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Limnological Study of Sonhoro, Mehro Pateji and Cholari Lakes of District Badin, Sindh Pakistan

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Abstract: The Tidal Link is constructed to dispose off the drainage water from Nawabshah, Sanghar, Mirpurkhas and Badin districts to Shah Samando Creek. It is connected with brackish water lakes belonging to Run of Kuch and Shah Samando Creek of Arabian Sea in District Badin. These lakes were examined in terms of biological life and water quality. The Sonhoro and Mehro are saline lakes rich in primary productivity with 114 species of algae, 17 species of aquatic plants and five species of fresh water fish. Among the fishes *Cirrhinus mirgala*, *Channa marulia*, *Notopterus notopterus*, *Oreochromis mossambicu's*, *Rita rita*, *Wallagoattu* were identified and all are commercially important. Water quality revealed, value of pH as 7.7-8.0, conductivity, 2.74-9.97 mS/cm and salinity 1.5-5.9 ppt with a number of nutrients. Pateji and Cholari are brackish water lakes. Majority of algal flora belong to Bacilliarophyta, Cyanophyta and *Enteromorpha* species of Chlorophyta. Beside, 28 species of fish and 8 species of shrimps were identified.

Key words: Limnology, Brackish water, Phytoplankton, Fishes

Introduction

In order to decrease water logging and salinity problem in Nawabshah, Sanghar, Mirpurkhas and Badin districts, Left Bank Outfall Drain (LBOD) Project was carried out. The drainage through the Kadhnan Pateji Outfall Drain (KPOD) are connected to Tidal Link. The Tidal Link also feeds water to Cholari, Pateji, Sonhoro and Mehro Lakes through Cholari Weir. The lake cover an area of about 70 square km. All the lakes are shallow with the depth ranging 2-6 feet. The lakes are located at 25-30 KM east and south of Badin city lying between 24-25°N. Latitude arid 68-69°E. Longitude (Map No. 1). Left Cholari is connected with Runn of Koch. Cholari Right, Pateji, Sonhoro and Mehro are connected to Shah Smando Creek Arabian Sea via Tidal Link canal.

Cholari weir serves dual purpose in providing the water from Shah Samando Creek to the lakes arid for the drainage back of the water from the lakes to the Sea. Sonhoro and Mehro lakes receives surplus water from the irrigated canals, agricultural lands and water logged area through the drains. These lakes are in natural depression, rich in nutrients which support the biological life. Some limnological work available an the fresh water lakes of Sindh, Kinjhar and Haleji, includes Baqai *et al.* (1974 a, b), Nazneen (1974, 1980) and Khuahawar *et al.* (1999). Baker lake (Leghari and Khuahawar, 1999), Hub lake (Iqbal, 1986) Manchar lake (Baig and Khan, 1976; Khuahawar and Mastoi, 1995). The present work examines the biological life and water quality of drains and saline brackish water lakes of District Badin to assess the feasibility of fisheries development.

Materials and Methods

Pateji, Cholari, Sonhoro, Mahro (Karoghanchro) lakes were examined during July to October 1997. Plankton samples were collected by using 25 µm plankton net and hand picking method. The plankton samples were preserved and stored in 13.4%) formaline. Aquatic plants were collected manually tram various location. For taking out from the bottom of the lakes a plant grapnel was used.

Samples of various kind of algae were collected manually from shallow and marginal area of the lakes. Epiphytic algae were Scraped off from the leaves and stems of emergent and submerged plants.

Fishes were collected by using hand nets and from the lending centres.

Water sampling was carried out during July to October 1997 with an interval of about two weeks. Time of collection of the sample varied within 11.0 a.m to 6.30 p.m. The temperature of water and air (1m) above the surface varied within 25.33.7°C and 25-37°C respectively.

The water samples from Cholari, Pateji, Sonhoro and Mehro were collected about 50-100 meters from the side of the lake. The water samples from Sonhoro lake (Kara Ghanghro) upto 34 km inside Sonhoro lake and 6-12 km towards the Cholari weir were collected from the boat. At each sampling station, boat was stopped and when turbulence created in the water due to the movement of the boat subsided, the water sample was collected.

