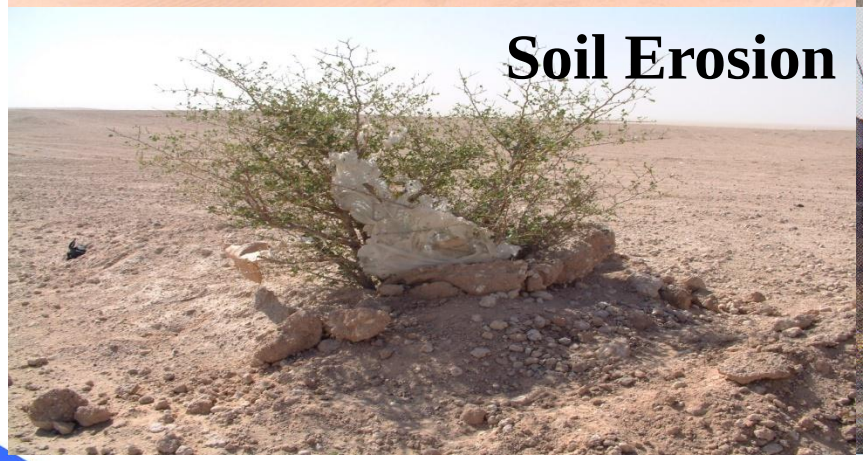
Human Activities

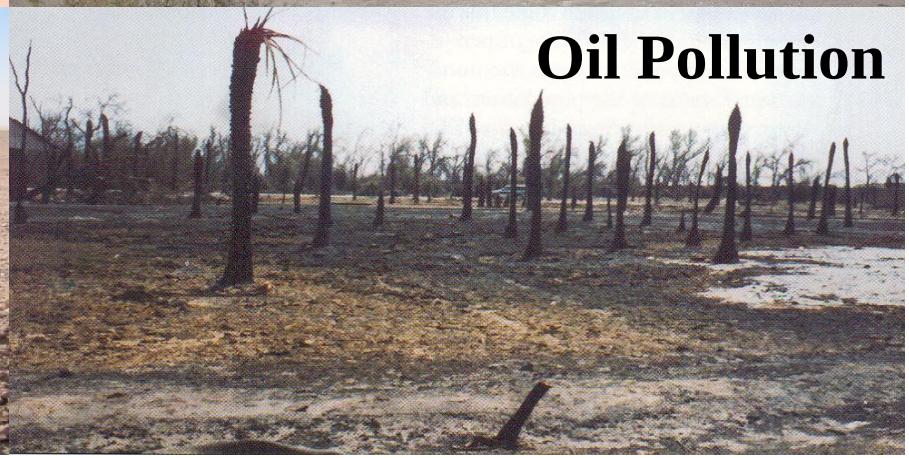


Gravel Quarry

Human Activities







Consequences

- Narrow Plant Base
- Irrigation induced salinization
- Greater Stress on Plant Growth
- Insufficient Greenery Impact

Biodiversity of Terrestrial Ecosystems at KSIR

•Provide the necessary research to improve the provision of ecosystem services and ensure the protection of biodiversity.
•Focus on understanding abiotic parameters associated with desertification;
•Develop and apply the first national level data gathering exercise for understanding biodiversity,
•Identify opportunities for conservation, restoration and protection of Kuwait's terrestrial biodiversity.

Information and Techniques to Support Conservation and Restoration of Kuwait's Terrestrial Ecosystems and Biodiversity

- Characterize and document Kuwait's native biodiversity
- Monitoring Techniques
- Conservation and restoration of Kuwait's terrestrial ecosystems and biodiversity

Identify and Optimize Mechanisms to Mitigate and Remediate Land Degradation Issues/Enabling better Compliance with Local Laws &Treaties

- Understand key abiotic parameters required to enable ecosystem functioning
- Improve land- planning and protected areas
- Enabling better compliance with local and international law

Sustainable Urban Landscape Development (Urban Ecosystems)

- Infrastructure development
- Adopting & developing ecologically sustainable plants for urban landscape
- Greenbelt development

Expected Outcome of the Programme

- Policies that would lead to healthy and sustainable biodiversity
- A detailed and comprehensive program to inventory all fauna and flora species in the country.
- A national reference collection based on specimens and cryopreservation of the tissues.
- A Restoration Seed Bank.
- Development of “in-situ” and “ex-situ” strategies to conserve native biodiversity.
- An extensive database of species composition and population size of flora and fauna, as well as relevant data on soils and climate.
- Interpretation of scenarios as to the potential effects of climate change on plant biodiversity and vegetation in Kuwait.
- An intense public campaign in collaboration with the print and electronic media to enhance public awareness regarding biodiversity is needed.
- **Marine and terrestrial biodiversities are under pressure. Immediate and effective measures in terms of scientific research as well as effective planning and designing management policies together with enhanced public awareness are needed to safeguard and preserve this vital and irreplaceable natural wealth.**

