

Conservation of *Medemia argun* and Nubian Desert Oases Biodiversity in Egypt



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Final report

**Conservation of *Medemia argun* and Nubian
Desert Oases Biodiversity in Egypt**

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ABSTRACT

Medemia argun is a mysterious and little known palm. It has a cultural significant in Ancient Egypt. Fruits were discovered in Pharaonic tombs before the palm was discovered in a living state in the Nubian Desert of Sudan in 1837. It was presumed globally extinct until one female and a small number of juveniles were discovered in Dungul Oasis in 1963. Bedouins have used the leaves for making mats and shackles for camels since. *Medemia* is critically endangered (CR) by IUCN Red list. The Nubian Desert Oases represent the last remains of the vegetation, which covered desert during the wet periods. These habitats are endangered due to habitat degradation, human activities and climate change.

This work aimed at providing baseline information about the biodiversity of the Nubian Desert Oasis and studying the conservation status of *Medemia* in Egypt. The project aimed also at involving stakeholders and raising the public awareness for the local community and decision makers about the value of biodiversity and the need of conservation. Field survey was conducted to explore the presence of *Medemia* in sites which compiled from literature and Bedouins knowledge. The main population in Egypt, Dungul Oases, had been monitored to determine the survival and mortality. Faunal and floral surveys had been conducted in the main oases. Workshops, training courses, wildlife photography exhibitions and visits to protected areas had been organized for NGOs, school teachers, students and public in Aswan to raise the awareness and involve the community in conservation.

The study discovered three new sites of *Medemia* in Egypt. The population size in Egypt has been declined to 31 individuals. The main threats to survival of the oases are human interfere by hunting and mining, and climate change.

Medemia habitats need urgent protection. Dungul, Kurkur and Nakhila Oases are underway to be protected by the Egyptian Environmental Affairs Agency. Not only would the loss of *Medemia* in Egypt be a cultural tragedy, it would also be indicative of potentially catastrophic habitat loss at the ecosystem level in the oases of Nubian Desert in Egypt.

INTRODUCTION

Egypt is located at the north-eastern corner of Africa and at the western extension of Asia (the Sinai Peninsula). It is also part of the Mediterranean Basin (ca. 1200 km of coastal front), and embraces two biogeographical corridors which link the tropics in the south with the Palearctics in the north: the Red Sea connects the tropical seas of the Indian Ocean with the temperate Mediterranean, and the River Nile links equatorial Africa with the Mediterranean Basin. The Red Sea and the Nile Basin are two principal highways along the migratory routes of the Palearctic-tropics journey of birds, and the Mediterranean wetlands of Egypt are vital resting stations. This geographical position of Egypt has had an indelible impression on the ethnology of inhabitants and on the geographical affinities of its biota. The history of the climate in the Quaternary which included alternating periods of rain and drought (pluvials and interpluvials) affect the diversity. Egypt is part of the Sahara of North Africa. It has an area of about one million square kilometres. Most of it is arid and hyperarid lands with cold winter and hot summer. In 1983, Law 102 was enacted and it set up the legal framework for the declaration and management of protected areas. Then the National Strategy for the Conservation of Natural Heritage was done in 1997. 17% of the total area of the country is designated as protected areas in a plan of 1997-2017. The implementation of this strategy has not been optimum done for various political and socio-economic reasons.



Medemia argun is a rare palm with a mysterious history. Fruits of *Medemia* were first discovered as sub-fossil material in Pharaonic tombs, including Tutankhamun's tomb. *Medemia* fruits history is going back to the 5th Dynasty. A record of matting fragments

in a predynastic tomb in Upper Egypt has been reported. *Medemia* may have held spiritual or ritualistic significance. The hieroglyphic name of *Medemia* is *Mama-n-Khanen* (or *Mama-n-Xanin*). *Medemia* is a genus of fan palm in sub-tribe Hyphaeninae of tribe Borasseae (Sub-family Coryphoideae). It is up to 12 m length, has un branched stem, supple leaves with bright yellow, lightly armed petioles and ovoid, purple fruit about 4 cm long and 3 cm broad with ruminant endosperm.

In the early 1800s, Giuseppe Passalacqua, an excavator of ancient tombs for antiquities, discovered unknown species to science; it was named as *Areca passalacquae*. In 1837, the German Prince Friedrich Paul Wilhelm von Württemberg discovered *Medemia argun* in the Nubian Desert at the north of Sudan. Since the discovery, few records of *Medemia* were reported by explorers active in northern Sudan. In 1963 *Medemia* was discovered in Dungul Oasis, south of Egypt, the population of *Medemia* was of one female tree and seven juveniles. Then it was recorded in three sites in the Eastern Desert and in one site in the Western Desert; one palm in each site. After the discoveries in Egypt, *Medemia* lapsed into obscurity for more than three decades. Suspicions were raised that it might even have become extinct. In October 1995, *Medemia* was rediscovered in northern Sudan. And shortly after (at 1998) it was rediscovery in Egypt at Dungul Oasis.



Medemia argun palm



Medemia argun fruits

The leaves of *Medemia* have been used for making mats; leaves are elastic, soft and strong. Camel's men made shackles for their camels from its leaves, they considered it better than doom and dates palm leaves. Bedouin used *Medemia* for making excellent ropes. The wood of the palm used for construction of Bedouin houses. In the rare ecosystem in the Nubian Desert, *Medemia* supports the wild life by provide a

shelter and food for the mammals (including rodents) and to those living in the desert where fruit is scarce. By the end of the 19th century, the Nubian Desert at the north of Sudan had dried up thus made the British colonial officials in Sudan warned that the groves found by Speke and Grant were in danger of the extermination by the local people who wove matting from the leaves. Steps have been taken by the Sudan Government to protect these groves. For most of the 20th century, very few records of *Medemia* were made. The genus was presumed globally extinct until the discovery in Dungul Oasis in Egypt in 1963. Although *Medemia* has survived, population size appears to be limited in Sudan and highly restricted in Egypt. *Medemia* is critically endangered (CR) by the IUCN Red List.

The Nubian Desert Oases represent the last remains of the vegetation which was covered the Great Sahara during the wet period. Many species listed in the red list of the IUCN had been recorded in the Nubian Desert such as *Medemia argun* CR, Nubian ibex (*Capra nubiana*) EN, Egyptian Vulture (*Neophron percnopterus*) EN and Dorcas gazelle (*Gazella dorcas*) VU. Many tools and prehistorical draws and inscriptions had been discovered in the area, which indicate the importance of the Nubian Desert in understanding the Egyptian history in the pre-dynastic era.

Few efforts had been made to explore the *Medemia* in other remote potential sites in Egyptian Nubia. The three sites in the Eastern Desert never confirmed. In the rare ecosystem in the Nubian Desert, *Medemia* supports the wild life by provide a shelter and food for the mammals (including rodents) and to those living in the desert where fruit is scarce. This part of the Egyptian Desert hyper arid land is rich in biodiversity.

The present state of vegetation is influenced by human activity. The ecosystems here are rare, to some extent even unique, vulnerable and critically endangered that make protection is necessary. The national strategy for biodiversity of Egypt (1997) proposed the area to be protected by the Egyptian law. Few efforts had been done towards conservation. The last decades bring more challenge for the survival of *Medemia* palm and the vulnerable wildlife in the Nubian Desert due to the dryness which struck the area. In addition to that, in the last decade of the 20th century, new development projects had been established in southern Egypt. The agriculture project at Tushka is a mega agriculture reclaiming project which located less than

100 km south west of Dungul Oasis. The project has future extension plans which are not clear until now. Acceleration of the protection status of the Nubian Oases becomes an urgent before we lose those important sites.

In 2000, the Unit of Environmental Studies and Development at the South Valley University initiated a program to conserve *Medemia argun*. Field trips had been conducted to Dungul Oasis to collect seed, an *Ex_situ* conservation experiment had been made in the experimental farm of the Unit at Aswan. The work has grown to involve collaboration with the Egyptian Environmental Affairs Agency (EEAA) and the Royal Botanic Gardens, Kew in order to take quick actions to conserve the Egyptian natural and cultural heritage in this area.



Medemia argun population in Dungul Oasis, Western Desert, Egypt

PROJECT PERSONALS

Team members

Haitham Ibrahim	Researcher in Nature Conservation Sector, EEAA, team leader
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Project base

The base of the project is the Protected Areas Office at Aswan, Nature conservation Sector, Egyptian Environmental Affairs Agency (EEAA).