The water sample was transferred to precleaned 2.5 litre brown glass bottle. The Meyers sampling bottle was allowed to dip to required depth and the rope attached to the open mouth of the bottle was pulled to open the bottle and was filled.

At the time of collection of sample temperature of water and air (1m) above the surcface of water) were taken by mercury thermometer. Transparency was measured by Secchi disk, electrical conductivity and salinity were recorded by WTW LF320 conductivity meter, pH measurements were made on Orion model 420A pH meter.

The total residue was obtained by weighing the material left after evaporation of well mixed sample (100 ml) and drying the residue at 105°C. The filterable residue (TDS) was obtained by, evaporation, the filtrate and weighing the material left after drying at 105°C. The samples were analysed for chloride, alkalinity and hardness by titration of their known amounts with standard silver nitrate, hydrochloric acid and E.D.T.A respetively. Dissolved oxygen determination was carried out by Wrinkler's method. Total phosphate, silica and ammonia were determined by spectrophotometry (Framan,1981).

Results and Discussion

The Sonhoro, Mehro, Cholari and Pateji are brackish water lakes and are inter connected with each other (Map 2). Sonhoro and Mehro lakes receive surplus water through the

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Table 1: Water Chemistry of Drains, Sonharo, Mehro Pateji and Cholari Lakes of District Badin Sindh, Pakistan

Parameters	Drains Water	Sonahro and Mehra	Pateji, Choari and Cholari Weir
pH	8.28	7.7-8.5	8.21
Conductivity m/s per cm	2.74	3.68-9.97	11.88-31.2
Salinity PPT	1.5	2.1-5.9	8-22.2
Hardness mg/L CaCO ₃	750	633-1150	1660-2362
Cl. mg/L	524	1180-2765	1365-4845
TDS mg/L	1643	2355-6340	7603-19100
Dissolved oxygen mg/L	7.7	4-6.76	4.5-5.7
T. Hydrolysable	12-41	40-230	80-120
Phosphate ug/L			
Silica mg/L	0.27-0.8	33-6	6.2
Ammonia. mg/L	0.20	0.2-0.5	0.50

Table 2: Aquatic Plants Recorded from Sonharo, Mehro Pateji and Cholari Lakes of District Badin Sindh, Pakistan

Name of Plants	Sonahro and Mehra Lake	Pateji	Cholari
Free floating			
Azolla pinnata R. Brown	+	-	-
Lemna minor Linnaeis	+	+	-
Pistia stratiotes Linnaeis.	-	-	-
Present in Serani Drain.			
Attached floating			
Ipomoea aquatica Forsskar	+	-	-
Nymphaea strobilata Will,	+	-	-
Submerged			
Ceratophyllum demersum Linnaeis	+	+	-
Hydrilla verticillata (Linnaeis) Royle	+	+	-
Myriophyllum spicatum Linnaeis	+	+	-
Najas minor Alloni	+	-	-
Najas Major Linnaeis	+	+	-
Potamogeton pectinatus Linnaeis	+	+	+
Potamogeton natans Linnaeis	+	-	-
Emergent			
Typha domogensis Rox	+	-	-
Phragmites communis Trin	+	-	-
Jussiaea repens Foster	+	+	-
Scirpus articulatus Linnaeis	+	+	-

- absent, present, + 4 + Presnet in abundant , + + + dominant

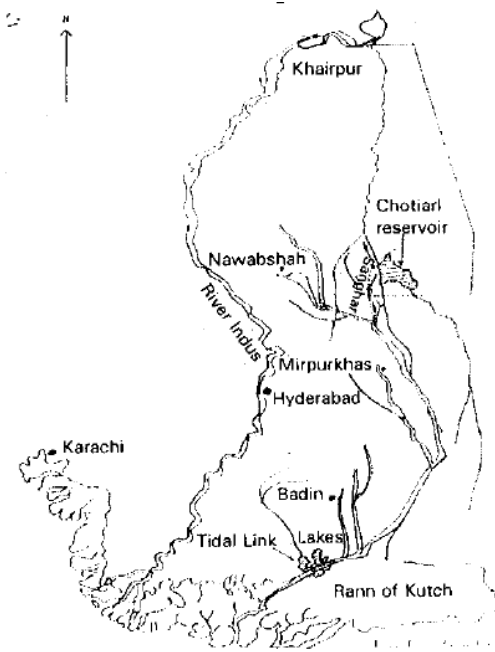
Table 3: Phytoplanklans and Algae Recorded from Sonahro, Mehra, Pateji and Cholari Lakes District Badin Sindh, Pakistan