Plant Conservation In Kuwait

In-Situ Conservation

- Establishment of nature reserves like Sabah Al-Ahmad Nature Reserve in 2003
- KISR established Agriculture Research Station in Kabd (ARS)

Agriculture Research Station (ARS)

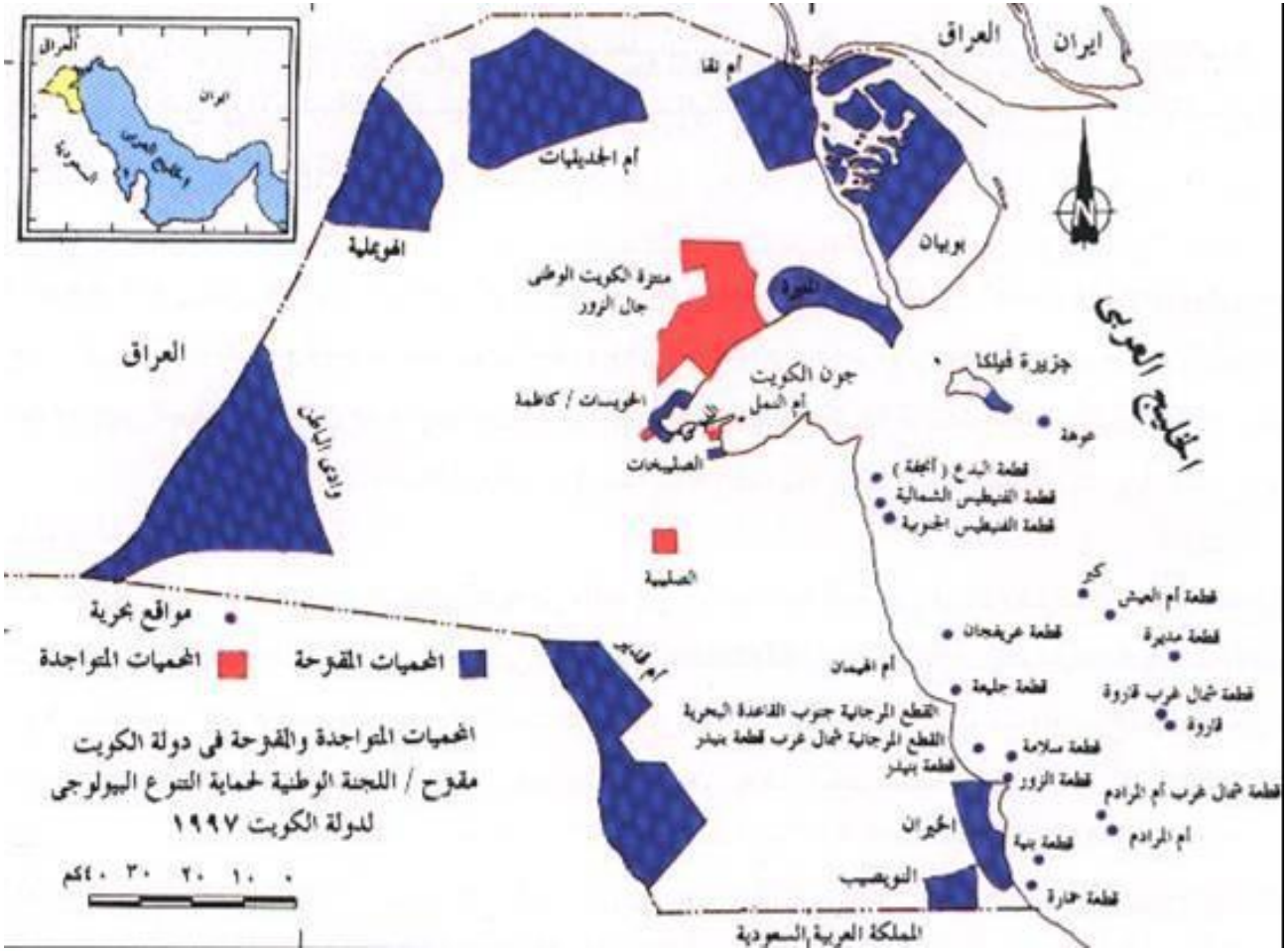
- Agriculture Research Station (ARS) established in 1975 with a total area of 20 km^2.
- It is located 35 km on the South west of Kuwait City.
- In 2001, an additional 20 km^2 extension has been added in the west side of the station.
- Its total Area now is 40 km^2.
- It's been established by KISR to carry out research activities concerning Animal and plant production, and biodiversity conservation.
- The station succeeded in conserving several native plants (ex. *Rhanterium epaposum, Cyperus conglomeratus, Gynandriris sisyrinchium, Helianthemum lippi, and Farsetia aegyptia*)