AIMS & OBJECTIVES

Main aim

To generate and produce baseline information on diversity and assemblages of the Nubian Desert Oases (NDO) ecosystems in Egypt especially sites which support populations of the endangered palm species *Medemia argun* in order to put conservation strategy for the area as a protected area by the Egyptian law.

Objectives

- Study the ecosystem components of the Nubian Desert Oasis (especially Kurkur, Dungul and Nakhila Oases).
- *Explore the potential sites in the Nubian Desert*
- *Medemia argun* to be a prominent element; study conservation assessment and population ecology in Egypt.
- Study the importance of these habitats for conservation and defined the threats.
- Build the team capacity in conservation skills.
- Raising the public awareness about biodiversity and conservation importance in a local scale by involving stakeholders and establishing networks of schools teachers and students, in order to enlarge local participation in conserving the biodiversity as a natural and cultural heritage of the area.
- Work on preparing the materials for declaring the area as a protected area by the Egyptian Law.
- Build cross border links into Sudan would be beneficial with respect to Sudanese *Medemia* populations as well as broader diversity issues to develop future collaboration.

STUDY AREA

The Nubian Desert Oases

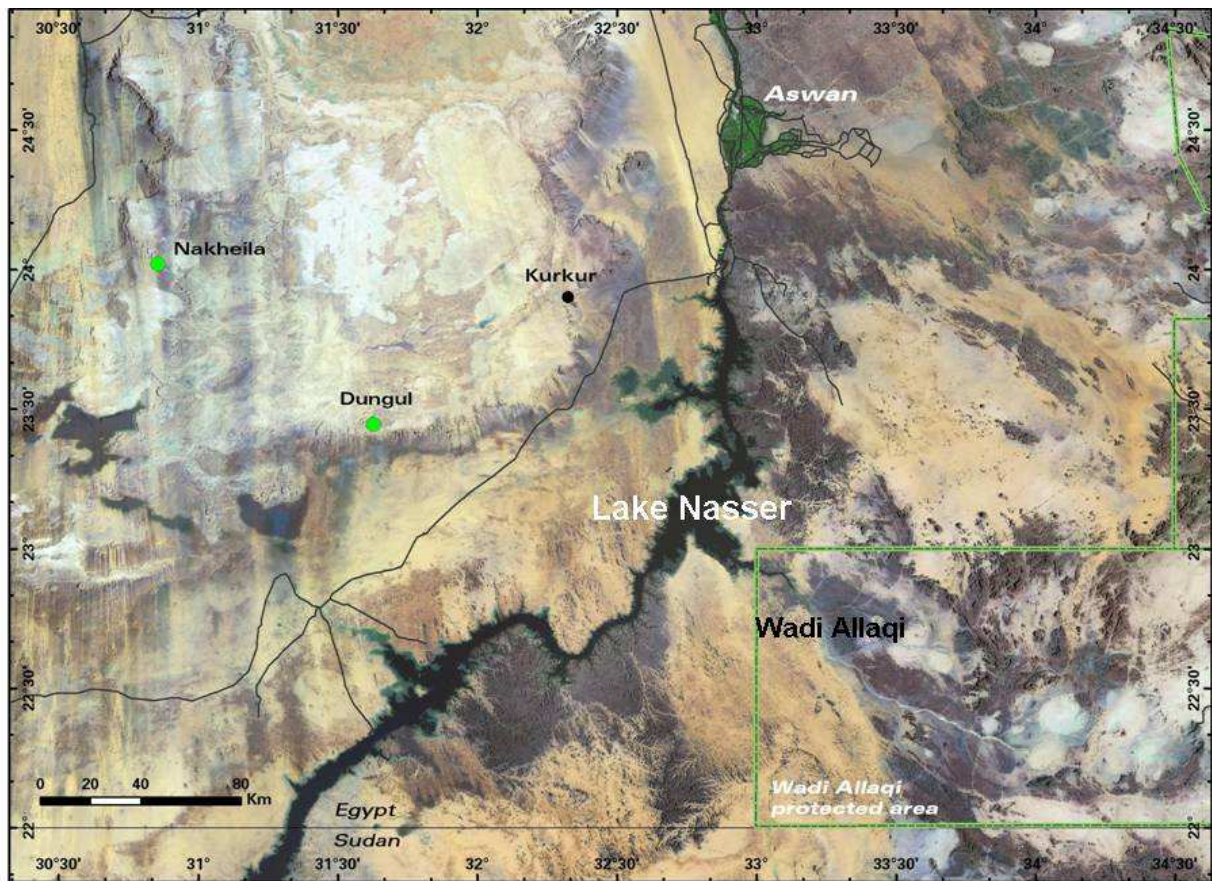
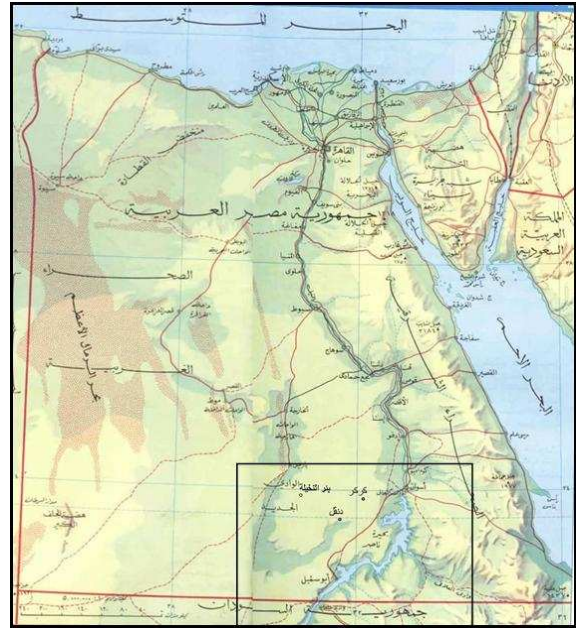
Nubian Desert extends in southern Egypt and northern Sudan in the eastern region of the Great Sahara Desert. In Egypt, to the east of the Nile, the Nubian Desert characterized by the large drainage system called 'Wadis'. While in the west of the Nile, the desert is sandstone and limestone plateaus with scattered oases. These oases resemble like islands of life in the middle of the desert. The Nubian Desert, west of the Nile, was primarily modelled by running water in the late Tertiary and early Pleistocene times. Subsequently, it was remodelled by wind. These oases were inhabited until the wet period is ended at 7600 – 7400 BC. Many tools and implements from the prehistory time were discovered there. The oases preserved vital parts of the history that may contribute to understanding of the origins of the Egyptian civilization. They represent the last remains of the vegetation which was covered the Great Sahara during the wet period.

The region lies within the hyper-arid core of the eastern Sahara. The area currently receives less than 1 cm of rainfall per decade. Temperatures exceed 40°C in the summer. The rainfall is rare and not an annually recurring phenomenon, but it is accidental event that may happen once each decade. It is consider as one of the



harshest environments on the planet. Kurkur Oasis, Dungul Oasis and Nakhila Oasis are important oases on the essential trading routes, in the Nubian Desert. Due to the difficulty of travelling through the Nile Cataracts, desert routes were a good solution. In the west of the Nile, Darb Al-Arbain and Darb Al-Galaba were the most famous routes that corridor between north and south of the western Nubian Desert. These roads travel more than 1,500 km. Darb Al Galaba, which begins at 'Dongola', passes Dungul and Kurkur Oases and ends at Aswan on the Nile.

The study area;
Nubian Desert at the south of Egypt.



The Nubian Oases at the Western Desert and Wadi Allaqi in Eastern Desert; the known habitats of *Medemia argun* in Egypt

Dungul Oasis located about 160 km SW of Aswan, at the edge of the Sinn El-Kaddab Plateau, in elevated region of Nubian sandstone capped with Eocene limestone. Dungul Oasis is a very limited vegetated area located in Wadi Dungul which runs E-W direction. The main source of water in the oasis is ground water, seepage. It receives its water as a result of the blockage of drainage lines of an artesian aquifer.

Nakhila Oasis is very small oasis, which is located 200 km west of Aswan inside Sinn El Kaddab Plateau and about 100 km North-West of Dungul Oasis. Similar to Dungul Oasis, climate is rainless and extremely arid. It is an important historical site located on the old caravan road which connected the upper and lower Nubia. Archeological rock inscriptions and remains which go back to predynastic time have been discovered in the area. The oasis holds the first evidence of living *Medemia* palm recorded by Ernst Sickenberger in 1901. The record considered uncertain until 1964 when *Medemia argun* had been recorded.