Name of specie	Sonahro, Mehro arid Drains	Pateji	Cholari
	1	2	3
CHLOROPHYTA			
<i>Marrgatia</i> sp	+	-	-
<i>Spirogyra thiviatiis</i> Helge	+	+	-
<i>S. rhizobracrialls</i> Jiro	+	-	-
<i>S. nitkia</i> Link	+	-	-
<i>S. irangata Kuteing</i>	+	-	-
<i>Euglena aces</i> Ehre	+	-	-
<i>Erythraea</i> sp.	+	-	-
<i>Nephroc-ytiurn nacsunt</i> W. West	+	-	-
<i>Nephrotyiarr agarahlanaro</i> Naeq	+	-	-
<i>Ankistradesmus spiralis</i> lemm	+	-	-
<i>Oncystis gigas</i> Archer	+	-	-
<i>O. allrptica</i> W. West	+	-	-
<i>O. lacustris</i> Clodat	+	-	-
<i>Costriarirror terciobumturri</i> Retosch	+	-	-
<i>C. margartatum</i> (Lund) Roy and Bias	+	-	-
<i>C. rehiformo</i> (Raits) Archer	+	-	-
<i>Cosmerium</i> sp.	+	-	-
<i>DerePVXIS oillula</i> var. minuta	+++	++	-
<i>D. stokesii</i> lemm	+	-	-
<i>Scenedesmus bijagatas</i> (Tarp) Kuetz	+	+	-
<i>S. quedricauria</i> Brehission	+++	-	-
<i>Oedogonirfirr</i> sp.	+	-	-
<i>O. bonsianaum</i> Gut.	+	-	-
<i>Cto.stooran pygaeum</i> , Gatwinski	+	-	-
<i>C. parvarfin</i> Naegeir	+	-	-
<i>C. acerosunt</i> (Schl) Ehrenberg.	+	-	-
<i>Cladophora crispata</i> (Rash) Kuetzing	++	-	-
<i>Cladophora glomerata</i> (L) Ktretzing	+++	-	-
<i>Stigeoclonium arrouatum</i> (Hazen) Collins	++	-	-
<i>Hyalothecia nisttheris</i> Both	+	-	-

