



# The Ecology of Qatari Barchan Dunes

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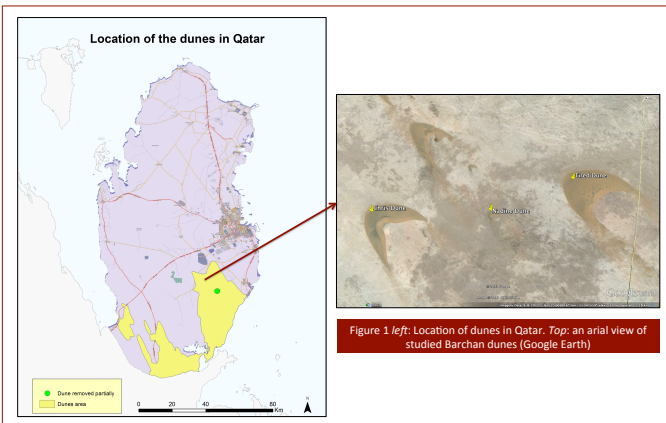
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**I. INTRODUCTION:** As part of NPRP 09-546-2-206 on the stabilization of mobile Barchan dunes, it has been observed by the research team, that these dunes are unique ecosystems harboring diverse species. Utilizing the Best Environment Research Award of USD 100,000 granted by Qatar National Research Fund in 2011 at the QF Annual Research Forum, a new study aiming to understand the ecology of an active dune, in terms of resident species and their populations was undertaken.



## II. METHODOLOGY:

- Twenty traps were placed 15 meters apart, along the avalanche face of each of the three dunes: Nadine, Chris and Tired (Figure 1).
- Traps were dug into the base of the dune and their edges were covered with sand. Over a period of 3 days in May 2013, all species landing in our 60 traps were collected for enumeration and identification.
- Skinks were tagged using a NONATEC RFID transponder delivered by a syringe injection. Capture/Re-capture data was collected over a period of 3 months (March to June 2013).

## III. RESULTS:

Table 1: Number of species and individuals found on 3 dunes and a measure of Shannon-Wiener Diversity Index and Evenness.

Species/family	Dune Name			Total
	Chris	Nadine	Tired	
<i>Amigaton schawalleri</i>	4	1	0	5
<i>Androctonus crassicauda</i>	0	0	1	1
<i>Apanteles arabicus</i>	14	12	5	31
<i>Apanteles</i> sp.	19	5	8	32
<i>Bunopus tuberculatus</i>	0	1	0	1
<i>Buthacus yotvatensis nigroaeneus</i>	0	1	0	1
<i>Chelodactylus</i> sp.	2	0	0	2
<i>Cleopatra</i> sp.	4	0	5	9
<i>Culicinae</i> sp.	0	0	1	1
<i>Curculionidae</i> sp.	0	0	1	1
<i>Erodus sauditus</i>	3	17	1	21
<i>Erodus</i> sp.	2	41	6	49
<i>Formicidae</i> sp.	6	0	69	75
Larvae	1	0	0	1
<i>Mesostena puncticollis</i>	15	3	39	57
<i>Mesostena</i> sp.	23	0	20	43
<i>Phrynocephalus arabicus</i>	0	0	1	1
<i>Pinella arabica</i>	0	0	1	1
<i>Pinella</i> sp.	0	0	1	1
<i>Prochoma bucculenta</i>	2	0	1	3
<i>Pterygota</i> sp.	2	2	0	4
<i>Scincus mitranus</i>	7	1	17	25
<i>Sollifugid galeodes</i>	0	1	0	1
<i>Stenodactylus arabicus</i>	1	1	0	2
<i>Thripitera</i> sp.	1	0	0	1
<i>Thysanura</i> sp.	8	25	20	53
<i>Trachyderma parvicollis</i>	0	0	8	8
<b>Total (i = number of individuals)</b>	<b>117</b>	<b>111</b>	<b>205</b>	<b>433</b>
<b>Species Richness (S)</b>	<b>18</b>	<b>13</b>	<b>18</b>	
<b>H<sub>max</sub> = Ln(S) Maximum diversity possible</b>	<b>2.89</b>	<b>2.56</b>	<b>2.89</b>	
<b>Shannon - Wiener Diversity Index (H')</b>	<b>2.46</b>	<b>1.80</b>	<b>2.09</b>	
<b>Evenness (E)</b>	<b>0.85</b>	<b>0.70</b>	<b>0.72</b>	

### Footnote for Table 1

Shannon-Wiener Index denoted by  $H' = -\sum(p_i) \times \ln(p_i)$   
 $\sum$  = summation  
 $p_i$  = proportion of total sample represented by species /  
 Divide no. of individuals of species / by total number of samples  
 $S$  = number of species / species richness  
 $H_{max} = \ln(S)$  Maximum diversity possible  
 $E = \text{Evenness} = H/H_{max}$

### Key Findings:

- Over a 3 day period, 111 to 205 individual organisms were collected from each of our 3 dunes
- Organisms collected belonged to 27 different species.
- The Diversity Index indicates that Chris dune exhibits the highest diversity (2.46) and that organisms are evenly (0.85) distributed throughout the habitat.
- The majority of inhabitants of the dune belong to the Tenebrionidae family.

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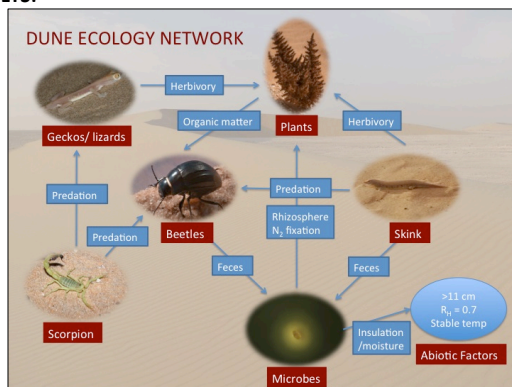


Figure 3: A network representing the unique ecology of a mobile Barchan dune

### Key Findings:

- Skink capture/recapture data showed that there has been no migration between dunes, indicating that each dune represents its own self-contained ecosystem.
- Metagenomic analysis of DNA extracted from 2 dunes revealed that the dune microbial communities were dominated by bacteria from the proteobacteria, actinobacteria and firmicutes phyla.
- The network of the dune supports a unique mobile ecosystem.

## IV. CONCLUSIONS:

- This is one of the initial efforts to identify the residents of mobile dunes in Qatar, and forms a baseline to future studies on the ecology of these unique ecosystems.
- Conservation efforts should be put in place to protect these valuable ecosystems from confiscation for construction purposes.
- Further studies on the effect of dune stabilization on this ecosystem must be undertaken.



Figure 2: A collection of photographs showing different species inhabiting the dune ecosystem (Photo credit to Dr. Alexey Sergeev, Dr. Renee Richer, Dr. Aurora Castilla and Sara Abdul Majid).

## V. ACKNOWLEDGEMENTS

We are grateful to Osama Al Ashek for logistic support, to Aitor Valdeón, Paloma Mas for advice regarding species identification and trapping effort, to Parag Parelkar, Pedro, Pablo Serra, for trapping effort, to Alexey Sergeev for taking photos, to Yanal Shaheen, Khalid Ahmed, Salama Chaker and Ki Lee for digging skink traps. This study has been possible by the Best Environment Research Program of the Year Fund earned under QNRF grant 09-546- 2-206 at the Qatar Foundation Annual Research Forum in 2011.