Kurkur Oasis is a small uninhabited oasis located about 60 Km southwest of Aswan and about 55 Km west the Nil. The oasis occupies what seems to be the confluence of three wadis joined in the formation of the letter Y. These are the upstream parts of Wadi Kurkur which meet the Nile at Dabud. The northwest part of Wadi Kurkur is divided to a downstream section with a deeply cut across the limestone plateau with a clearly defined channel bounded by cliff sides, and an upstream section with an ill-defined shallow course on the surface of the plateau. The wadi runs along what seems to be a seepage line which feeds the plant growth that obviously would not be found otherwise in this rainless area. There are two surface wells where the vegetation cover is dense.

Wadi Allaqi is the largest wadi and one the most extensive drainage system in the Egyptian Eastern Desert. It runs SE-NW for about 250 km. It meets Lake Nasser at 180 km south of Aswan. It was declared as a protected area in 1989 and was designated as a Biosphere Reserve within the UNESCO, Man and Biosphere programme (MAB), in 1993. Wadi Allaqi is characterized as a “hyper-arid environment”. Annual rainfall in this area rarely exceeds 5 mm and is highly variable and many years may pass without any rain. The upstream tributaries receive

occasional rainfall, the drainage accumulate in the main wadi channel and discharge in the Lake Nasser to the West. The annual mean of temperature is 25.1°C, with mean minimum of 8.1°C (-2° C) in January and high o f 48°C in August. The highest relative humidity is in December (37%) and the lowest is in May and June (13%). Wadi Quleib is one of Wadi Allaqi tributaries in the downstream part. It runs NE-SW. When the water level rose in Lake Nasser, water inters the mouth of the wadi.

FIELD WORK & RESEARCH

BACKGROUND

Medemia argun had been recorded in Egypt at Dungul Oasis, Nakhila Oasis in the Western Desert, and in three sites at Wadi Allaqi in the Eastern Desert. Since the discovery, at 1963, few field studies had been conducted in these areas. It was until 1998 when the population in Dungul had been revisited while no records from Nakhila or the eastern Desert sites until this study. In Dungul Oasis number of *Medemia* was grown from 8 to 36 trees in 1998; one fruiting female and three males were recorded. In 2007, prior to this study the population number were 25 with two fruiting females and four males. The population size had show a dramatic decrease in the last decade.

When the team start to think about involving in a project towards conservation of the *Medemia argun* and its habitats, the Nature Conservation Sector NCS, the regional office at Aswan supported the idea. Meeting and workshops had been conducted in the NCS-Aswan to initiate a project. The CLP help the team to clarify the aims and construct the proposal. Then the CLP generously funded the project. The NCS-Aswan had facilitated the work by providing a base to work in the NCS-Aswan office and a store for the tools and the equipments.

PLANNING & PREPARING

- Collection of literature about *Medemia argun* and the Nubian Desert Oases.
- Workshop to introduce the project proposal to the Nature Conservation Sector office at Aswan.
- Establish a project base at the Nature Conservation Sector, Aswan office
- Meeting and office visits with stakeholders in Aswan (EEAA, Government department, NGOs, community leaders...) to introduce the project.
- The team work on preparing tools and equipments which will use in the field work and community work.
- Building capacity of the team and postgraduate students who work in the conservation field, these include trainings and education field trips:
 1. Writing proposals
 2. Projects planning and project management.
 3. Protected areas management and conservation strategies.
 4. Environmental education
 5. Training on bird census techniques, 1-12 Dec. 2008
 7. Flora survey techniques



- Mentoring programme
Introductory course to Insects, (Main groups, sampling and preservation techniques). 18 Dec. 2008 – 6 Jan. 2009

The CLP fund a mentoring program for building the team capacity in the Insect identification and conservation field. The program took place at Aswan Protected area office. 8 people had been involved in the program. Field work took place at the First Catatact island Protected Area at Aswan.



AIMS

- Study the distribution of *Medemia argun* in Egypt
- Study the population status and demography of the *Medemia* populations
- Conservation Assessment of *Medemia argun* in Egypt
- Discover the wildlife which inhabit the area
- Study the importance of these habitats for conservation and defined the threats.

METHODOLOGY

Study the distribution of *Medemia argun* in Egypt

Collection of *Medemia* distribution records from literature, herbarium and archaeological specimens and local Bedouins records in south of Egypt. Field survey of *Medemia* possible locations by using the list produced by the last step. Produce a distribution map of *Medemia* in Egypt had been done.

Population status and demography of the *Medemia* populations

The largest Egyptian population of *Medemia* at Dungul Oasis was monitored at intervals over a period of almost eight years, building on baseline data gathered since 1963 (Boulos, 1968; Zahran, 1968; Bornkamm *et. al.*, 2000; Ibrahim 2010) Numbers of *Medemia* individuals and sex were counted, survival and recruitment within the population were recorded.

Conservation assessment of *Medemia argun*

A regional conservation assessment of *Medemia* following IUCN Red List guidelines was completed. The georeferenced localities compiled from the literature and herbarium specimens were used, as well as those obtained directly from recent fieldwork, to calculate extent of occurrence (EOO) and area of occupancy (AOO). Species distribution maps were plotted using ArcView 3.2 GIS (ESRI 1999) to obtain measurements suitable for applying to the Red List Criteria.

Vegetation survey

A vegetation survey had been done in the Nubian Oases (Kurkur, Dungul and Nakhila) in Sinn El Kadab Plateau and in Wadi Allaqi. Satellite imageries have been used to discover the location of the remote and scattered vegetation spots. Field survey to map and describe the scattered vegetation patches. Detailed vegetation survey have been done for Kurkur Oasis using transect methods. Plant materials have been collecting for identification and produced Herbarium specimens.

Wildlife survey

Preliminary wildlife survey had been conducted by collecting field observations about Mammals, reptiles and birds. Insect sampling; Pitfall and Flight caught traps techniques were used.

Determine threats for conservation

Observations on changing the environment have been collecting. Monitor the marks of human activities and thier impacts in order to define the threats to the biodiversity in the area.

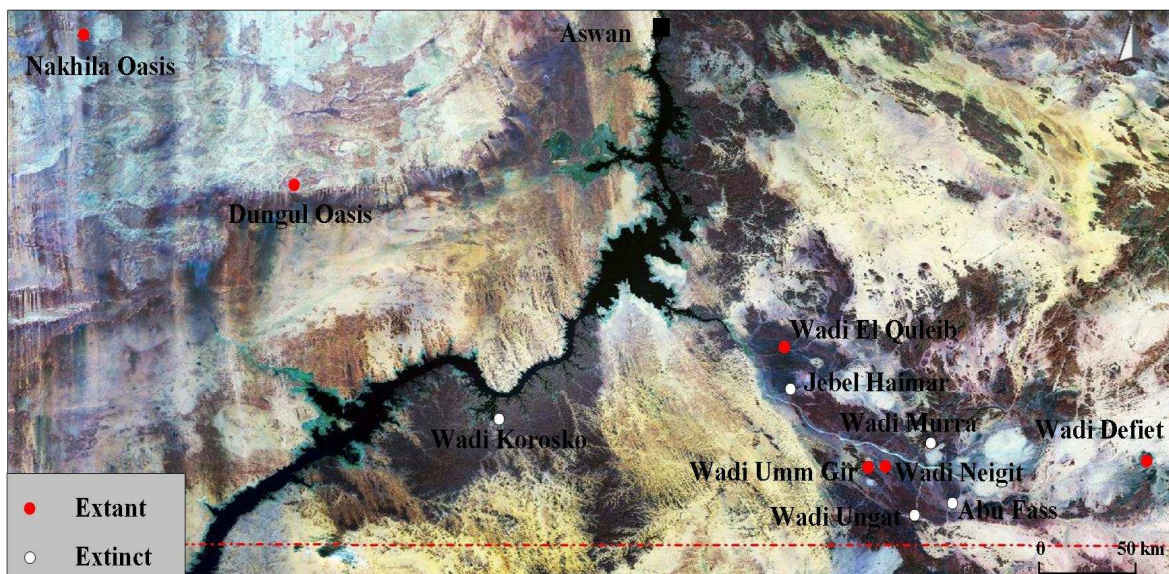
RESULTS

Distribution of *Medemia* in Egypt

Through the literature and herbarium specimen review and the knowledge survey of the Bedouin communities in the south of Egypt, a list of 11 potential localities of *Medemia* distributed in southern Egypt was produced. *Medemia* has been extinct in five reported Egyptian localities, but confirmed its presence in six other sites, three of which are new records (Wadi Quleib, Wadi Umm Gir and Wadi Neigit).