General view of ARS


Rhanterium epaposum at ARS


Desert Iris
(*Gynandriris sisyrinchium*)

Current and Suggested Natural Reserves



Plant Conservation In Kuwait

Ex-Situ Conservation

KISR established:

1. Seed Bank Unit for Native Plant of Kuwait.
2. KISR Herbarium for Native Plants of Kuwait

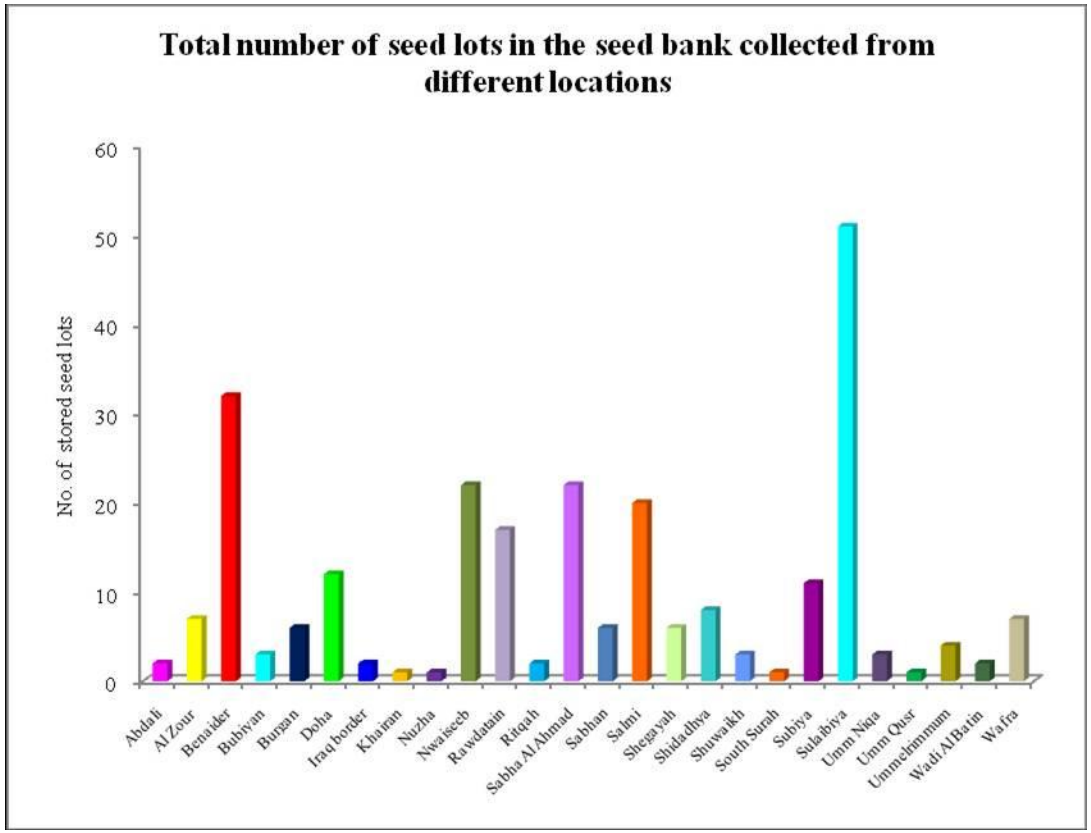
KISR Seed Bank Unit

The overall objectives of the KISR seed bank unit were to:

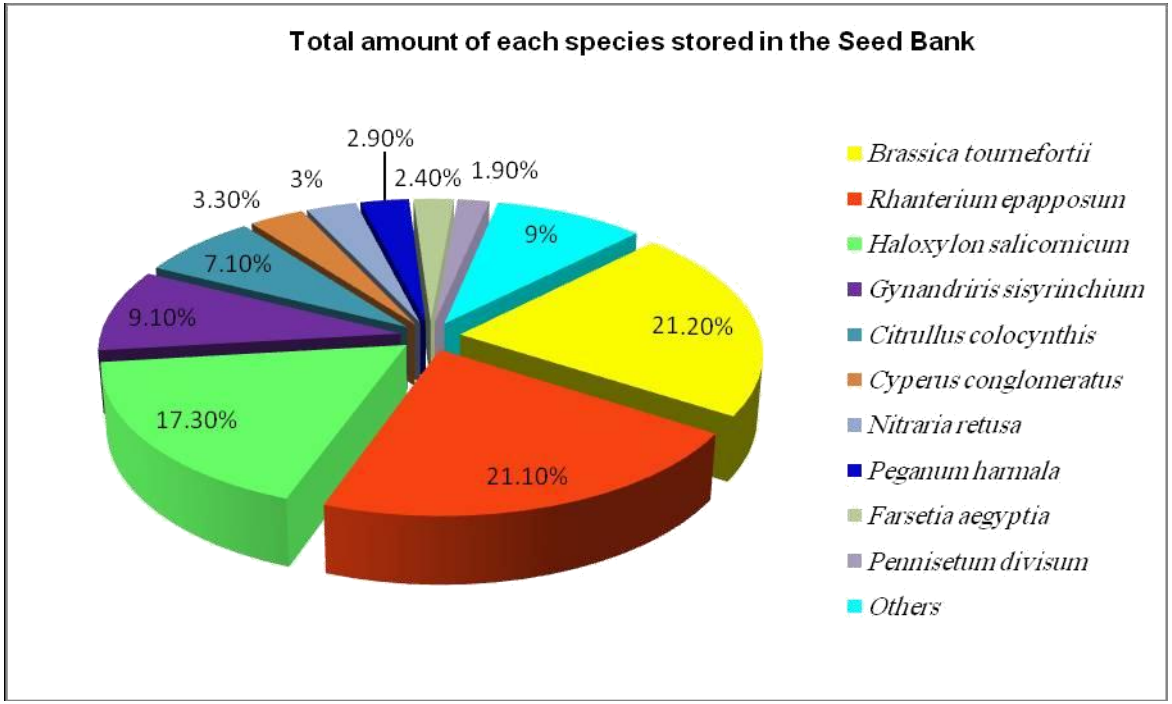
- Collect and conserve native seeds.
- Make the native seeds available for research.
- Reintroduce the native plants into degraded ecosystems and rehabilitation programs.
- Maintain and promote public interest in plant conservation.

KISR Seed Bank Unit

- Field trips were made to 26 different areas in Kuwait.
- The current collection includes 281 accessions of 71 different species.
- Of these 45 are perennials, 3 are biennial and 23 are annuals.
- The largest quantity of seed collected was over 30 kgs of *Rhanterium epapposum* and *Brassica tournefortii*.
- The second highest seed quantity collected was between 10 and 26 kgs from *Citrullus colocynthis*, *Gynandriris sisyrinchium* and *Haloxylon salicornicum* and between 1 – 6 kgs was collected from *Cyperus conglomeratus*, *Nitraria retusa*, *Peganum harmala*, *Farsetia aegyptia*, *Pennisetum divisum*, *Calligonum polygonoides*, *Zygophyllum qatarense*, *Helianthemum lippii*, *Echinops blancheanus* and *Cenchrus ciliaris*. Less than 1 kg seeds were collected from the 55 remaining species.



Total Number of species collected from different locations



Total amount of each specie stored in the Seed Bank Unit

Medium term storage walk in cold room

Inside view

Containers for medium and long term storage

- The information records of a native seed collection were a valuable resource, especially where they involve complete coverage of a local area or region.
- The data base includes Passport and Storage data.
- The passport data contains the information collected from the field included the date, location, GPS, species name, genus name, land type, vegetation type, associated species, condition of protection, population density, distribution, variability, and productivity.
- The seed storage data contains information about the seed lot, which include moisture percentage, total weight, seed number, seed density, germination percentage, and the location of the seed lot inside the Seed bank cold storage room.