<i>Gontontia rupicola</i>	+	-	-
<i>Phacas pleurorrectes</i> Dui.	+	-	-
<i>Phacas minatus</i> , Pochman	+	-	-
<i>Nitella hyalina</i> Agardh	+	-	-
<i>Chars zeylanica</i> Klein Chilidenow	++	-	-
<i>Chars fibrosa</i> A. Braun	+++	+	-
<i>Lamprothanium succinatum</i> R.D.W	++	++	++
<i>Stigeoclonium lubricant</i> Kuetz	++	-	-
<i>Rhizoclonium hieroglyphicum</i> Ktietzing	++	+	+
<i>R. kochianotti</i>	++	+	+
<i>Enteromoplia saliva</i> Kuetzing	++	+	+
<i>Eintestinalis</i> L. Greville.	++	+	-
<i>E. profitera</i> J.G. Agardah	+	++	+++
PHYRROPHYTA			
<i>Gielenodinium quadridens</i> Schiller	+	-	-
<i>G. Barger</i> (Lernir) Schiller	+	-	-
<i>Peridierium</i> sp.	+	-	+
<i>Peridierium bipes</i>	+	-	-
RHODOPHYTA			
<i>Compsopogen cueruleus</i> (Borbis) Mont.	++	-	-
CYANOPHYTA			
<i>Synechococcus elongates</i> Nage	++	-	-
<i>Merisnopedia punctata</i> Meyen	+	-	-
<i>M. glauca</i> Nag.	+	-	-
<i>M. elegans</i> A.Br.	+	-	-
<i>Aphanothece saxicula</i> Nag.	++	-	-
<i>Gomphospiracria aponina</i> Kutz	+	-	-
<i>Goraphasnacria</i> op Elerik	++	-	-
<i>G. coniformis</i> F. multiplex Ere	++	-	-
<i>Scytonema chiasmum</i> Ceitlen	+++	-	-
<i>Tralypothr</i> sp.	+	-	-
<i>Phormiliant calcicola</i> Gard	+	-	-
<i>Phormidium purpurascens</i> Gom	++	-	-
<i>Katagnymonc palustris</i> Lemru	++	-	-
<i>Calothrix marchiaca</i> Lemm	+	-	-
<i>Calothrix epiphytica</i> West	++	-	-
<i>Glaptotrichia raciborskii</i> Wolosz	+	-	-
<i>Johannes baptisia pellicirila</i> Taylor	++	-	-
<i>Sairalina lahyrinthiformis</i> Gom	+	+	+
<i>Micrucystis palverea</i> var incerta	++	-	-
<i>Oscillatoria princeps</i> Vaucher	++	-	-
<i>Oscillatoria angaina</i> Grim.	++	-	-
<i>Oscillatoria cutviceps</i> Ag.	++	-	-
<i>Oscillatoria limosa</i> AG.	+	-	-
<i>Oscillatoria tomosa</i> Bory.	++	-	-
<i>O. tennis</i> Ag.	+	-	-
<i>O. irrigua</i> Kurz	+	+	-
<i>O. splendirla</i> Grev	-	-	-
<i>Microcoleas chthonoplastes</i> Thor	+	+	+
<i>Katagnymonc pelagica</i> Leimn	++	-	-
<i>Chroococcus minatus</i> (Kirtz) Nag.	++	-	-
<i>Chroococcus minor</i> (Kutz) Nag.	++	-	-
<i>C. limneticas</i> lemm	+	-	-
<i>C. indices</i> Zeller	+	-	-
<i>C. turgirlas</i> (Kutz) Nag.	++	-	-
<i>Spirulina taxa</i> Smith.	+	-	-
<i>Spirulina subtilissima</i> Kutz	+	-	-
<i>Spirulina gigantea</i> Schemidle	+	-	-
<i>Spradllra labyrartortornis</i> Gorn.	+	-	-
<i>Anabaerre</i> sp.	++	-	-
<i>A. vadabilis</i> Kutz	++	-	-
<i>Nostac commurine</i> Vaucrier	+	-	-
<i>N. Lfircikia</i> Roth.	+	-	-
<i>Lyngbye aesuarii</i> Liebni	++	-	-
<i>L. larea</i> (Ag.) Gain	+	-	-
<i>L. lagerneirni</i> Gom	++	-	-
<i>L. hironomusii</i> Lerrini	+	-	-
<i>L. confervodis</i> Ag.	-	+	+
<i>L. epiphytica</i> Hieron	+	-	-
<i>L. majuscala</i> Harv	++	-	-
<i>Piertrocaspia minor</i> Gettler	++	+	+
<i>Coelospaerirfirr kretzingianum</i> Nag.	+	-	-
<i>Dermacarpa yersicalar</i> Gettler	+	-	-
<i>Hydrocoleuro cantharidasurn</i> Gam.	+	-	-
<i>Rrvuloria aqutica</i> De.Wilde	++	-	-
<i>Xerinc.occus acervatris</i> Satchell and Gardner	+	-	-
<i>X. Kene.ri</i> Hansg.	+	-	-
XANTHOPHYTA			
<i>Centifractus blanophorus</i> Lemm	-	+	+