Medemia argun distribution in Egypt

Locality	Lat.	Long.	Date range	Classification
Nakhila Oasis	24.0195	30.8552	1893 - 2009	Extant
Dungul Oasis	23.4411	31.6214	1963 - 2009	Extant
Wadi El Quleib	22.7966	33.3265	2007 - 2010	Extant
Wadi Umm Gir	22.3253	33.6173	2008 - 2010	Extant
Wadi Neigit	22.3270	33.6545	2008	Extant
Wadi Defiet	22.3375	34.5697	1963	Extant
Wadi Murra	22.3999	33.8167	1908 - 1963	Extinct
Wadi Korosko	22.5009	32.3273	1963	Extinct
Abu Fass	22.1667	33.8998	1908	Extinct
Wadi Ungat	22.1435	33.7755	1908	Extinct
Jebel Haimar	22.6333	33.3333	1908	Extinct



Medemia argun distribution in Egypt

Population status and demography

The six sites of where *Medemia* exist in Egypt occupy a vast area, The distance to the nearest neighbour site for the populations ranges from ca. 5 km for clustered sites (Wadi Neigit, Wadi Umm Gir) to ca. 100 km for remote sites (e.g. Nakhila Oasis). Population size varies widely; Wadi Neigit, Wadi Quleib, Wadi Umm Gir and Wadi Defiet contain only one individual each (male in the Wadi Neigit and juveniles in the other localities). In Nakhila Oasis, only two individuals recorded (both males). At Dungul Oasis, 25 individuals were recorded at the most recent census (February 2009), including three females and three males.

Within the palm height measurements in Dungul Oasis; three size classes were discern. 19 individuals in size class one (<0.6 m) were recorded, 11 individuals in size class two (1.2-2.6 m) and four individuals in size class three (>5.0 m). Palms in the size class one are stemless, whereas the remainder display aerial stems. During the observation period, all mortality (nine individuals) occurred within size class one, while the surviving members of size class one showed almost no increase in height.

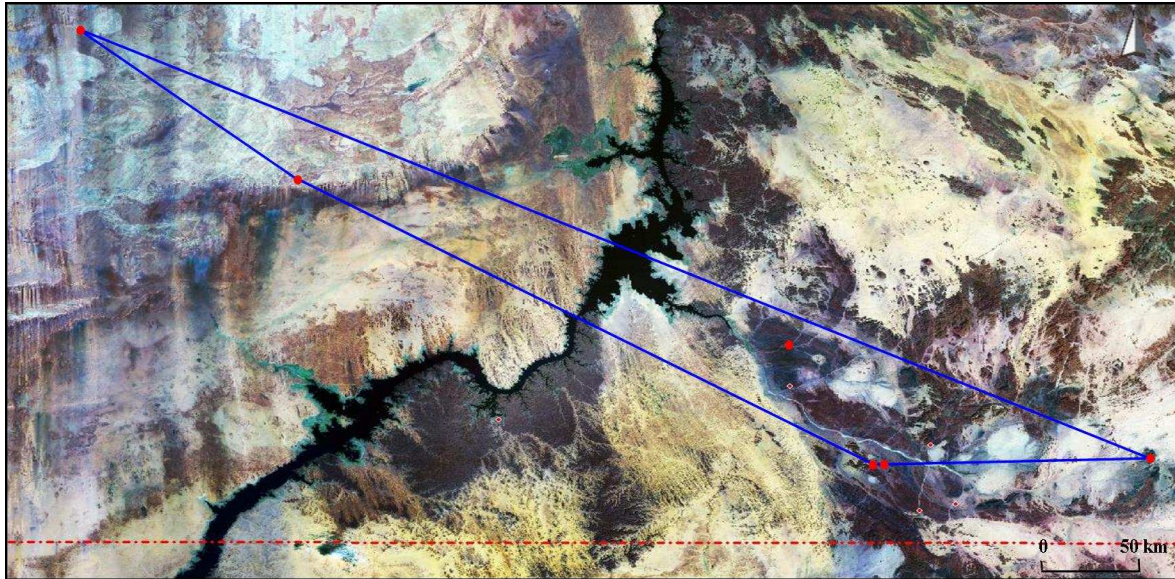
In Nakhila Oasis, the heights of the recorded two male palms were 10.5 and 9.5 m. The male individual *Medemia* recorded in the Eastern Desert was the shortest (3.2 m recorded in Wadi Neigit), while the recorded juveniles were almost slightly higher (2.5 m in Wadi Umm Gir and 2 m in Wadi Quleib).

Heights of *Medemia argun* individuals in Dungul Oasis (m)

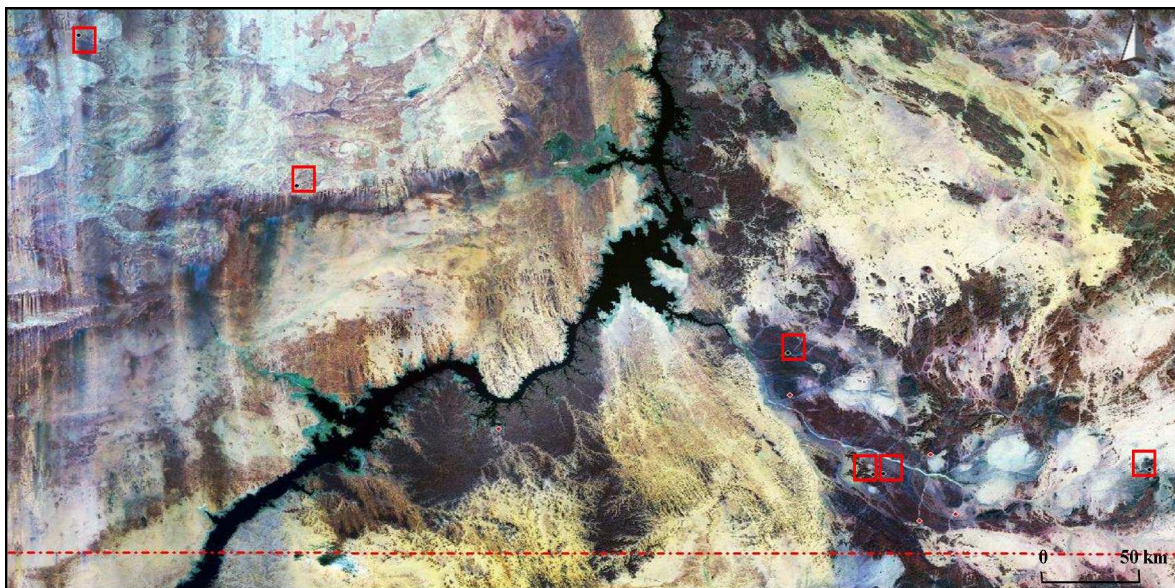
	2001	2002	2005	2007	2009
Female	1.9	2	2.6	3.1	3.5
	2.6	2.8	3.3	3.7	4
	7.8	8.1	8.6	9.2	9.8
Male	2	2.3	2.8	3.3	4.1
	5	5.2	5.8	6.2	6.5
	5.5	5.7	6.3	6.6	7
	7	7.3	7.8	8.4	9
Juvenile	0.2	0.2	0.2	0.2	0.2
	0.2	0.2	0.2	0.2	0.2
	0.2	0.2	0.2	0.2	died
	0.2	0.2	0.2	0.2	died
	0.2	0.2	0.2	0.2	died
	0.2	0.2	0.2	0.2	0.2
	0.3	0.3	0.3	0.3	died
	0.3	0.3	0.3	0.3	died
	0.3	0.3	0.3	0.3	died
	0.4	0.4	0.4	0.4	0.4
	0.5	0.5	0.5	0.5	0.5
	2.0	2.2	2.7	3.0	3.2
	0.5	0.5	0.5	0.5	died
	0.5	0.5	0.5	0.5	0.5
	0.5	0.5	0.5	0.5	0.5
	0.5	0.5	0.5	0.5	0.5
	0.6	0.6	0.6	0.6	0.6
	0.6	0.6	0.7	0.75	0.75
	1.2	1.2	1.2	1.2	1.2
	1.35	1.35	1.4	1.4	1.5
	1.4	1.4	1.4	1.5	1.5
	1.5	1.5	1.6	1.7	1.75
	1.55	1.55	1.65	1.8	2
	1.6	1.6	1.8	1.9	2
	1.7	1.7	1.9	1.95	2.1
	0.4	0.4	died	died	died
	0.4	0.4	died	died	died
Numbers of trees	34	34	32	32	25

Conservation assessment

Based on the field data of number of *Medemia* in each population, a grid cell size of 0.01 km² was determined, this was appropriate for the calculation of Area of occupancy (AOO). The GIS-based calculations of Extent of occurrence (EOO) and Area of occupancy (AOO) are 11223 km² and 0.06 km².



