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Monitoring (Biodiversity) Aquatic Plants of Iraqi Marshland

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Abstract : The study was conducted during December 2014 –December 2015 in ten mainly stations from Iraqi marshlands since been recorded dominated types of aquatic plants in study sites .Results showed that high intensity for aquatic plants all months was observed at a rate of 73 % *Typha* sp. , followed *Phragmites australis* impressive 65% then *Ceratophyllum dermersum* 33 % less abundant for being non-indigenous , statistical results highest value to the standard appearance of species Mean±SD (0.999± 0.013) (0.480 ± 1). Evaluation of species of aquatic plants in marshes communities response to the change of climate, focusing on the type it , submerged ,emergent and floating and depending on differences and similarities with responses to factor , temperature , O2 , CO2 exposure, level rise water and other expected environmental alterations with natural weather in the region .Advantages environmental climate have an important influence on plant diversity of Iraqi marshes. Based on environmental factors ten ecological regions with the specific plant which is located climate factors interact to plant influence distribution and they play an important role in creating ecological biodiversity of Iraq.
Keywords : Iraqi marsh, pollution, Biomonitoring, Distribution Aquatic plants.

1 Introduction

In aquatic plants used of biological response to assess the changes in the environment called Biomonitoring , Generally this change on anthropogenic causes. Biomonitoring programs have been qualitative, quantitative and semi-quantitative [1] Based biomonitoring of pollutants using the species accumulation on the ability of some of the plant has to a large amount of some pollutants without apparent harmful effects. Biomonitoring has different advantages it can be performed in two ways based on types samples, organism endemic native and passive-active biomonitoring [2].it an important role in the functioning of ecosystems [3]. However, any change in economic and ecological impacts would threaten this ecosystem [4].

Growing aquatic plants in or near water can be classified as floating plants, emerging, submerged or emerged, used aquatic plants to remove different contaminants, including elements from water bodies [3, 5].

There are many studies on the subject of the marshes [5,6,7].Biomass depends on in surfaces rivers water and geographical distribution of Mass plants by biological diversity in changing distribution [5,8]..

In quality aquatic marshes was determined by the interaction of all the physical, biological and chemical through environmental monitoring , therefore use of environmental directories can be defined it as environmental characteristics which provide quantitative information on the situation environmental resources

[9,10,11]. 104 total speciesof aquatic and semi-aquatic plants have been historically recorded in marshland Iraq[12,13].

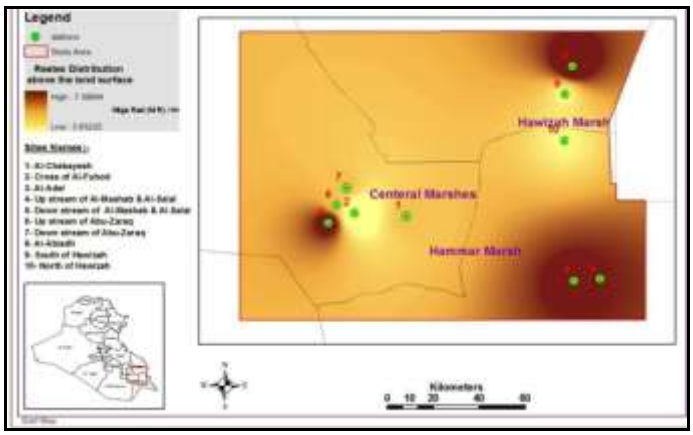
The major marshes (Hawizeh, Hammer and The Central Marsh) in southeast Iraq.Hawizeh marsh is located to the east of the Tigris River in Missan Governorate. Depending on the time of the season, Hawizeh marsh could cover about 3,000 km2. Al-Hammar Marsh is situated almost entirely south of the Euphrates, extending from near Al-Nasiriyah in the west to the outskirts of Basra on Shatt al-Arab in the east. Al-Hammar Marshes are bordered by a sand dune belt of the Southern Desert. Estimates of this marsh area range from 2800 km2, extending to a total area of over 4500 km2 during periods of seasonal and temporary inundation [9,11]. Influenced distribution aquatic plants in marshes to many factors as temperature, pH and water level depends on the abundance of oxygen seasonally floods and restoration,they are important factors for primary productivity and phytoplankton growth which represents the base of the pyramid in the food chain [13,14].Ecologically any change in distribution macrophyte community such as alter in structure of food web , modify, richness species , abundance and deplete oxygen this stands can dense macrophyte increase flooding and risk impeding flow river [15].

