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Ecological Survey of Aquatic Macrophytes in Restored Marshes of Southern Iraq during 2006 and 2007

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Abstract

Ecological survey of six sites in three main restored marshes (Huwaiza, Chebaish and East Hammar) was carried out during 2006 and 2007 to study the re-establishment and distribution of aquatic macrophytes. A total of 44 species were recorded, only 1 exotic (*Hydrilla verticillata*) was found in all three marshes after inundation. *Ricciocarpus natans* (Bryophytes) was new record in Chebaish marsh, while *Cyperus aucheri, Torulinium odoratum* , badderwort (*Utricularia australis*) and saw grass (*Cladium mariscus*) were observed in Huwaiza marsh for the first time in this study. The highest number of aquatic plants was registered in Huwaiza marsh (35) in comparison with Chebaish (27) and E.Hammar marsh (24). The present study showed that the aquatic macrophyte species restoration percentage were 97.22%, 61.36% and 63.15% in Huwaiza, Chebaish and E.Hammar marsh respectively.

1- Introduction:

The Mesopotamian marshes were considered as the largest wetland ecosystem in the Middle East and Western Eurasia covered more than 15,000 km^2 (Al-Hilli, 1977; Maltby, 1994; Nicholson and Clark, 2002; Richardson, 2008). The importance of these marshes is due to their historical, economic, social and environmental values characterized by frequency of water flows, accumulation of nutrients, organic matter and the production of commercially important vegetation and fish. They play a key role in the intercontinental flyway of

migratory birds, support endangered species (UNEP, 2001; Stevens and Alwash, 2003; USAID, 2004). Iraqi regime drained these marshes in the 1990s, turning 95% of that wetlands to desert (UNEP, 2001). Since early 2003, the marshes total surface area was expanded from seven per cent to 41% of their maximal extent in the early 1970s, but the most recent estimates in December 2006 indicate that they reach 58% of its original size (UNEP, 2007).

The presence of macrophytes is one of the defining features of wetlands. They play as vital part in structure and function of aquatic ecosystems by altering water movement regimes (Chambers *et al*., 1999; van der Valk, 2006), providing shelter, food for many levels of wildlife, and at the same time produce oxygen needed by animals (Chambers *et al*., 2008), taking up nutrient, releasing dissolved organic matter, increasing sedimentation (Sand-Jensen, 1998; Schallenberg and Waite, 2004) and improving water clarity (Scheffer *et al*., 1993).

Vascular aquatic macrophytes have a wide distribution all over the world and many of them are cosmopolitan. The vegetation covering land surface is main component of biosphere. The vegetation of aquatic plants plays a very important role on the natural environment conservation and improvement to keep human beings living environment evergreen while the vegetation supplies many resources to human living and development continuously.

The objectives of present study were: 1) Collection and identification of plant species in marshes after inundation. 2) Determination of restoration percentage of species and comparing it with recent and historical studies. 3) To survey the extent and distribution of macrophytes.

2- Materials and Methods

Study sites

Huwaiza marsh

Historically Huwaiza marsh covered approximately at least 3,000 km^2 expanding to over 5,000 km^2 during the floods (UNEP, 2007). It lies to the east of the Tigris, extending towards the Iraqi-Iranian border. Two sites were selected to represent the vegetation patterns in the marsh. Um-Alwared(S1) with shallow water and dense vegetation and GPS reading (N 31 34 20. E 47 31 28) Um-Al-Naaj(S2) with deep and open water and GPS reading (N 31 36 06. E 47 42 12). Huwaiza marsh is non tidal freshwater marsh and representing the best remaining natural marsh in the original Mesopotamian wetlands, dominated by dense stands of *Phragmites australis*.

Chebaish marsh

Its part of Central marshes situated towards the west of Tigris River and north of the Euphrates, delimiting by the triangle

between the towns of Al-Nasiriyah, Al-Amarah and Al-Qurnah. Abosobat(S3) a river-like canal with dense vegetation located in (N 30 58 15. E 47 02 21) and Abocholan(S4) a new reflooded area located in (N 30 57 48. E 47 04 80) were selected in Chebaish. Its non tidal oligosaline marsh, receives water from Euphrates. Almost the entire area is covered by tall reed-beds of *Phragmites australis* and *Typha domingensis*. Central marshes covered an area of about 3,000 km^2 extending to over 4,000 km^2 during flood periods (UNEP, 2007).

East Hammar marsh

Situated almost entirely south of the Euphrates, extending from near Al-Nasiriyah in the west to the outskirts of Basra on the Shatt-al-Arab in the east. Their surface area covered 2,800 km^2 of continuous permanent marsh. Two sites were chosen in E. Hammar marsh, Burga (S5) at the end of Junction Mashab and Salal (N 30 39 99. E 47 39 65) and Nagara (S6) with open water (N 30 40 07. E 47 38 56). Its tidal marsh with brackish water long 120 km and formerly the largest water body in the lower Euphrates (UNEP, 2007).