Extent of occurrence (EOO) in Egypt



Area of occupancy (AOO) in Egypt

Vegetation survey

1. Kurkur oases and surrounding

Inside the oasis; the vegetation is dense due to exist of near ground water. There are two wells of water located in the oasis. Vegetation around the two wells is characteristic by the growing of *Phragmites australis*, *Imperata cylindrica*, *Desmostachya bipinnata* and *Alhagi graecorum*. Some trees of *Tamarix nilotica* and *phoenix dactylifera* are growing around the southern well, while *phoenix dactylifera* and *Hyphaene thebaica* grow around the northern well.

Desmostachya bipinnata is the dominant species which grow along the wadis inside the oasis. Large size trees of *Acacia raddiana* are growing along the northern and the north western wadis. The size of the *acacia* trees is up to 10 m high, which indicate that they are quite old. *Acacia ehrenbergiana* grow a long the wadis, which also characteristic with a large size. *Acacia raddiana* is concentrated inside the oasis while *A. ehrenbergiana* is spread around the oasis for about 10 km east and west, up the plateau. The Total number of species of recorded in Kurkur Oasis is 12 species. The upstream of north west wadi is extensive areas of plant growth. *Desmostachya bipinnata* grows on sandy hills, with dots of *Acacia raddiana* and *A. ehrenbergiana*.

2. Dungul Oasis

Dungul Oasis complex is consists of three different vegetation areas. Dineigil Oasis is a hanging oasis located at the very edge of the plateau. It extends for about 1.5 km in a narrow strip only 200 m wide along a limestone ledge. The vegetation is dominated by the low, spiny legume shrub *Alhagi graecorum* which grows in remarkable parallel lines following a fault plan and *Juncus rigidus* which grow near the old water spring which is dry now. Two *Acacia ehrenbergiana* and one *Acacia raddiana* are growing there with some dots of *Hyphaene thebaica* and *Phoenix dactylifera*. Little Dungul is a small area of vegetation about 300 × 100 m² located about 3.5 km north of Dineigil Oasis, across a spectacular landscape of sandy plains and blasted limestone canyons. It is occupied by a tamarisk hillock, *Imperata cylindrica* and a lonely Date palm. Wadi Dungul is run to the north of Little Dungul. Its direction is east – west. The wadi is rich in about 5 km; *Tamarix nilotica* and *T aphylla* grow in the edge of the

vegetation east and west. *Phoenix dactylifera* and *Hyphaene thebaica* grow together with a community of *Imperata cylindrica*. *Medemia argun* grow in the west end of the vegetative part of the wadi. *Acacia ehrenbergiana* is spread along the wadi on the plateau for about 15 km east of the oasis (more than 500 trees were recorded).

3. Nakhila Oasis

Nakhila Oasis is a small size vegetative area (about 100 x 100 m²). It is located on the top of the plateau. Three species have been recorded; *Medemia argun* (2 male palms), *Phoenix dactylifera* (5 grooves) and *Imperata cylindrica*. The oasis holds two *Medemia* palms which indicate that no recruitment could be happened naturally in the future.

4. Wadi Allaqi

The Eastern Desert Wadis is characterized by xerophytic vegetation. More than 130 plant species were recorded along wadi Allaqi *Acacia ehrenbergiana*, *Acacia raddiana*, *Aerva javanica* and *Cassia senna* were recorded grow in association with *Medemia argun*. Vegetation in this area is depending on rains, the area suffer a long period of dry which affect the vegetation cover.

Wildlife survey

Few species had been recorded in the preliminary investigation in the study. The study proved that in the autumn period the oases represent a vital area for a large numbers of birds and mammals. Foot prints and dung showing how important these small vegetated sites are to the desert animals, even the records are few.

1. Mammals

In the surveys; four species had been recorded, while more species had been recorded in previous.

List of mammals had been recorded in this study:

Lesser Egyptian Gerbil,

Gerbillus gerbillus

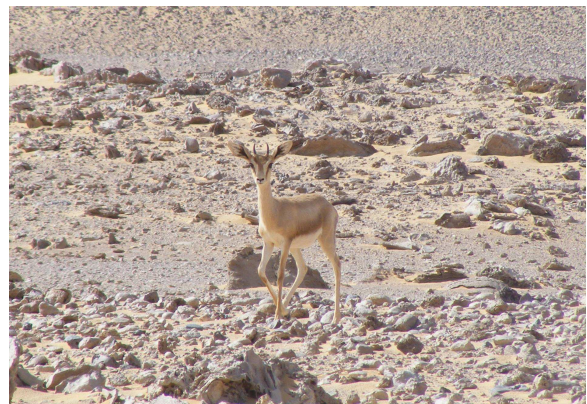
Egyptian Spiny Mouse,

Acomys cahirinus

Ruppell's Sand Fox,

Vulpes rueppeli

Dorcas Gazelle, *Gazella dorcas*



2. Reptiles

Changeable Agama, *Trapelus mutabilis*

Saharan Sand Snake, *Psammophis aegyptius*

Nidua Lizard, *Acanthodactylus scutellatus*



Spiny Agama



Saharan Sand Snake

3. Birds

21 bird species had been recorded at the Nubian Oases:

Little Egret, *Egretta garzetta*

White Stork, *Ciconia ciconia*

Egyptian Vulture, *Neophron percnopterus* (**Endangered Species**)

Crowned Sandgrouse, *Pterocles coronatus*

Collared Doves, *Streptopelia decaocto*

Hoopoe, *Upupa epops*

White-crowned Wheatear, *Oenanthe leucopyga*

Mourning Wheatear, *Oenanthe lugens*

Desert Wheatear, *Oenanthe deserti*

Red Start, *Phoenicurus phoenicurus*,

Rock Martin, *Ptyonoprogne fuligula*

White Wagtail, *Motacilla alba*

Yellow Wagtail, *Motacilla flava*

Chiffchaff, *Phylloscopus collybita*

Lesser white-throat *Sylvia curruca*

Spanish Sparrow, *Passer hispaniolensis*

House Sparrow, *Passer domesticus*

Brown-necked Raven, *Corvus ruficollis*

Species of Falcons, Ducks and Fly Catchers,

4. Insects

14 insect's species of 7 Orders were collected and detected during the trip.

Order: Odonate: 3 sp. of Dragonflies

Blue Dragonfly, *Orthetrum chrysostigma*

Order: Orthoptera: 2 sp. (locusts and grasshoppers)

Egyptian Grasshopper, *Anacridium aegyptiacum*

Order: Mantodea,

Praying Mantis, *Blepharopsis mendica*

Order: Lepidoptera: 1 sp. of Butterflies: Painted Lady, *Vanessa cardui*

Order: Coleoptera: 2 sp. of beetles

Order: Hymenoptera: 3 sp. of Ants

Order: Diptera: 2 sp. of true flies

Threats for conservation

The surveys revealed a dramatic deterioration of these habitats combined with a new widespread destruction and pollution at landscape level. Responsible factors as recognised in the field are primarily:

- 1) Indiscriminate and unsustainable hunting
- 2) The vast mining activities with careless and improper handling of waste.
- 3) Over use of leaves by local Bedouins
- 4) Climate change

The unmanaged and unsustainable way of planning in Egypt especially with new mega development projects without a proper environmental impact assessment. Thousands of km² have been given to mining and industrial activities without doing a proper survey for archaeological or biological features beforehand. That is a disaster especially if you add the late response of environmental agency to catastrophs which happened there. Climate change is great challenge which affecting the area; almost 2 decades of dray have been passed which affecting the vegetation of the area and the recruitment of the *Medemia* and other plants which grow there.