Because of the possibility of a negative impact on a large scale, and potential risks conducted a field study of the distribution of plants in the marshes of Iraq, which dominates the area with the assessments in previous studies, different and influenced by climatic changes

2 Materals and Methods

2.1 Study Area and Sample Collection

This study was conducted monthly specimens plants were collected duration December 2014-December 2015 in ten major marshes divided between (Hawizeh, Hammer and The Central Marsh) in southeast Iraq. Hawizeh marsh is located to the east of the Tigris River in Misan Governorate and extending to the Iranian territory. Depending on the time of the season, Hawizeh marsh could cover about 3,000 km2 [9,10]. Hammar marsh is located to the south of the Euphrates. It is bordered by a sand dune belt of the Southern Desert. It covers about 2,800 km2 and could extend to about 4,500 km2 when it inundates. The Central Marshlands is located in a triangular area between the Tigris and the Euphrates, bounded by cities of Al-Nasiriyah, Qalaat-Saleh and Al-Qurnah. The preparation of different models of plants [9,10]. . Identified samples in the field and taken to the laboratory for confirmative identification and weighing.Have been followed the methods of internationally adopted for the collection of models and by focusing on the parts which have been prepared for the purpose of measuring the biomonitoring contamination by analyzing after calibration laboratory instrumentation and measurement. Aquatic plants samples were collected from ten locations (Al-Hammar (31°07′58″ N, 47°03′07″ E), Cross of Al Fuhod and Al-Tar (31°35′30″ N, 47°35′21″ E), Downstream of Al-Mashab and Al-Salal (33°40′22″ N, 47°43′03″ E), Al-Hawizah (32°41′22″ N, 47°33′03″ E) and Al-Chebayesh (30°07′52″ N, 47°05′12″ E) in Southeastern Iraq Fig(1) Fig. 1 Boundaries of the ten marshes where samples were collected.



Fig(1): Boundaries of the ten marshes where samples were collected.

To obtain accurate results in statistics were collected three replications Plants of each type for each station, Samples were collected three replicates from field observations were made at the selected sites were taken to record species of aquatic plants that are dwelling at each location wherever it is possible. Photographs were taken for each species of aquatic plants. For conspicuous species laboratory test was necessary to ascertain proper identification.

Species of plants were chosen were dominate and using a wooden box and stored in special plastic bags and transferred .To the laboratory for the purpose of conducting measurements and calculations crisis. Each study sites and by three ² 13:00 13:00 any area × been calculating the number of individuals of the species using wooden box 13:00. The guide species index replicates as environmental marshes (Tale 1) .

Shanon-Weiner diversity and standard Shannon Weiner Similarity index and guide similarities Evenness index parity 108 The standard smoothing the appearance of species and the value of Simpson diversity index (D) and standard Simpson index (H) Jaccard's standard, jacquard and Sorenson The species uniformity index (E) linked to the value of the standard Shannon Weiner [16].

2-2 Testing

During the sampling process we selected sites different physical properties measurements have been covered out using field instruments, these measurements have been:

1. Air Temperature (AT) °C: air temperature was measured by thermometer which was divided until 0.1 °C.
2. 2-Water Temperature (WT) °C: water temperature was measured directly in the field by digital portable multi meter.
3. Water Hydrogen Ion Concentration (pH): Water pH was measured directly in the field by digital portable multi meter; model 340i/SET.
4. Water Electrical Conductivity (EC) ms/cm: Water electrical conductivity was measured directly in the field by digital portable multi meter; model 340i/SET, The Ecis measured by microsemens/cm) [12].