- absent, 4- present, + i Presnet in abundant + + + dominant

drains rich in the nutrients with total phosphate 12-41 µ/L, silica 0.27-0.8 mg/L and ammonia 0.2 mg/L. The water quality assessment for Sonahro and Mehro lakes indicated with pH 7.7-8.5; conductivity, 2.7-9.9 mS/cm; salinity, 1.5-5.9 ppt; hardness as CaCO₃ 633-1150 mg/L; T.D.S. 1643-



Map 1: Map of Tidal Link lakes showing study area of Badin District, Sindh. (Source: Final Fisheries Report of Tidal Link lakes, Department of Fresh Water Biology and Fisheries University of Sindh, Jamshoro, 1997)

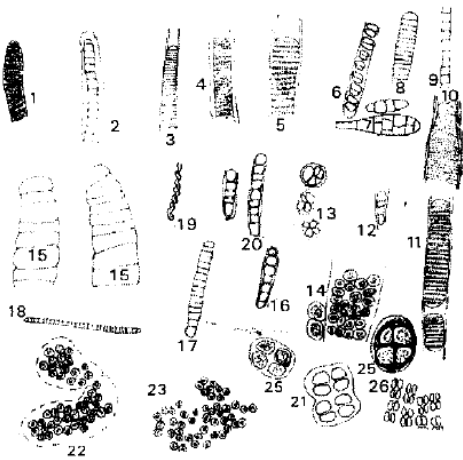


Fig. 1:
 1: *Oscillatoria vizagapatensis* Rao.. 2: *Phormidium calcicola* Gardner 3: *Lyngbya confervoides* Ag. 4: *Phormidium purpurascens* (Kuetz) Gomont. 5: *Lyngbya marrensiana* Menegh. 6: *Johannesbaptisia pellucida* (Dickie) Taylor at Drouet. 7: Fungal spore. 8: *Oscillatoria limosa* 9: *Oscillatoria formosa* Bory. 10: *Lyngbya majuscula* Ham 11: *Lyngbya hieronymusii* Lemm. 12: *Lyngbya epiphytica* Wille. 13: *Xenococcus Kerner'* Hansg. 14: *Xenococcus acervatus* Satchel'. 15: *Oscillatoria princeps* Vaucher. 16: *Calothrix epiphytica* West. W. West. 17: *Oscillatoria irrigua* Kutz. 18.: *Oscillatoria limnetica* Lemm. 19: *Spirulina major* Kuetz. 20: *Stichosiphon sansibancus* (Hieron) Drout et Daily. 21: *Chroococcus liinneticus* Lemm. 22: *Microcystis aeruginosa* Kuetz. 23: *Microcystis flosaqua* Kirchn. 24: *Merismopedia tenussima* Lemm. 25: *Chroococcus turgidus* (Kuetz) Nag. 26: *Chroococcus minutus* (Kuetz) Nag