Macrophytes

Aquatic and semi aquatic macrophytes were collected by walking around and throughout marshes. Monthly surveys of marshes starting in January 2006 to December 2007 in order to collect the highest number of species. Samples were taken to the laboratory for confirmative identification and deposited in Basra University Herbarium BSRA. The plants were identified based on Flora of Iraq (Townsend *et al*., 1968; Al-Saadi and Al-Mayah, 1983; Townsend and Guest, 1985; Al-Mayah and Al-Hemeim, 1991). Presence or absence of plant species was recorded in each site of the marshes monthly.

Restoration percentage

A restoration percentage calculated as the number of species present now compared to historical records (Reference study of Al-Mayah , 1994).

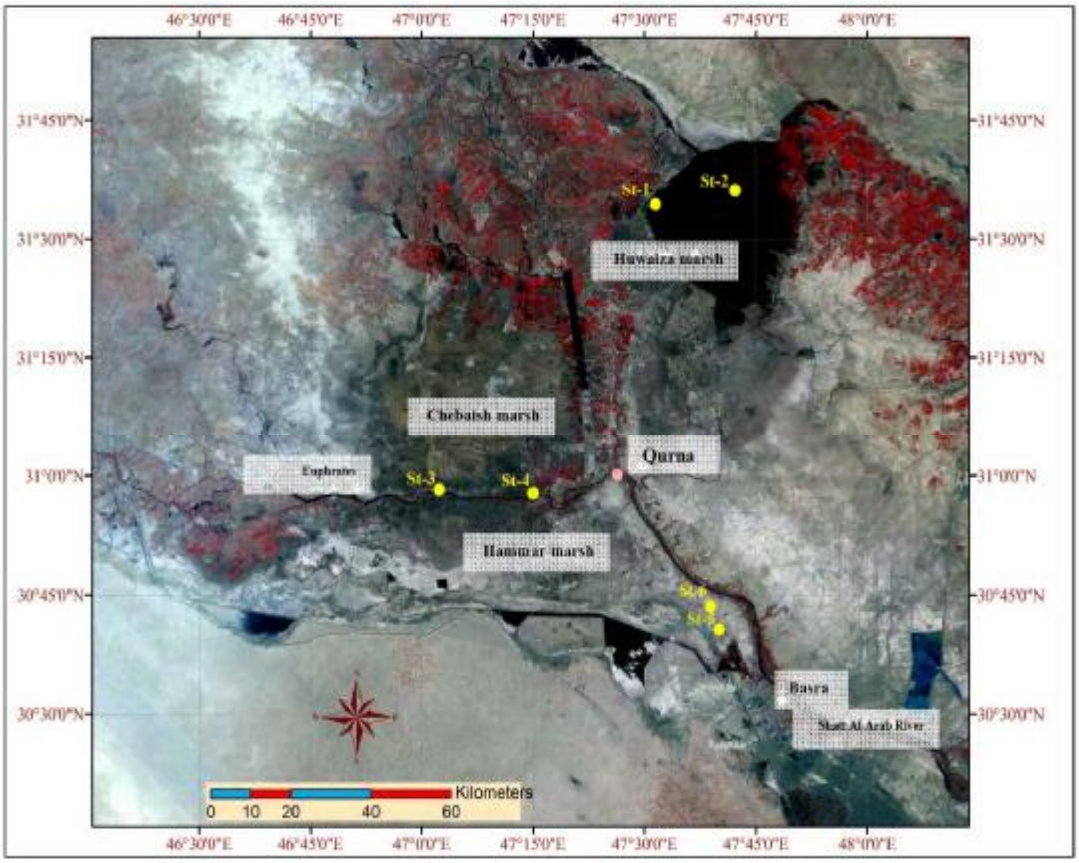

Figure 1: Samples sites from study area. (source: Google earth)

3-Results

In Southern Iraqi marshes 44 macrophytes species included 13 dicot, 28 monocot and one species of moss, fern and macroalgae were collected and identified during January 2006 to December 2007; twelve of which were submergent, 6 floating, 11 emergent , 13 wet and one non-native submergent species (Tables 1,2&3). Total aquatic plant species recorded in Huwaiza marsh was 35, while it was 27 and 24 in Chebaish and E. Hammar marsh respectively (Fig. 2). Digital photographs of some aquatic macrophytes presence in study sites were shown in figure 3.

Figure 4 showed the composition of aquatic plant groups (%) in each studied marsh. Wet and emergent plants had the highest percentage in Huwaiza marsh, while the submergent plants have highest percentages in E.Hammar and Chebaish marshes. Where as the lowest percentage of floating plants was recorded in E.Hammar compared with other two marshes.

Herbaceous plants were the dominated species (35) recorded in the studied marshes and 6 grass species and only one species of each of macroalgae, fern and moss (Fig.5).

