Current World Environment Vol. **12**(1), 165-168 (2017)

Genetic Instability by Mangroves: A Global Warming Threat Found in Gulf Countries

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http://dx.doi.org/10.12944/CWE.12.1.19

(Received: February 20, 2017; Accepted: April 09, 2017)

ABSTRACT

The Mangroves are highly threatened by certain ecologically condition and there arise a need of critical management and protection of those species because of vital role in protecting the coastal areas of their ecosystem. The diversity of these plants with respect to genetics is well understood but the genetic variations of those species in gulf countries were scattered on the basis of reports from literature. The main aim of the current review is to collect all the available literature for creating a comprehensive viewpoint of different works on the basis of genetic variations in Mangroves. With so little known, it will be important to monitor the responses of mangroves to global warming to minimize the impacts and reestablishing mangroves.

Keywords: mangroves, vegetation, distribution, ecology, genetic structure, diversity.

INTRODUCTION

Mangroves were productive and serve as a biologically significant component of the sea, land and tropical interface of subtropical regions[1]. Mangroves serve as a chief component in planning of resource conservation[2]. The mangroves in the gulf form a significant part on the basis of their occurrence from approximately 26°N in the border of Saudi Arabia[3]. In order to evaluate the significance of mangroves in Gulf, a brief overview of the mangrove resource were reviewed in this manuscript[4]. Mangrove forest are exposed on rockiest shorelines, they occupy all regions between mean sea level to highest spring tide in tropical and subtropical latitudes making these forest daily subjected to tidal changes in water height, salt concentration and temperature.

Studies to assess the extinction risks of mangrove species found that 70 species of mangroves, stand at elevated threat of extinction and could disappear within the next decade. This loss will have devastating economic and environmental consequences for coastal communities due to the importance of these species for the livelihood of indigenous populations[17].

Climate threats to coastal regions reverberate well beyond the shoreline. Both farmland affected by saltwater incursion and fisheries menaced by higher ocean acidity feed populations distant from the water's edge. Ports, roads, rail lines, and other facilities that could be damaged by cyclones and storm surges serve producers and consumers located far inland. All the countries will have to take action to adapt to the effects of global warming. A more globally representative view of mangroves would allow us to better understand the importance of mangrove type and landscape setting in determining system resiliency to future climate change[18].

Review of Study Approaches and Methodologies in Gulf

Field surveys were carried out in 1992 at Kuwait, in 1993 at Saudi Arabia and in 1996 at UAE[5]. November to December 1999 the mapping was

initially conducted by helicopter surveys by GPS in the coastline of the Abu-Dhabi Emirate[6]. Ground-trusting together with structural data were collected from selected field sites using sampling methods by considering the heights and densities of 72 plants at each site from the sixth nearest neighbour of randomly selected plants for reference[7].

Review of investigated field sites in Gulf

Site 1: Meena Sheikh - N24°26.696 E054°26.551. Observation: The species "*Avicennia marina" were* abundant with *Arthrocnemum macrostachyum. Avicennia* ranged in height from seedlings to trees 5-6 m. Site 2A: Al Dhabay-yah - N24°26.730 E054°26.470

Observation

Occasional bushes of *Suaeda vermiculata, Arthrocnemum macrostachyum,* and *Halocnemum strobilaceum* were identified.

- Site 2B: Al Dhabay-yah-N24°16.721 E054°10.552

Outcome

"Sampled during the flooding tide - mangroves were around 3 m tall in sand.

- Site 3: Jazirat Fahid-N24°29.657 E054°34.526.

Observation

On an average, almost certain park-like structures with an altitude of 3.5-4.5 m were identified in the drainage lines which occurred throughout the pneumatophores and the salinity in drainage lines was 50ppt."(Physico-chemical parameter)

- Site 4: Jazirat Kassar Essal N24°28.209 E054°28.289

Observation

Fringing mangroves were well developed and it has of 5 m with dense pneumatophores in a closed canopy. Substrate was sandy except drainage lines. Species *Avicennia* was found with open flowers and *Salsola baryosma* contain scaly flowers."