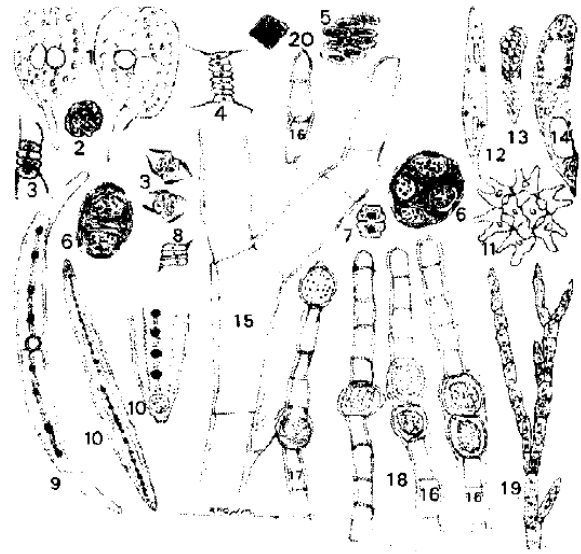


Fig. 2:
 1: *Phacus pleuronectes*. 2: *Phacus minutus* (Play fair) pochman. 3: *Scenedesmus opoliensis* Richter. 4: *Scenedesmus armatus* (Chodab G.M. Smith. 5: *Scenedesmus bijugatus* (Turpin) Kuetz. 6: *Gloeotaenium loitelsbergerianum* Hansgirg, 7: *Cosmarium trilobatum*. 8: *Scenedesmus armatus* var. *bicaudatus* Chodat. 9: *Closterum parvulum* Nag. 10: *Closterum acerosum*, 11: *Pediastrum duplex* Myen. 12: *Euglena acus* Ehr. 13: *Euglena* Sp. 14: *Euglena Oxyuris*. 15: *Cladophora glomerata* Kuetz. 16-18: *Oedogonium* Sp, 19: *Stigeoclonium subsecundum* Kuetz. 20: *Crucigenia tetrapedia* (Kirchn/ West. G. S. West

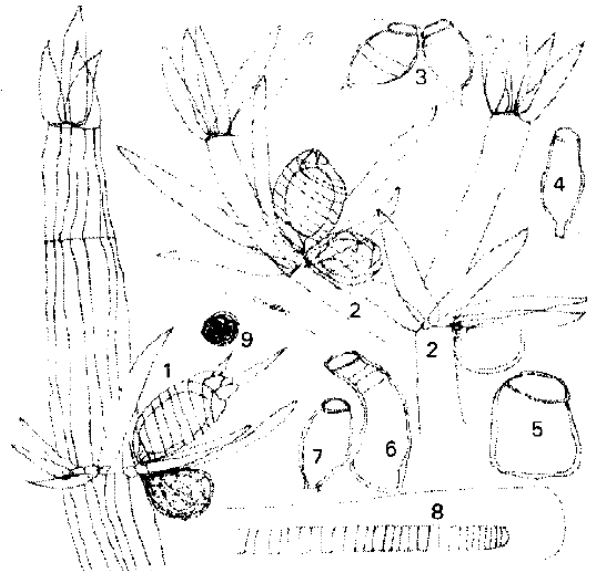


Fig. 3:
 1: *Chara zeylinca* Kelin Chlldenow.
 2: *Chara fibrosa* A. Braun 3-5: *Derpnyx stokessii* Lemm.
 6&7: *Derpnyx stokessii* var. *planticum*
 8: *Katagny mane pelagica* Lemm,
 9: *Chlorella valugaris* Beij.



Fig. 4:
Enteromorpha procera
Enteromorpha salina
E. prolifera

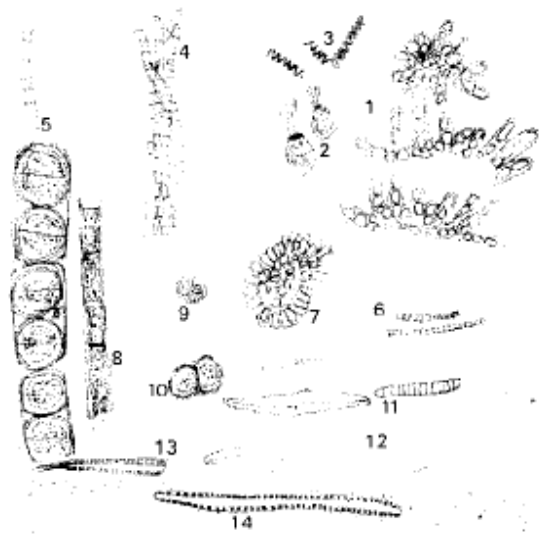


Fig. 6:
 1: *Plectroceps minor* Flansg. 2: *Platymonas elliptica* G. M. Smith 3: *Spirulina subtilissima* (C. R. Fretz) ex Gomont. *Microcoleus chihonoplastes* Thurel ex Gomant. 5: *Ocellularia formosa* Bory. 6: *Phormidium bohneri* Schripf. 7: *Gomphosphaeria aponina*. 8: *Rhizoclonium heiroglyphicum* Kuetz. 9: *Chroococcus minutus*. 10: *Gloencapsa calcarata* Tilden. 11: *Oscillinaria angustissima*. 12: *Gyrosigma scalporides*. 13: *Gomphonema*. 14: *Ghosca*. 15: *Nitzschia vermicularis* (Kütz.) Gum. 15: *Meiosira* Various Ag.