Tables 4&5 explained presence of aquatic vascular plants in each marsh during 2006 and 2007. The occurrence of aquatic plants in 2006 was as follow: Stations S1 and S2 registered 22 species and were similar in 19 species, while S3 and S4 registered 22 and 19 species respectively and were similar in 17 species. In S5 and S6, total number of species reached 19 and 15 respectively with 15 similar species between both stations. It was clear that number of species increased in all studied stations during 2007 in comparison with 2006.

Similarity among different studied stations was showed in cluster analysis in figures 6&7. Jaccard index (Ss) showed that the highest similarity was between Chebaish and E.Hammar that reached 59% (Table 6).

Restoration percentage were calculated and showed that the highest value was recorded for Huwaiza marsh reached 97.22%, while it was 63.15% and 61.36% for E. Hammar and Chebaish marshes respectively. The highest value of restoration was recorded for submergent group comparing with other groups (Table 7).

Figure 2: Number of aquatic macrophytes recorded in southern Iraqi marshes during 2006-2007.

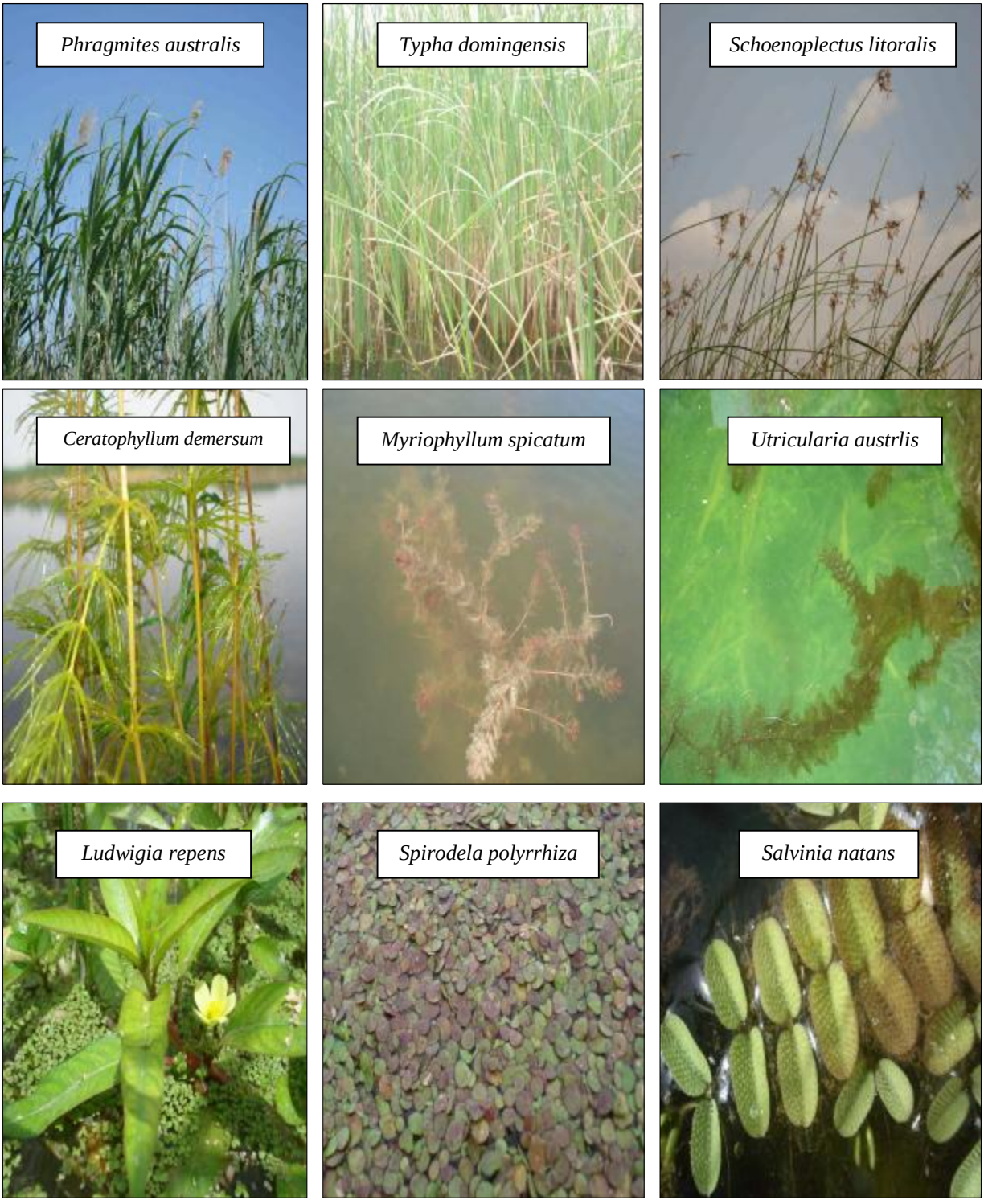

Figure 3: Digital photographs of some aquatic macrophytes presence in study sites. (Photo: D.A.Al-Abbawy)