- Site 5 : Ras Al Sidre N24°40.035 E054°39.968

Observation

Short mangroves attained a considerable re growth.

Major Outcomes of Mangroves in Coastal line

Mangroves are limited by the coastal stability[8]. Establishment of mangroves was apparent in natural shelter[9]. The observations were also supported by the experimental data of Kogo (1988) in the shores of Mubarraz Island which consist of 60-80% of newly propagules were washed and around 10% were sheltered in shorelines[10].

Mangrove maintenance in Gulf

In order to maintain the present areas with mangrove for productivity in Gulf requires an understanding and appreciation of these resources by public to minimize damage and frame a regulation framework to protect resources from the planned activities in public or private department for the development of mangroves[11].

Public education can be achieved through the involvement of local communities in studies associated with mangrove[12]. Construction of boardwalks and platforms for observation allows the public to appreciate these communities through the process of informal education programs in field training and focus on publications for layman understanding[13].

Major threats for the mangroves in Gulf related to development involve (i) The hydrological modification of mangroves and (ii) The effects of hydrocarbon pollution in short and long term. Pollution in Gulf is localized for significance by the elevated indicators (Shriadah, 1999).

The disruption of mangrove hydrology involves dredging of channels and waterways, land-filling, foreshore construction such as breakwaters and jetties, tidal obstruction and groundwater extraction. Oils and oil-dispersant mixtures are additional on-going threat to the mangroves in Gulf.

Dispersant mixtures from oil have been reported from the laboratory study which involves the inclusion of that Light crude in Arabia. Oils from Bunker C tanks were less toxic to the seedlings

Table 1: Demographic parameters of Mangroves in Gulf (per capita mangrove)

Country (US$)	Coastline Length (km)	Population Density (Of what???)(?????)	Mangrove Area (km2)	Per Capita GNP
Iran	3180	30.5	89	1000
Iraq	58	41.9	0	540
Kuwait	499	120.5	0*	17390
Bahrain	161	811.3	4*	7840
Saudi Arabia	2510	6.3	204**	7040
Qatar	563	35.9	9*	11,600
United Arab Emirates	1448	30.9	30*	17, 400

*Plantations of mangrove

** Area within 4 km2 on the Gulf coast

of Avicennia[14]. In a similarl study, Lai et al. (1984) demonstrated that the crude oil dispersed in Arabian Light was more toxic to the saplings of *Avicennia*.

In a field study of Wardrop et al (1987), mature and dwarfed mangrove*, Avicennia marina* were assessed with the relative toxicities of Australian crude oils produced Tirrawarra and Arabian Light were dispersed and mixed together and the sub-lethal effects were monitored for 3 years by including the factors of pneumatophore damage, defoliation, leaf damage, abnormalities in flower and fruits. Initially, the toxicity of both oils was increased by the addition of dispersant and it resulted in less production of flower or fruit.

Regulation of these developmental impacts was undertaken after the amendment of assessment procedure with an environmental aspect where changes from any specific development can be evaluated and quantified to minimize the adverse effects. As an addition, the establishment of a marine system in protected areas was centered in the areas of mangroves. In Gulf, the establishment of marine sanctuary has been initiated[15] by a network of smaller and marine protected areas to provide benefits in commitment for a positive action.

In the longer term, the global warming threats and their associated rise on the sea-level affected mangroves in the Gulf and a special focus is required to review this affects and reveres the habitation. Several reviews on climate change and sea-level rise on mangroves were undertaken[16] with some mixed conclusions. Though the process of developing and planning initiatives predicted the scenarios of raise in sea-level, we are in need of technology in low cost to address the threats.

CONCLUSION

In Gulf population, a high level of diversity is seen in genetics with low levels of inbreeding. Hence, the seed material should be collected locally for increasing the size of population. Additionally, it is important to collect the equal numbers of seeds as per the physiology of plant because all genotypes will be represented equally and collections were made from all local regions to maintain the natural levels of genetic diversity in those study areas.

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