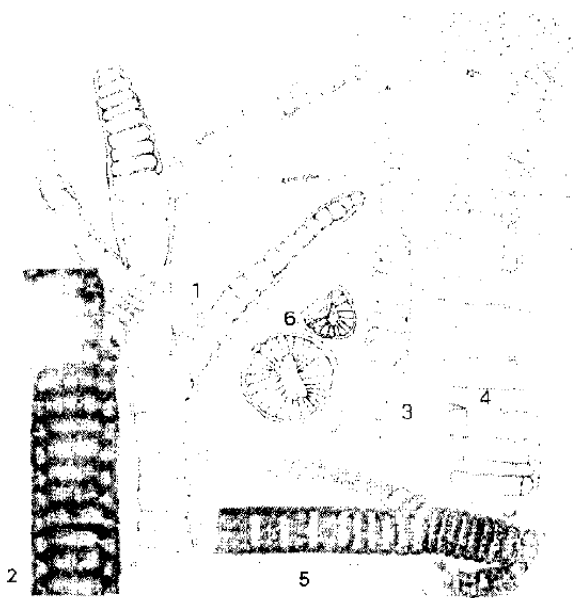


Fig. 5:
 1-5: *Compsopogon coeruleus* (Bulb.) Mont x 400 6: *Campylodiscus* sp.

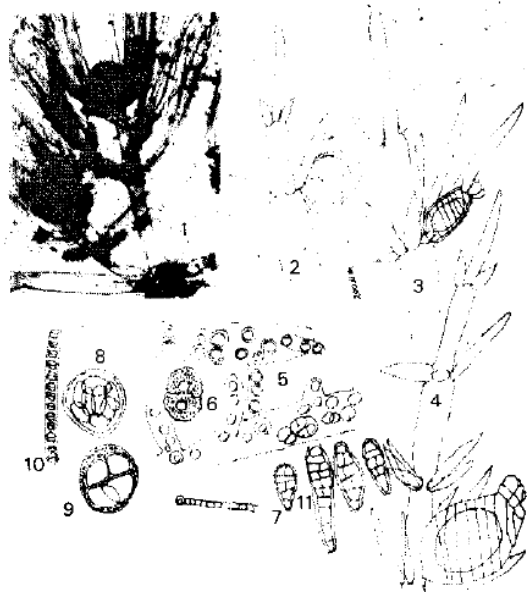


Fig. 7:
 1: *Nitella hyalina* Agardh. 2-4: *Lamprothamnium succinatum* R.D.W. 5: *Cyanostylon microcystoides* Geitl. 6: *Cosmarium subcostatum* Nordst. 7: *Cylindrocapsa* sp. 8: *Oocystis elliptica*. 9: *Chroococcus turgidus* (Kuetz) Nag. 10: *Johannesbaptistia pellucida* (Dickie) Taylor. 11: Fungal spores.

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Table 4: Marine, Fresh Water Fishes and Prawn Recorded from Pateji, Chotail, Sonharo and Mahro Lakes of District Badin Sindh, Pakistan