Table1: List of monocot aquatic macrophyte species present in southern Iraqi marshes during 2006-2007

Family	Plant Species	Common Name	Habitat	Habit
Cyperaceae	*Bolboschoenus maritimus* (L.) Palla	seacoast bulrush	emergent	herb
Cyperaceae	*Cladium mariscus* (L.) Pohl.	Great fen-Sedge , saw grass	emergent	herb
Cyperaceae	*Cyperus aucheri* Jaub.et Sp.	Sedge	emergent	herb
Cyperaceae	*Cyperus laevigatus* L.	smooth flatsedge	emergent	herb
Cyperaceae	*Cyperus malaccensis* Lam		emergent	herb
Cyperaceae	*Cyperus michelianus* (L.)Del.		wet	herb
Cyperaceae	*Fimbristylis sieberiana* Kunth.		wet	herb
Cyperaceae	*Schoenoplectus litoralis* (Schrad) Palla	Bulrush , club-rush , tule	emergent	herb
Cyperaceae	*Torulinium odoratum* (L.) S.S.Hooper	fragrant flatsedge	wet	herb
Hydrocharitaceae	*Hydrilla verticillata* (L. f.) Royle	waterthyme,hydrilla,esthwaite water weed	submergent	herb
Hydrocharitaceae	*Vallisneria spiralis* L.	Wild celery , straight vallisneria, tape grass	submergent	herb
Lemnaceae	*Lemna gibba* L.	windbags , swol en duckweed , inflated duckweed , fat duckweed	floating	herb
Lemnaceae	*Lemna minor* L.	common duckweed , lesser duckweed	floating	herb
Lemnaceae	*Spirodela polyrrhiza* (L.) Schleid.	Great duckweed, Giant duckweed	floating	herb
Najadaceae	*Najas marina* L.	spiny naiad, Holly-leaved naiad	submergent	herb
Najadaceae	*Najas minor* All.	brittle water nymph	submergent	herb
Poaceae	*Arundo donax* L.	grain reed	emergent	grass
Poaceae	*Diplachne fusca* (L.) P. Beauv.		wet	grass
Poaceae	*Panicum repens* L.	creeping panic-grass, torpedo grass	wet	grass
Poaceae	*Paspalum paspaloides*(Michx)Scrib	Bahiagrass, paspalum	wet	grass
Poaceae	*Phragmites australis* (Cav.) Trin.ex Steud.	Common reed	emergent	grass
Poaceae	*Polypogon monspeliensis* (L) Desf.	beard grass, Rabbits foot grass	wet	grass
Potamogetonaceae	*Potamogeton crispus* L.	Curley leaf pondweed	submergent	herb
Potamogetonaceae	*Potamogeton lucens* L.	Shining pondweed	submergent	herb
Potamogetonaceae	*Potamogeton pectinatus* L.	sago pondweed , fennel pondweed	submergent	herb
Potamogetonaceae	*Potamogeton perfoliatus* L.	perfoliate pondweed	submergent	herb
Typhaceae	*Typha domingensis* Pers.	Cattail , corn dog grass , punks	emergent	herb
Zannichelliaceae	*Zannichellia palustris* L	Horned pondweed, common poolmat	submergent	herb

Table2: List of dicot aquatic macrophyte species present in southern Iraqi marshes during 2006-2007

Family	Plant Species	Common Name	Habitat	Habit
Amaranthaceae	*Alternanthera sessilis* (L.) R. Br. ex DC.	alligator weed	emergent	herb
Asclepiadaceae	*Cynanchum acutum* L.	rabbit-footgrass , bread grass	wet	herb
Asclepiadaceae	*Oxystelma esculentum* R. Br.	rose-colored asclepias	wet	herb
Asteraceae	*Eclipta alba* L.	false daisy	wet	herb
Ceratophyllaceae	*Ceratophyllum demersum* L.	hornwort, coontail , Rigid hornwort	submergent	herb
Haloragaceae	*Myriophyllum spicatum* L.	Eurasian watermilfoil,Spiked water-milfoil	submergent	herb
Lamiaceae	*Lycopus europaeus* L.	Gypsywort , Egyptians herb	wet	herb
Lentibulariaceae	*Utricularia australis* R. Br.	Bladderwort	submergent	herb
Onagraceae	*Ludwigia repens* L.	Water primrose large-flower primrose-willow	floating	herb
Primulaceae	*Samolus valerandi* L.	Water pimpernel,water cabbage, Brook weed	wet	herb
Ranunculaceae	*Ranunculus aphereospermus* L.	White water crowfoot	submergent	herb
Scrophulariaceae	*Bacopa monnieri* (L.) Penn.	Dwarf bacopa , baby tears, smooth water hyssop,herb of grace	emergent	herb
Verbenaceae	*Phyla nodiflora* (L.) Greene	Carpet grass, hairy frogfruit	wet	herb