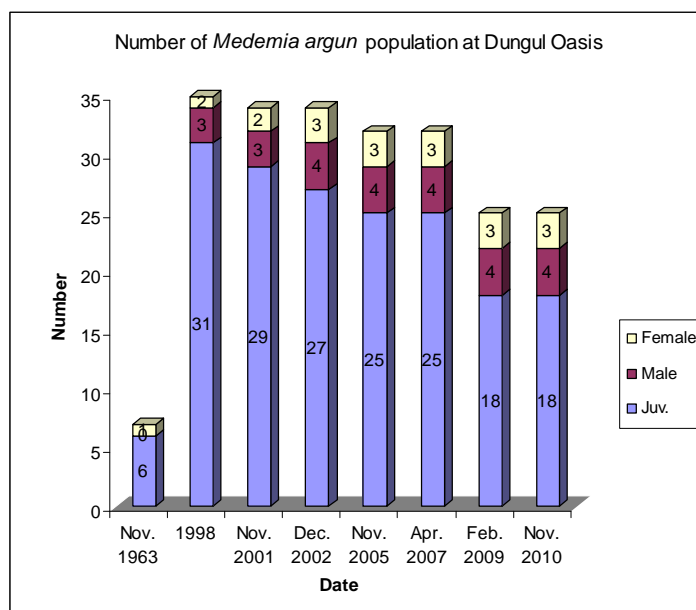


DISCUSSIONS & CONCLUSIONS

The results indicate that *Medemia argun* was distributed in eleven localities in Egypt. Six of these locations still have *Medemia* while it is extinct in 5 locations. Only one productive site with two reproductive females in good health is located in Egypt (Dungul Oasis). Other locations have males or juveniles trees, and they are one or two palms maximum in each site. The population at Dungul Oasis is currently healthy and has shown a dramatic increase in size, while it showed a high loss of individuals over the past decade.

Medemia population is highly fragmented in Egypt. The distance to the nearest neighbour site for the confirmed populations ranges from ca. 5 - 150 km for remote sites. Localities in the Eastern Desert have similarity in habitat type, dry wadi beds. Population size varies between one or two palms, sterile or male, in a site and a population of 25 palms in a site (Dungul Oasis). Status of *Medemia* building on various studies gives a 47 year record of population dynamics for *Medemia* in Dungul Oasis. Prior to this study, the population increased substantially between 1963 and 1998, however, from 2001, the population decline. Although the number of adult increased to three males and three females, but no recruitment happened during the study time.

Observations build on various studies gave a 47-year record of population dynamics for *Medemia* in Dungul Oasis (Table 2). Within the oasis complex, *Medemia* occurs only in a 100 × 100 m patch within the long vegetated portion of Wadi Dungul. Data collected prior to our work indicate that the population increased substantially between 1963 and 1998 from a single adult female and seven juveniles to a total of 36 individuals including four adults (one female, three male). However, from 2001, we have observed a population decline to a total of 25 individuals in February 2009.



Number of living individuals of *Medemia argun* in Dungul Oasis (1863-2010)

Results of the *Medemia* height measurements in Dungul Oasis indicate three discontinuous size classes were discerned. These three size classes comprise three mega-recruited stages in Dungul population. Most of the mortality occurred within size class one (0.2-0.6 m). The surviving members of size class one showed almost no increase in height. This indicate that they will die soon if the dry last for more time. The rate of growth (height change) in the non-reproductive individuals in size class two showed limited growth between 2001 and 2009 (0.0-0.4 m), whereas reproductive palms grew substantially in the same period (1.4-2.0 m). These mean that *Medemia* seedling need to cross the 1.2 m height in order to maintain the ground water and survive.

A regional IUCN conservation assessment for Egypt of Critically Endangered can be justified under criterion B2 (area of occupancy AOO <10 km²) and also under criterion D (population size <50 individuals). The populations *Medemia* are severely fragmented (B2a), 2) a continuing decline in EOO, AOO and number of locations (B2b i,ii,iv) is projected due to the vulnerability of sites with small populations (e.g. Nakhila Oasis, Wadi Neigit, Wadi Quleib, Wadi Umm Gir), 3) extent and quality of habitat is threatened by human activity (B2b iii), and 4) decline in number of mature individuals (B2b v) is observed in Dungul Oasis and inferred at other sites where palms have been cut by humans.

Additional support evidences of a critically endangered (CR) status of *Medemia argun* in Egypt:

Assessment criteria	Description
B2	Area of occupancy AOO <10 km ²
D	Population size <50 individuals
B2a	Populations are severely fragmented
B2b i	Continuing decline in EOO
B2b ii	Continuing decline in AOO
B2b iii	Quality of habitat is threatened by human activity
B2b iv	Small populations

The studies show a decline of plant diversity recorded in the oases. Number of plant species in Dungul Oasis decreased from 17 species in 1963 to 11 species in the present study. In Kurkur Oasis the number of species decreased from 27 species in 1966 to 11 species in 2008. With the dry period which extent over the last decade, recruitment of new plants is difficult and that could affect the seedbank. The vegetation in the Nubian Oases is influenced by human activity since long time. Records back to the beginning of the 20th century mentioned that several groups of Doum palms and some feeble date palms are suffering from charcoal burning by the nomads. Also records back to the end of the 19th century show that the Sudan Government took steps to protect the *Medemia* groves at northern Sudan from danger of the extermination by the local people who wove matting from the leaves. The last published record of *Medemia* was in 1907 before the discovery in Egypt at 1963. All that show how the *Medemia argun* live on the edge of the flora and was always in risk.

The Nubian Oases are hotspots of diversity in this harsh environment of the Nubian Desert. They are hugely important for the wildlife. Protection of these sites will support the wild life in the Egyptian Desert. The loss of any of these habitats could be catastrophic. This area has been in fact proposed to be protected area since more than 10 years by the Egyptian Environmental law. No realistic steps done by the government towards the conservation.

The habitats are threatened by human activity and climate change. Those represent long term threats to this remarkable palm species and other taxa. The number of adult individuals of *Medemia* is decreasing, no recruitment in the last decade. Extend of occurrence and the area of occupancy for *Medemia* is decreasing.

These isolated green spots in the vast desert provide food and shelter for a wide range of wild life within this hostile environment, and are therefore considered key habitats for biodiversity. Some of Acacia groves on the plateau outside of the oases still remained undisturbed. While the acacias and palm groves in the oases are very affected. Many human activities observed, such as hunting (e.g. birds, gazelles), mining, agriculture, safari travels and camping which end with wood cutting from trees and garbage dump. Car tracks criss-cross the stands, several incidences of pollution by motor oil have been recorded.

In February 2009, a fire destroyed a 100 × 100 m area of vegetation at the eastern end of Wadi Dungul, approximately 1 km from the *Medemia* population. The fire destroy old and large grooves of Date and Doom palms, we thought it is a man-made fire. The removal of *Medemia* leaves for waving mates and manufactory of camel ropes by Bedouin was observed in all the sites. Palm stems were cut in some other location (Nakhila). Although it is not certain that these were *Medemia* individuals, it is illustrative of the risks that the palms face.



EDUCATION, AWARENESS & COMMUNITY WORK

Raising the public awareness about biodiversity and conservation issues was one of the project objectives. The aim was to involve the local community as a partner in carrying the responsibility toward the environmental protection and spread the awareness in wide range. The project target the local communities in Aswan and surroundings, presenting our work and express the historical importance of *Medemia argun* and the biodiversity of the area. Stakeholders were government authorities, university and community leaders, representatives of (hunters, Bedouins, farmers, mining people, military and tourism companies). We find the community is far from understanding the value of *Medemia argun* as important and endangered palm species, the community need to understand the value and importance of nature and how it could affect their life directly and indirectly.

Many different tools were used to achieving the targets; workshops, field works, exhibitions, competitions, parties and media coverage. These tools were applied on our targeted groups; school students, school teachers, NGOs and local community.

Objectives

- Establishment of networks; students, teachers, NGOs to promote the biodiversity and conservation and enlarge the results of the projects.
- Raising the environmental awareness for schools students and provide them understanding of their surrounding environment, its components and the problems that affect it and therefore interact with the environment.
- Raise the awareness of teachers on environment and building their capacity in environmental education and provide them materials.
- Involve the community participant and the role of NGOs in conservation process.
- Raise the efficiency of the team of the project and gain experience on the community work by training.

Activities

1. Workshops

Three workshops were conducted on teachers and local NGOs. The workshops comprised lectures, documentary movies, discussions, educational activities and field trips.

i) Workshop on Environmental Education. 28-30 Oct. 2008

A 3 days workshop for 20 of high school teachers and 5 members of the Department of Environmental Education at Aswan.