2-3 Statistical method

The statistical analysis was performed according to the AOAC Protocol [12,16] was assessed using different measures of statistical sigma plot and coefficient of determination, interclass correlation coefficient and concordance correlation coefficient, mean prediction error the concentration was the concentration of component standard method. The coefficient of determination, r^2, was calculated where N is the total number of paired observations. A value of $r^2 = 1$ indicates 100% precision between the methods.

3- Results and Discussion

Temperature (temp.) considers an important parameter that controls quality, dispersion and distribution of living organisms such as aquatic plants addition flooding, drought and climatic conditions [16]. During summer was recorded a maximum temperature and lowest in January for all monitored stations, synchronized changes in the water temperature with air temperature [17].There are some differences in the temperatures between the stations within the same location ,this is due to the time of taking samples because absorption of light by the dense submerged and floating plants that reduce temperatures [18,19].This contrast between water and air temperature helps in abundance and growth of different living organism species in all study area .

About pH meter is another important factor influencing the species and metabolism of organism inhabiting. Low pH interferes with oxygen uptake and pH outside a range. The pH is greatly affected CO2 concentration, DO, ammonia, photosynthesis, water temperature, organic matter content [19,20,21].

About Electrical conductivity (EC) depending [21,22,23].The low EC value in all time is because of the dilution by the relatively higher water level.

High temperatures that causes evaporation of the water its increases with increasing temperature [21,22] and the increasing of vegetation extension [24, 25].

The variation It was apparent from type to other and area of aquatic plants. Study showed monitoring species of plants in *Typhasp*and*Phragmitesaustralis* and compatibility between water temperature and air temperature mean ranging air temperature (16 -8.6)m ,Respectively while the value pH (7.1). Table (2).

Table (2) shows the Mean Max, Min and average values of Physical properties under the study

	Air Temp. °C	**Water Temp. °C**	**pH**	**Cond. (ms/cm)**
Max.-Min.	40.02-36.9	17.2-11.4	8.4-7.2	15.5-4
mean	38.21	13.69	7.81	8.60
SD	0.999	1.696	0.317	2.930
LSD	0.157	0.268	0.5	0.248
P < 0.05				

Mean ranged within months of study in all locations (790 CM-EC) electrical conductivity that's may be caused by high return on deposits of soils adjacent to the density of the vegetation was *Typha*sp. having a relatively high density of 73% for other aquatic plants and *Phragmitesaustralis*an impressive 65 % . *Ceratophyllumdermersum* 33 % less abundant for being non-indigenous.For all seasons of the year with the rest of the other varieties of aquatic plants may be due to the difference in susceptibility of plants to withstand environmental conditions and different nutrient deficiency during the seasons of the year in addition to the different nature of plant growth and its sustainability in the environment [21,22,26]. This diversity used as a monitoring to presence despite various problems such as drying and water pollution but it rich of diversity aquatic plants, aquatic plants have important functions such as being shelter, food source for other organisms (fish, waterfowl, etc.) . Source of production oxygen, decreasing negative impacts of change in climate to use for purification. Depending on depth ranged to ten locations [27,28].

From 0.8 to 3.5 m with an average depth of 3.09 m . The dominated majority of species10 were submerged, five were emergent plants and four floating-leafed plants (Table 1).Aquatic plant distributions with most associated plants were correlated sampling depending on dates of highly P value significant P < 0.01 in all locations do not change time.The majority of plants found in the survey were previously studied [11,29,30] Abundant of plants on in the Al- Hiwazah part of region Table(3)

Table (1) :The guide species index replicates as environmental marshes .