Table3: List of mosses, ferns and macroalgae present in southern Iraqi marshes during 2006-2007

Plant Species	Common Name	Habitat	Habit
Ricciocarpas natans (L.) Corda		floating	mosses
Salvinia natans (L.) All.	floating waretfern, water spangles	floating	fern
Chara vulgaris Valliant	muskgrass ,muskwort	submergent	algae

Table 4: Occurrence of aquatic plants species in different stations of southern Iraqi marshlands during 2006

Species	Huwaiza		Chebaish		E.Hammar	
	S1	S2	S3	S4	S5	S6
Alternanthera sessilis	+	+	+	-	-	-
Arundo donax	-	-	-	-	-	-
Bacopa monnieri	-	-	+	+	-	-
Bolboschoenus maritimus	-	-	-	-	-	-
Ceratophyllum demersum	+	+	+	+	+	+
Chara vulgaris	-	-	+	-	+	+
Cladium mariscus	-	-	-	-	-	-
Cynanchum acutum	-	-	-	-	-	-
Cyperus aucheri	-	-	-	-	-	-
Cyperus laevigatus	+	+	-	-	-	-
Cyperus malaccensis	-	+	-	-	-	-
Cyperus michelianus	-	-	-	-	-	-
Diplachne fusca	-	-	+	+	+	+
Eclipta alba	+	+	-	+	-	-
Fimbristylis sieberiana	-	-	-	-	-	-
Hydrilla verticillata	+	+	+	+	+	-
Lemna gibba	+	+	-	-	-	-
Lemna minor	+	+	+	+	+	-
Ludwigia repens	+	+	-	-	-	-
Lycopus europaeus	-	-	-	-	-	-
Myriophyllum spicatum	+	+	+	+	+	+
Najas marina	+	+	+	+	+	+
Najas minor	-	-	-	-	+	-
Oxystelma esculentum	-	+	-	-	-	-
Panicum repens	+	-	-	-	+	-
Paspalum paspaloides	+	+	+	-	+	+
Phragmites australis	+	+	+	+	+	+
Phyla nodiflora	-	-	+	-	-	-
Polypogon monspeliensis	-	-	-	-	-	-
Potamogeton crispus	+	+	+	+	+	+
Potamogeton lucens	+	+	+	+	+	+
Potamogeton pectinatus	+	+	+	+	+	+
Potamogeton perfoliatus	+	+	+	+	+	+
Ranunculus sphaerospermus	+	+	+	+	-	-
Ricciocarpas natans	-	-	-	-	-	-
Salvinia natans	+	+	+	+	+	+
Samolus valerandi	-	-	-	-	-	-
Schoenoplectus litoralis	+	-	+	+	+	+
Spirodela polyrrhiza	+	+	-	-	-	-
Torulinium odoratum	-	+	-	-	-	-
Typha domingensis	+	-	+	+	+	+
Utricularia australis	-	-	-	-	-	-
Vallisneria spiralis	-	-	+	+	+	+
Zannichellia palustris	-	-	+	-	-	-

Table 5: Occurrence of aquatic plants species in different stations of southern Iraqi marshlands during 2007

Species	Huwaiza		Chebaish		E.Hammar	
	S1	S2	S3	S4	S5	S6
Alternanthera sessilis	+	+	+	-	-	-
Arundo donax	-	-	-	-	-	-
Bacopa monnieri	-	+	+	+	-	-
Bolboschoenus maritimus	-	-	-	+	-	-
Ceratophyllum demersum	+	+	+	+	+	+
Chara vulgaris	-	-	+	-	+	+
Cladium mariscus	-	+	-	-	-	-
Cynanchum acutum	+	+	-	-	-	-
Cyperus aucheri	-	+	-	-	-	-
Cyperus laevigatus	+	+	-	-	+	+
Cyperus malaccensis	+	-	-	-	+	+
Cyperus michelianus	-	+	-	-	-	-
Diplachne fusca	-	-	+	+	+	+
Eclipta alba	+	+	+	+	-	-
Fimbristylis sieberiana	-	-	+	-	-	-
Hydrilla verticillata	+	+	+	+	+	+
Lemna gibba	+	+	-	-	-	-
Lemna minor	+	+	+	-	-	-
Ludwigia repens	+	+	-	-	-	-
Lycopus europaeus	-	+	-	-	-	-
Myriophyllum spicatum	-	-	+	+	+	+
Najas marina	+	+	+	+	+	+
Najas minor	-	-	-	-	+	-
Oxystelma esculentum	+	+	-	-	-	-
Panicum repens	+	+	-	-	+	-
Paspalum paspaloides	+	+	+	-	+	+
Phragmites australis	+	+	+	+	+	+
Phyla nodiflora	+	+	+	+	-	-
Polypogon monspeliensis	+	-	-	-	+	-