Aims

- Raise the awareness of 25 school teachers on environment and the importance of the natural component.
- Provide teachers with new thoughts, materials and methods to use in the environment education at their schools.

Activities

- Lectures on; biodiversity, climate change, water crises, indigenous people, bird migration, national laws and international agreements concerning biodiversity, behaviour change.
- Documentary movie and field trip to the First Cataract Islands Protected Area (Saluga and Ghazal) to explain a real example of conservation. In the trip talks about 'problem solutions techniques' and explanation of the food chain game took place.
- The recommendation of the workshop had been written and sent to the NCS/EEAA and for the department of Education of Aswan to enhance the environmental education activities.

ii) Workshop on Biodiversity and the role of NGOs in conservation, 8-9 June 2009

10 active NGOs were selected depending on its location for a two days workshop. The NGOs lie in hot spots of biodiversity in Aswan. In addition, members of civil work organizations were invited (Social work Department, Woman National Council, youth clubs,).

Aims

- Raise the awareness of 10 of the active NGOs which located in a hotspot area for biodiversity at Aswan.
- Strengthen the community participation in conservation of the habitats and species as a natural heritage.

Activities

- Lectures: Plant biodiversity, Insects, Nile Crocodiles, Global Warming.
- Documentary movies and case studies of examples of working NGOs in conservation.
- Discussions about how to activate the role of NGOs in society to work on the biodiversity threatens followed by put some recommendations to achieve this goal.



iii) Workshop on Solid Wastes Management, 14 June 2009

The same group of the second workshop were invited for a one day workshop on solid waste managements. The solid waste is a big problem in Aswan. It affects the biodiversity in the surrounding. This workshop was organized as a recommendation of the workshop on Biodiversity and the role of NGOs in conservation, 8-9 June 2009.

Aims

Educate the NGOs about the hazard of the solid wastes and the best practice in their management.

Activities

- Lectures: Solid waste consequences and management, examples of contribution of NGOs in solving this problem, the importance of the public awareness.
- Discussions on recommendations for solving solid waste problems in Aswan.

2. Educational field trip to the First Cataract Islands Protected Area, 16 Mar. 2009

This event was designed as an example for the educational program of the First Cataract Islands Protected Area. It aims to encourage the participation of the students in the activities of the rangers to understand more and be attached to the nature and wildlife. 22 primary school students were targeted.

Activities

- Reception of the student at the visitor centre in First Cataract Islands Protected Area.
- Beginning by the definition of the protected area and the concept of conservation.
- A hike in the Protected Area, describe the natural vegetation and examples of adaptation to the hard conditions.
- Identification of common bird species. Students chair in collecting insect samples by using pitfall traps and fly caught traps and release them again. We explain the ecological role of insects.
- Catch the fresh water shrimps from the costal side and put them in jar of water to be easily observed then release them again.
- Play the Food Web game which explains the role of organisms in the life cycle.



3. Wildlife Photography Exhibitions

The exhibitions aimed at deliver a message on biodiversity and conservation, it was a chance for the local community to know and meet examples of the wildlife and endangered species. 80 Photographs and 8 examples of staffed animals were displayed comprising Aswan's nature, endangered habitat, endangered species, birds and mammals. Documentary movies were shown. Three exhibitions were organized; the first was in the Akkad Culture House, second was in the Reading for All Festival in Aswan and the third was held in the visitor centre of the First Cataract Island Protected Area. Children were invited through schools and NGO's.



4. Children Parties

Serials of activities for public awareness which targeting young students had been organized. The party include a play by young student's volunteers, food web game, and competition between students with prizes. The parties had been organized at the Rowing Club, Aswan Sport Club at Aswan.

5. Students Competitions

Competition on writing and drawing in the field of the environment were organized on the local scale of Aswan city, involving schools around the city in cooperation with the Environmental Education Department, this was one of the recommendation of the workshop on the environmental education of the school teachers. Prizes were given to the three best students in the primary and secondary levels.



6. Talks

Lectures and talks were presented in several community occasions. The talks were mainly about biodiversity and conservation of *Medemia argun* and our nature heritage. The talks take place in schools, youth clubs, university and NGOs.

7. Students trainings

The trainings were organized for the students of the Faculty of Science at Aswan, South Valley University. The aims were to build the capacity for the students and prepare them for the future studies and work. The training took place in two stages; med year holiday training and summer training program.

The training includes:

- Bird identification
- Project planning
- Writing proposal
- Presentation skills



CONCLUSION

The CLP provided fund for the project to explore the Nubian Desert Oases, study the *Medemia* populations and record wildlife in these areas. Work had been done with the community to raise the awareness of the importance of *Medemia* and its habitats. Training and capacity building for the team members and others who are interested in conservation had been done.

- *Medemia argun* is a rare species of fan palms grows in the Nubian Desert (southern Egypt and northern Sudan). It was discovered as fruits collected by archaeologists from Egyptian tombs dating back to 2500 BC while it had been discovered a life in northern Sudan in 1837. It was considered extinct in the wild until it is discovered in Sudan in 1995.
- *Medemia* is restricted to the Nubian Desert, occurring in several fragmented locations in southern Egypt and Northern Sudan. In some sites in Sudan, populations consist of a few hundred palms, whereas some localities in Egypt contain only one individual.
- Sites where *Medemia* is found in Egypt are located on old trading caravan routes. Many rock inscriptions, tools and equipments from the pre-dynastic time had been discovered there. *Medemia* is ecologically important as one of the few, large trees in the Nubian Desert, providing shelter and food for desert wildlife. These small oases where *Medemia* located are the main support for wild life in this part of the eastern part of the Great Sahara.
- Three new sites had been discovered of *Medemia argun* in Egypt; each site with a single palm. The total number of *Medemia* palms in Egypt is 31; with two fruiting females.
- Conservation assessment was done for the species in Egypt. The extent of occurrence is 11223 km², while the area of occupancy is 0.06 km². These data describe *Medemia* as critically endangered species by the IUCN Red List categories.
- The range of *Medemia* may be shrinking as a result of habitat loss. Exploitation of the leaves is a potential threat. Degradation of habitats by human disturbance, vandalism, fire and agricultural activities are significant risks. Climate change is a

potential, but poorly understood threat. Rainfall in the Nubian Desert is extremely infrequent. Reduction in frequency may lead to changes in ground-water patterns and will reduce palm survival.

- *Medemia* habitats need to be protected from human disturbance, ideally by the establishment of protected areas. Not only would the loss of *Medemia* in Egypt be a cultural tragedy, it would also be indicative of potentially catastrophic habitat loss at the ecosystem level in the oases of Egyptian Nubia.
- More effort is needed toward the conservation of *Medemia* on the global scale in respect to the Sudanese populations.
- The project team developed more ideas and projects to conserve the natural heritage of southern Egypt. they intend to apply for the CLP for a follow up conservation fund in order to work on conservation of the *Medemia* and its habitat in a formal way by declaring a protected area.

THE COMPLETION OF OBJECTIVES

1. Study the ecosystem components of the Nubian Desert Oasis (especially Kurkur, Dungul and Nakhila Oases).

Data had been collected from literature about the Nubian Oases and the wildlife distributed there. The team made several field trips to the main sites of the study area to collect data about the, distribution and status of the wildlife there. The team repeated the field visits to the important sites for monitoring the wild life. Check list of the biota which have been observed there had been produced.

2. Explore the potential sites in the Nubian Desert

We conduct a survey thorough of the literature to gather the published field records of *Medemia*. Also we collect the herbarium specimen records. These data were compiled with information provided by local Bedouins in southern Egypt to produce a list of the potential sites of *Medemia argun* in Egypt. Also we collect information about the potential sites for wildlife in the Nubian Desert.

Following that the team explore these areas by field trips to discover the real distribution of *Medemia argun* and to highlight the important area for wildlife in Nubian Desert in Egypt.

3. *Medemia argun* to be a prominent element; study conservation assessment and population ecology in Egypt.

The team had studied the population status and demography of *Medemia argun* at Dungul Oasis, the largest population in Egypt. Detailed data had been obtained about the highest and sex of the individuals there.

Depending on the distribution data which had been obtained from field work, a regional conservation assessment of *Medemia* following IUCN Red List guidelines was completed.

These studies resulted in a detailed distribution map of *Medemia argun* in Egypt. The demography study provides data about the history of recruitments of *Medemia* in Dungul Oasis.