A	**B**
Alismalaniceolatum	*Baccapamonniera*
Alismaplantago-aquatica	*Bergiaammannioides*
Alternantherasessilis	*Bergiacapensis*
Arundodonax	*Bolboschoenusmaritimus*
Aster tripolium	*Butomusumbelllatus*
C	**D**
Ceratophyllumdemersum,	*Damasoniumalisma*
Ceratopteristhalicroides	*Diplachnefusca*
Cladiummariscus ,	**E**
Cynancumacutum	*Echinoeloa crass-zalli*
Cyperusdifformis	*Eclipta alba*
Cyperuslavegatus	**J**
Cyperuslongus	*Juncusacutus*
Cyperusmalaccensis	*Juncusarticulatus*
Cyperusiria	*Juncusrigidus*
Cyperuscorymbosus	**L**
Cyperusmichelians	*Lemnagibba*

Cyperusrotundus	*Lemna minor*
F	*Lemnaperpusilla*
Fimbristylisbisumbillata	*Lemnatrisulca*
Fimbristylislittoralis	*Limnophiiaindica*
Fimbristylissieberiana	*Ludwigiarepens*
N	*Lycopuseuropaeus*
Najasgraminea	**M**
Najas marina	*Marsileacapensis*
Najas minor	*Menthaaquatica*
Nastutiumofficenale	*Myriophyllumspicatum*
Nymphaea alba	*Myriophyllumverticillatum*
Nymphoidesindica	**O**
Nymphoidespetata	*Otteliaalismoides*
R	*Oxystelmaesculentum*
Rannunculussphaerosperm us,	**S**
	Sagittariasagitifolia
Rannunculustrichuphyllus	*Salvinianatans*
Rorippa amphibian	*Samolusvalerandi*
Ruppiamaritima	*Schenoplectuslitoralis*
U	*Schenoplectusmaritimus*
Utriculaiaaustralis	*Schenoplectustriquater*
Utriculaiagibba	*Sonchusmaritimus*
Utriculaia minor	*Sparganiumerectum*
Z	**T**
Zannichelliapalustris	*Thelypterispalustris*
P	*Typhadomingensis*
Paniamrepens	*Typhalugdunensis*
Paspalumpaspaloides	*Typhaminina*
Peplidiummaritimum	**V**
Phragmitesaustralis	*Vallisneriaspiralis*
Phyla nodiflora	*Verbanaofficinalis*
Polygonumamphibium	*Veronica anagallis*
PolygonumlapathifoliumP olygonumpersicaria	*Veronica beccabunga*
	Veronica aquatic
Polygonumsalicifolium ,	
Polypogonmonspeliensis	
PotamogetonberchteldiiPo tamogetoncrispus	
Potamogetonlucens	
Potamogetonnodosus	
Potamogetonpectenatus	
Potamogetonperfoliatua	

Table (3): Abundant of plants on in the region under study .

No.	Plant Species	Plant Species	Plant Species	Plant Species	Plant Species
1	*Ceratophyllum dermersum* *Mariophyllum verticillatum*	*Vallisneriaspiralis*	*Typha*sp. *Phragmitesaustralis*	*Myriophyllum spicatus* *P. perfolitus* *Typha domengensis*	*Potamogetonpectinatus*
2	*Mariophyllum verticillatum* *Ceratophyllum dermersum*	*Najasarmata*	*Phragmitesaustralis*	*Vallisneria spiralis*	*Potamogetonpectinatus*
3	*Potamogeton crispus* *Ceratophyllum dermersum*	*Phragmitesaustralis*	*Phragmites*sp.	*M.verticillatum*	*Ceratophyllum dermersum*
4	*Potamogeton crispus*	*Ceratophyllumdermersum*	*Potamogetonpectinatus*	*Potamogeton pectinatus*	*Potamogeton pectinatus*
5	*Hydrochartaceous* sp. *Ceratophyllum dermersum*	*Potamogeton pectinatus*	*Najasarmata*	*Phragmites australis*	*Ottelia alisnoides*

3-Conclusion and Recommendation

Environmental monitoring used to boundaries environmental with any changes of Iraqi marsh by periodically time (monthly or weekly) to assess and determine the nature reserved of marshes to control the dominated plants and organism and water flow, especially the properties physical and chemical in study area and developing new data very important to effectively control and monitor to get biodiversity aims and challenges starting with indicators global apply in network to support reporting .Aquatic plants diversity achieved with a clean environment and the level of water being stable with a temperate climate to get a better ecological character. Restoration in material marshes of water quality.

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