Potamogeton crispus	+	+	+	+	+	+
Potamogeton lucens	+	+	+	+	+	-
Potamogeton pectinatus	+	+	+	+	+	+
Potamogeton perfoliatus	+	+	+	+	+	+
Ranunculus sphaerospermus	+	+	+	+	-	-
Ricciocarpas natans	-	-	+	-	-	-
Salvinia natans	+	+	+	+	-	-
Samolus valerandi	-	+	-	-	-	-
Schoenoplectus litoralis	-	-	+	+	+	+
Spirodela polyrrhiza	+	+	-	-	-	-
Torulinium odoratum	+	+	-	-	-	-
Typha domingensis	+	+	+	+	+	+
Utricularia australis	-	+	-	-	-	-
Vallisneria spiralis	-	-	+	+	+	+
Zannichellia palustris	-	-	+	-	+	+

Table 6: % Similarity (Jaccard index) among studied marshes during 2006-2007

Marsh	%Similarity (Ss)
Huwaiza & Chebaish	44.18
Huwaiza & E.Hammar	43.90
Chebaish & E.Hammar	59.37

Table 7: Comparison number of Aquatic plant species recorded before desiccation and in restored marshes (present study) with % restoration.

Marsh	Group	Before desiccation	Present study	Restoration %
	Submergent	6	10	166.66
	Floating	6	5	83.33
Huwaiza	Emergent	12	9	75.00
	Wet	12	11	91.66
	Total	**36**	**35**	**97.22**
	Submergent	16	12	75.00
	Floating	9	3	33.33
Chebaish	Emergent	12	6	50.00
	Wet	7	6	85.71
	Total	**44**	**27**	**61.36**
	Submergent	12	12	100.00
	Floating	8	2	25.00
E.Hammar	Emergent	10	5	50.00
	Wet	8	5	62.50
	Total	**38**	**24**	**63.15**

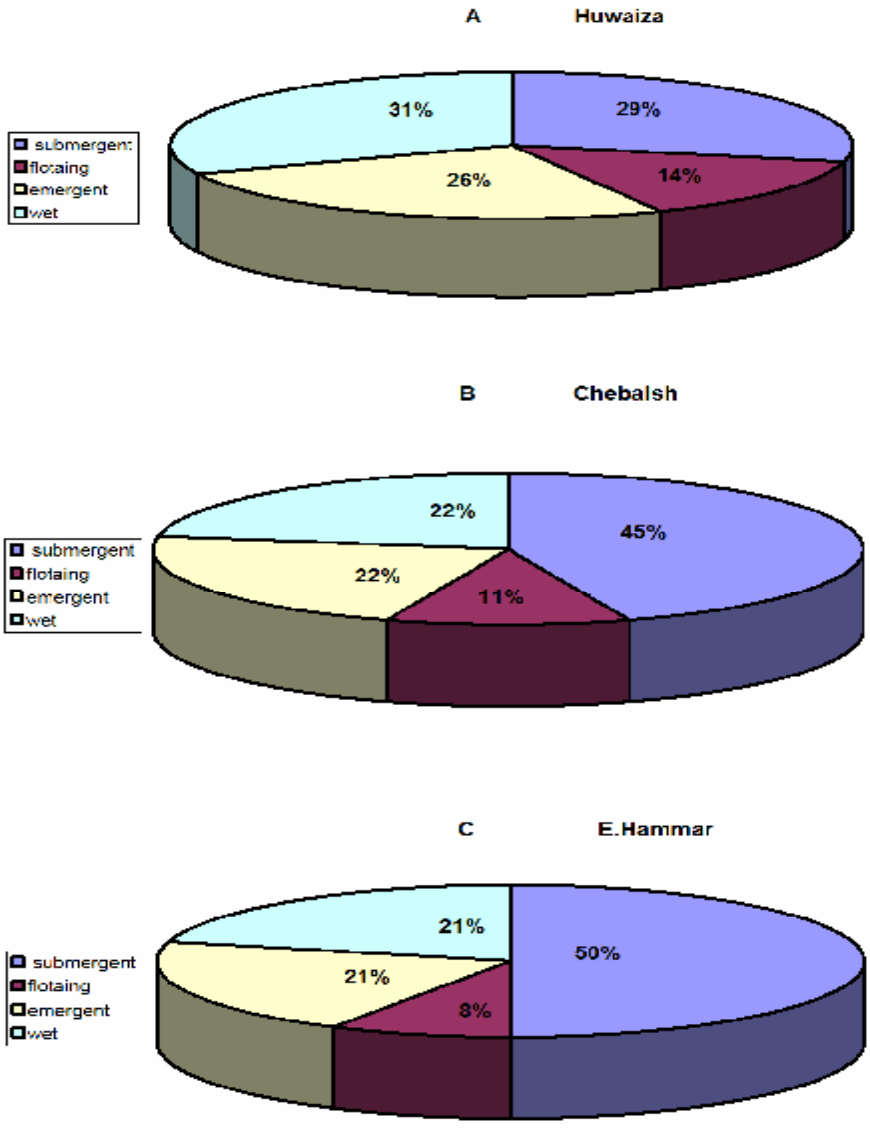

Figure 4: Composition of different plant groups in three southern Iraqi marshes during study period