The GIS-based calculations of EOO and AOO of *Medemia* in Egypt are 11223 km² (VU) and 0.06 km² (CR). A regional IUCN conservation assessment for *Medemia argun* in Egypt is resulting in Critically Endangered status.

4. Study the importance of these habitats for conservation and defined the threats.

Observations on changing the habitats have been collecting. The main threats are primarily:

- 1) Indiscriminate and unsustainable hunting
- 2) The vast mining activities with careless and improper handling of waste.

Human activities observed, such as hunting (e.g. birds, gazelles), mining, agriculture, safari travels, camping which end with wood cutting from trees, fires and garbage dump. The unmanaged and unsustainable way of planning in Egypt especially for the new mega development projects affected the area; thousands of km² have been giving to mining and industrial activities without doing a proper survey for archaeological or biological features beforehand. Mega agriculture projects depending on ground water will affect the vegetation growth in the area. Climate change is great challenge which affecting the area; almost 2 decates of dry have been passed which affecting the vegetation of the area and the recruitment of the *Medemia* and other plants which grow there.

5. Build the team capacity in conservation skills.

Serials of activities had been organized to build the capacity of the team and other conservationist and postgraduate students.

- Training on Bird census techniques, 1-12 Dec. 2008
- Flora survey techniques.
- Writing proposals
- Environmental education.
- Projects planning and project management.
- Introductory course to Insects, 18 Dec. 2008 – 6 Jan. 2009 through the Mentoring programme

The team organized several training for undergraduate students at South Valley University at Aswan in the med year Holiday and the summer training program

- Bird identification
- Project planning
- Writing proposal
- Presentation skills

6. Raising the public awareness about biodiversity and conservation importance in a local scale by involving stakeholders and establishing networks of schools teachers and students, in order to enlarge local participation in conserving the biodiversity as a natural and cultural heritage of the area.

Workshops, lecture, public events had been organized by the team aimed at raising the public awareness.

List of activities:

- Workshop on Environmental Education for school teachers, 28-30 Oct. 2008
- Workshop on Biodiversity and the role of NGOs in conservation, 8-9 June 2009
- Workshop on Solid Wastes Management and the role of NGOs, 14 June 2009
- Educational field trip to the First Cataract Islands Protected Area for primary schools, 16 Mar, 2009
- Wildlife Photography Exhibition at Akkad public library, Aswan 16 – 18 June 2009
- Wildlife Photography Exhibition at the summer reading festival at Elsalam Park, Aswan, 5 – 7 July 2009
- Children Party at the Rowing Club, Aswan, 8 June 2008
- School Competitions, school year 2008/2009

In cooperation with the Education Department at Aswan, the team organized competitions for writing and drawing about Environment. Prizes were offered by the projects

The team organize several meeting and office visits with the governmental organizations which work in the target area, these meeting and office visits aims at

describe the situations and discuss the collaboration and to involve the environmental issues in the decision making process. List of stakeholders and decision makers:

- Lake Nasser Authority
- Police of Environment
- Patrol Force of the Egyptian Army at Aswan
- The General Secretariat of Aswan Governorate
- Unit of Environmental Studies and Development at the South Valley Uniniversity
- Nature Conservation Sector, Egyptian Environmental Affairs Agency head quarter
- Mining Department at Aswan
- Agriculture Department at Aswan
- Antiquities Department at Aswan
- Irrigation Department at Aswan
- Catastrophe and Problems Department at Aswan

7. Work on preparing the materials for declaring the area as a protected area by the Egyptian Law.

The team gather information about the land use of the target area. The team discussed in several meeting with the stakeholders the aims of the protected area. A workshop had been held at Aswan concerning the planning for the proposed protected area. A draft report had been produced about the importance of the area and how it could be protected and it had been send to the head quarter of the Ministry of Environment.

8. Build cross border links into Sudan would be beneficial with respect to Sudanese *Medemia* populations as well as broader diversity issues to develop future collaboration.

The team had get in contact with sudanese counterpart who work in conservation field; the national herbarium at Khartoum and University of Khartoum. Ideas and information had been exchanged and the there will be collaboration in the near future.

OUTPUTS/OUTCOMES

The study came out with some output and outcome:

- More understanding of the status of endangered palm species *Medemia argun*. An article and a Master thesis had been published :
Ibrahim, H. and Baker, W. (2009). *Medemia argun* – Past, Present and Future. Palms 53: 9–19. <http://www.palms.org/palmsjournal/2009/v53n1p9-19.pdf>
Ibrahim, H. (2010). Ecology and phytochemistry of *Medemia argun* in Egypt. MSc thesis, Botany Department, Faculty of Science at Aswan, South Valley University.
- A regional conservation assessment of *Medemia argun* in Egypt.
- Complete a primary biological fieldwork and produce checklists of the wild life of the main habitats of *Medemia* in Egypt and highlight the endangered and threatened species status and distribution.
- A report of conservation assessment and status introduced to the Egyptian Environment affairs agency and decision makers.
- Produce preliminary management plan for the Nubian Desert Oases in the Sinn El Kaddab Plateau. Such that protective measures can be implemented and recommendations can be made for a protected area status.
- Knowledge developed in young conservationists from different agencies (EEAA, universities, students) through training and experience in fieldwork, community work and data analysis to be able to produce projects proposals for conservation in their agencies.
- Provide scientific assistance and advice to students and young conservationists in order to improve their projects and efforts towards conservation.
- A well trained team of young people who will participate actively in implementing conservation plans in future through NGOs, universities and governmental organizations.
- Encourage long-term research links of local university (South Valley University SVU) and Nature Conservation Sector (NCS) regional Office at Aswan and different international institutions (Royal Botanic Gardens, Conservation Leadership Programme).
- The tools and equipments which bought through the project will be kept at the Protected Area of Aswan and will be own to the proposed protected area.

RECOMMENDATIONS

- The study recommends the immediate protection and recognition these sites in the Nubian Desert. The area is designed to be protected area by the Egyptian law since 1997, as a part of the national strategy of conservation of Nature in Egypt. The full protection will secure the future for the *Medemia argun* and the wild life in the area.
- Produce a management plan for the main oases in the Sinn El Kaddab Plateau as a future protected area.
- Involving stakeholders is important to facilitate the management and conservation of the few remaining *Medemia* palms and its habitat.
- An *in_situ* conservation program for *Medemia argun* in Wadi Allaqi as it is a natural habitat of *Medemia* and it is protected by the Egyptian law.
- Conduct education program to raise the public awareness and encourage local participation in conservation.
- Use *Medemia argun* as a flagship species, to provide protection for the wild life in the Nubian Desert Oases and in the southern Egypt.
- The project recommends studying the conservation assessment of the *Medemia* on a world scale; Egypt and Sudan and working on producing species action plan.
- Study the population's genetic diversity of *Medemia* in Egypt and Sudan to understand the relation between the population and the origin of the species.

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Deep thanks for the organizations which support this work; the **Royal Botanic Gardens, Kew** for the scientific support, **Aswan Protectorates Office NCS/ EEAA** for participating in the field trips and supporting our activities towards the conservation of the area.

Thanks to **drivers** and **local guides** who had helped us in the field. Finally heartfelt thanks to our **colleges** and **friends** for their helps, support, encouragement, patience and moral support.

Nubian Oases team

APPENDICES

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Conservation Leadership Programme, CLP

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<http://www.kew.org>

<http://www.kew.org/plants-fungi/Medemia-argun.htm>

<http://www.palmweb.org>

http://www.palmweb.org/?q=cdm_dataportal/taxon/b1805b49-375e-4bc5-b545-777ae8e29391

Global Tree Campaign

<http://www.globaltrees.org>

http://www.globaltrees.org/tp_m_argun.htm

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<http://www.yale.edu/>

http://www.yale.edu/egyptology/ae_kurkur.htm

IUCN Palm Specialist Group

http://www.iucn.org/about/work/programmes/species/who_we_are/ssc_specialist_groups_and_red_list_authorities_directory/plants/palm_sg/

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The IUCN Red List

<http://www.iucnredlist.org>

<http://www.iucnredlist.org/apps/redlist/details/30401/0>

Arkive, Images for life on Earth

<http://www.arkive.org/argun-palm/medemia-argun>

Oryx, the international journal of conservation

<http://oryxthejournal.org>

The Society for Conservation Biology, SCB

<http://www.conbio.org>

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