Rumex vesicarius **fruit and seeds**

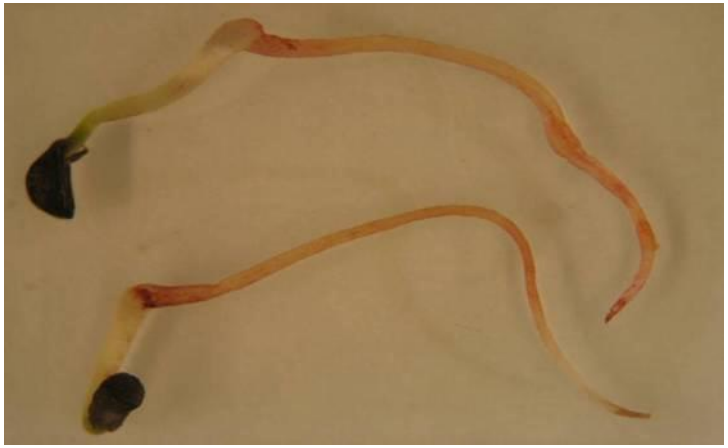
Peganum harmala **fruit and seeds**

Rhanterium epapposum **fruit and seeds**

Picris babylonica **seeds**

Germination percentage test

Seed viability test using Tetrazolium



Seed vigor test, normal and abnormal seedlings of *Peganum harmala*

KISR Herbarium for Native Plants of Kuwait

- The Kuwait Institute for Scientific Researches herbarium was established during the 1970's in Aridland Agriculture and Greenery Department.
- The sheets of dried plant specimens are stored in standard steel herbarium cabinets, the well preserved complete specimens with full labelled data.
- The specimens are sorted alphabetically by family and genus in herbarium cabinet.
- Herbarium contains multiple collections of the most common native plants.
- The collection contains approximately 2200 specimens belonging to 55 families.
- The oldest specimen goes back to 1961.

Cabinets used for storing Herbarium specimens

Arrangement of folders in the steel filing cases

A Herbarium specimen

KISR

Herbarium Information Card

Family ID	01	Family Name	Aizoaceae	Photo
Genus ID	01	Genus Name	Aizoon	
Species ID	01	Species Name	hispanicum	
Local Name				
Habitat				
Location	Khairan			
Life type	Annual	Growth Form	Forb	
Date of Collection	01-Apr-80			
Speciement No.	2			
Sample	B			
Composite ID	0101012B			
Collector				
Registration No.				

Note

Kuwait Fauna

- Kuwait possess a fairly rich diverse environment despite its small size and harsh climate with more than 350 species recorded from reptile fauna.
- However only 18 species breed locally whilst the rest are passage migrants or winter visitors. Kuwait is situated at the crossroads of several major bird migration routes and between two and three million birds pass each year.

- Twenty-eight mammalian species live in Kuwait. But four large mammals have been extirpated; the dorcas gazelle, the mountain gazelle the Arabian sand gazelle and the Asiatic cheetah .
- Large carnivores such as the wolf, caracal and jackal are now extremely rare. Among the endangered mammalian species are the fennec fox, the red fox, the honey badger, the Indian grey mongoose and the wild cat. Causes for wildlife extinction are habitat destruction and extensive and unregulated hunting.

KISR activities

- The data collected in KISR within activities indicates that in closed protected environments such as the the Agriculture Research Station (ARS), and Urban Demonstration Garden (UDG) provided havens for wildlife flora and fauna because of the protection from environmental disturbances and the availability of food and water.

- The undisturbed environment of both ARS and UDG had tremendous positive impact on the wildlife flora and fauna.
- The healthy food chain was recorded to be richly diversed and balanced. These were observed with the over-wintering of some raptors like the Short-toed eagle, Long-legged buzzard, Common kestrel and the Eagle owls and the high number of predators such as Red foxes; Desert monitors; and other predator reptiles like the Horned vipers, Sand boas, Rat snakes, and False cobra.

Conservation measures

- Article 7 of the Biodiversity Convention stresses that first requirement in any programme should be to characterise the status of the subject.
- The inventory of Kuwait's biodiversity is far from complete. The terrestrial fauna particularly birds, insects and the large mammals have not researched diligently.

Whurral

Indian Grey Mangoos

Dhub

General Recommendations

- Encourage and invest in research, innovations and technology development.
- Develop climate-smart agricultural strategies addressing both adaptation and mitigation options to minimize the impact of climate change on biodiversity.
- Considerable investment is required in filling data and knowledge gaps as well as in research and development to develop technologies and tools.
- Strengthen research on biodiversity conservation and development of drought and salt-tolerant varieties of crops and species.
- Institutional and financial support are needed.
- Strengthening and capacity building of national manpower and providing them with the necessary technical skills.
- Create awareness and involve youth in project management, communication and leadership.
- Develop early warning systems/ strategies to predict effect of climate change on biodiversity.

General Recommendations cont'd

- A national biodiversity database should be established .
- Establish training programs for animal monitoring.
- Public awareness of wildlife in Kuwait , and how to protect and conserve it should be the focus of importance.

Final Remark

As such extensive plans encompass restoration, protection, sustainable and equitable use and systematic revegetation and monitoring, and covers so many interests and issues; NO single agency or management tool can be expected to met the objectives set forth.

The effective implementation of this plan will depend upon a high level of political support, the integration and harmonization of sectoral policies and legislation, as well as effective co-ordination between governmental agencies; nongovernmental organizations, and the private sector.

THANK YOU