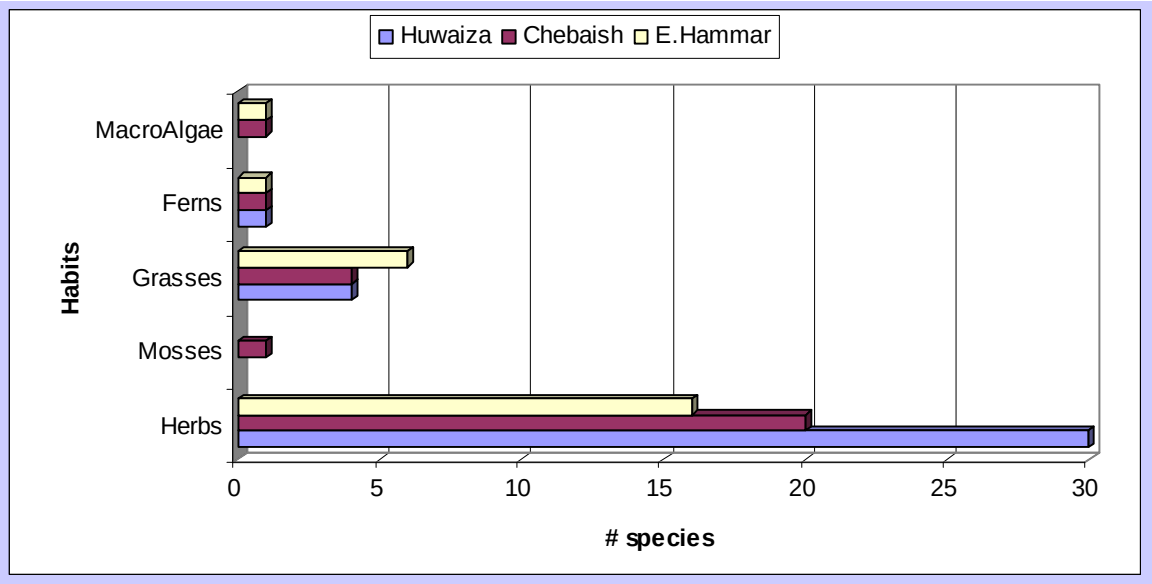

Figure 5: Habits of different aquatic plant species occurred in southern Iraqi marshes

4- Discussion

Many aquatic plants were disappeared because of the mass destruction of the Mesopotamian Marshes during the late 1980s and 1990s resulted in a severe decline of marshes extent by 2000 (UNEP, 2001), while only a slight part of the north-eastern part of Huwaiza marsh was remained.

After restoration 2003 significant and rapid environmental change has taken place in the Iraqi marshes. IMOS (UNEP, 2007) showed that an exceptional recovery process is underway and the present data showed and emphasized this fact. Different aquatic plant species were observed in all marshes and Huwaiza marsh was the highest one in the number of plant species. Five species occurred just in Huwaiza marsh included: *Cladium mariscus, Cyperus aucheri, Spirodela polyrrhiza, Panicum repens* and *Utricularia australis.* In Chebaish there were *Bolboschoenus maritimus* and *Fimbristylis sieberiana,* while E.Hammar marsh was unique in *Najas minor.*

Lowest numbers of species recorded in Chebaish and E.Hammar in compared with Huwaiza marsh may due to that the Chebaish and E.Hammar marshes were almost totally desiccated by 2000 (Richardson *et al.*, 2005). The increase influencing of semi tidal brackish water flowing from the Shatt-al-Arab into the

marsh may preventing reestablishment of some freshwater species.

Large quantities of water entered southern Iraqi marshes gave a chance for aquatic plants to reestablish and expand distribution throughout the marshes. Santamaria (2002) explained the dispersal potential of aquatic plants, either through water movement or biota movements, influences the composition and functioning of their ecosystems. Uniformity of the aquatic environment, clonal reproduction, high dispersal rates, and plasticity are some points of view that could give explanation to the wide distribution of aquatic plants in southern Iraqi marshes.

The survey is an important tool for the conservation strategies, it is important to have investigating the past and present status of the vegetation. Knowledge of the past status of a marsh can provide insight into the chances of restoration or rehabilitation work being successful. The aquatic macrophytes restoration, and its growth and development, depend largely on life history traits and strategies (Rolon and Maltchik, 2004; Tremolieres, 2004). The present data showed that the Iraqi marshland plants vary mainly herbaceous, occasionally shrubby in nature and mostly perennial.

The survey gave a primary picture of aquatic plants in marshes after inundation in 2003. Because of shallow water of different marshes, three main emergent plants *Phragmites australis*, *Typha domingensis* and *Schoenoplectus litoralis* appeared to establish fast and composed extended clonals. These *Phragmites australis* clones occurred across the marshes. They are found in a variety of marsh settings, most commonly in quiet-water areas in Huwaiza (non tidal freshwater marsh), but also in running water as in Chebaish (channel marsh) and E.Hammar (tidal marsh).

The vegetation of studied Iraqi marshes is also dominated by *Typha domingensis* and *Schoenoplectus litoralis* in Chebaish and E.Hammar with scattered of these plants in Huwaiza. Numbers of emergent plant species were higher in Huwaiza marsh comparing with other marshes.

During study period, there was a continues water quantity entering the marshes, the matter led to or gave the chance for different species of submergent plants to reestablish again in all marshes. The highest number of all different groups was recorded for submergent plants especially in Chebaish and E.Hammar. The species *Ceratophyllum demersum* and *Potamogeton* spp. exhibited all marshes.

Macrophyte surveys allow identifying invasive species of macrophytes such as *Hydrilla verticillata* recorded in southern Iraqi marshes. This species may tend to over populate water resources forming dense canopy (Langeland, 1990), and can regenerate from small cuttings, out-compete native species, die early and release nutrients, and in-turn create poor aesthetics (Owens *et al*., 2001; Walley, 2007), so it will be a big problem in the future.

Few species of floating plants were observed during present survey in southern Iraqi marshes with no record to *Nymphoides indica* and *N. peltata.* Disappearing of some floating plants may be explained by that desiccation associated with prolonged drawdown was fatal to survival of the seedling (Shibayama and Kadono, 2007).

Cluster analysis explained that each marsh station were in the same pattern marsh, it means that both of marsh stations were closed to other in species taxa and occurrence and that may refer to same condition of marsh environment. Overall, Similarity index indicated that both Chebaish and E.Hammar were closed marshes 59.37%.

Comparing present data with historical data, exhibit that 167% were recorded to submergent plants in Huwaiza marsh and this is an indication on its restoration. This high percentage of restoration may refer to the lack of considerable surveys about submergent plants before desiccation especially in Huwaiza marsh, while the lowest percentage 75% in Chebaish marsh means that this marsh needs more time to restoration. The main problem observed in present survey was the low percentages in both Chebaish and E.Hammar marshes.

Overall, Table 8 showed that Huwaiza marsh had the highest number of species with restoration percent reached 97.22%. A recent comparison of numbers of aquatic macrophytes species recorded in all studied marshes during present study versus other studies shows that the marshes are continuing to improve in species richness and macrophyte restoration.

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Table8 : Comparison of the number of aquatic macrophytes species in historical study and recent studies(after restoration).

Marsh	Reference study	Recent Studies					
	Al-Mayah, 1994	IMRP, 2006	Alwan, 2006	ARDI, 2007	Al- Kenzawi, 2007	Mahmoud, 2008	Present study
Huwaiza	36	8	8	10	-	14	35
% Restoration		22.22	22.22	27.78	-	38.89	97.22
Chebaish	44	-	22	-	28	-	27
% Restoration		-	50	-	63.63	-	61.36
E. Hammar	38	11	14	14	-	11	24
% Restoration		28.2	35.89	35.89	-	28.2	63.15

It can be concluded that restoration of Iraqi marshes to their full 1970s extent clearly depends on the amount of water available in the Tigris-Euphrates river system, in addition to hydrogeomorphology condition of marshes, but nevertheless future studies need to estimate the maturity and development of aquatic populations.

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مسح بيئي للنباتات المائية في اهوار جنوب العراق خلال عامي 2006 و 2007

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الخلاصة

اجري مسح لستة مواقع في ثلاثة اهوار رئيسة جنوب العراق (الحويزة والجبايش وشرق الحمار) خلال عامي 2006 و 2007 بهدف دراسة استرجاع وتوزيع النباتات المائية. تم تسجيل 44 نوعا نباتيا منها نوع واحد دخيل هو *Hydrilla verticillata* تم العثور عليه بعد أغمار الاهوار الثلاثة. سجل الحزاز *Ricciocarpus natans* لأول مرة في هور الجبايش بينما لوحظت نباتات *Cyperus aucheri* و *Torulinium odoratum* وعشب المثانة *Utricularia autralis* و الجريح *Cladium marisicus* في هور الحويزة لأول مرة في هذه الدراسة. سجل اكبر عدد من النباتات المائية في هور الحويزة (35) بالمقارنة مع هور الجبايش (27) وهور شرق الحمار (24). أظهرت الدراسة الحالية نسب استرجاع النباتات المائية وبلغت 97.22 % و 61.36 % و63.15 % في كل من هور الحويزة والجبايش وشرق الحمار على التوالي.