Name Fish	Local Name	Size	Family
Sardinella sindensis Day	Tarli/Pali	14-17 cm	Ctupeidae
<i>Nematolosa nassus</i> Baloch	Dhadi Pali	14-17 cm	-
<i>Thryssa mystax</i> Schneider	Kagaja	20-22 cm	Engraulidae
<i>Pisodonophis boro</i> Hamilton-Buchann	Snakeel	14-16 cm	Ophichthidae
Anus anus Hamilton Khagga	5-20 cm	100-150 cm	
<i>Antennarius coccineus</i> Lessen	-	Ariclae 5-10cm	Antennoriidae
<i>Hemiramphus archipelagicus</i> Colletter and Parlin	Butho	23-34cm	Exocoetidae
<i>Strongylurda Leiura</i> Bleeker	Kango	Lip 1 meter	Belonidae
<i>Platycephalus indicus</i> Linnaeus	Rabab	60-100	Platycephallidae
<i>Lates calcarifer</i> Bleaker	Dangri	30-40 cm	Lactariidae
<i>Epinephelus fasciatus</i>	Dhamb	40-60cm	Serranidae
Forsskal Terapon Jarbua Forsskal	Gingno	30	Theraponidae
<i>Sillago sihama</i> Forsskal	Bhambhor Sundra	15-25 cm	Sillaginidae
<i>Lutianus lubjanus</i> Park	Dndia	18-25vm	Lutjanidae
<i>Pomadasys Kaakan</i>	Dothar, Dali	50-80 cm	Pomadesyidae
<i>Cuvier Dendrophyysa russet!</i>	Goli	15-25 cm	Sciaenidae
<i>Cuvier Scatophagus argus</i> Bleekar	Kooyi	10-15cm	Scatophagidae
<i>Oreochromis mossambicus</i> Peter	Tilapia, Dayyo	10-15cm	Chichlidae
<i>Liza cannata</i> Valenciennes	Moor Millet	14-15cm	Mongilidae
<i>Liza subviridis</i> Valenciennes	Chodi	25-30cm	
<i>Valamugil speiglen</i> Bleaker	Phare	30-70cm	
<i>Eleutheronema tetradactylum</i> Show	Sear, Rishi	50-100cm	Poynernidae
<i>Boleophthalmus dussumieri</i> Cuvier and Valenciennes	Gullo	50-80mm	Gobiidae
<i>Cobius ocellatus</i> Day	Vacho-gullo	10cm	
<i>Trypauchen taenia</i> weber and Beaufort	Golfo	17-18cm	Trypauchemidae
<i>Pseudohmobus arsius</i>	Phani	30-40cm	Bothidae
<i>Brachirus macrolepis</i>	Sole	90-100 cm	Soleidae
<i>Tricanthus brevirostris</i> Temminck and Schlegel	Tila & Khok	15-20cm	Tricanthidae
Fresh water Fishes			
<i>Oreochromis mossambicus</i> peter	D ayyo & Tilapia		Cichlidae
<i>Channa marulia</i>	Chitto		Channidae
<i>Drhinus mirgala</i>	Morakhi		Cyprinidae
<i>Notopterus notopterus</i>	Moh		Notopteridae
<i>Wallago attu</i>	Muni & Jarki		Siluridae

SHRIMPS

Name	Family	Common Name of Local Name
<i>Penaeus Japonicus</i> Beta	Penaeidae	Kalri
<i>Penaeus indicus</i> M.Edwards	-do-	Jaira
<i>Penaeus rnonodon</i> Fabricicus	-do-	"
<i>Penaeus merguensis</i> De Man	-do-	"
<i>Metapenaeus brevicornis</i> Milne Edwards	-do-	"
<i>Metapenaeus monoceros</i> Fabricus	-do-	Kiddi
<i>Melerapenaeus stebbingi</i> Nobili	-do-	"
<i>Parapenaeopsis stylifera</i> M.Edwards	-do-	Kalri

6330 mg/L, dissolved oxygen 4.5-7.7 mg/L, total hydrolysable phosphate 40-230pg/L and ammonia 0-0.9 mg/L. (Table 1). Being rich in nutrient, these lakes support a rich plant life. *Typha domingensis*, *Phragmites communis* *Scirpus* sp. and *Fimbristylis* sp. are marginal which are used as food by buffalows. They also provide shelter to aquatic birds. *Azolla pinnata*, and *Lemna minor* are the free floating and *Ipomoea aquatica*, *Nyrnphae stellata* are rooted with floating leaves, while *Hydrilla verticillata*, *Ceratophyllum demersum*, *Myriophyllum spicatum*, *Najas major*, *Najas minor*, *Potamogeton pectinatus*, *Potamogeton nodosus* were present as sub-merged vegetation. *Najas major* and *Potamogeton pectinatus* served in the saline condition and covered major portion of the lakes. Cambra and Aboal (1992) and Cook (1996) have suggested that *P. pectinatus* survive in the adverse condition of salinity due to the tuber formation and excessive seed growth. Their seeds and tubers became food of the ducks and other aquatic migratory and local birds (Table 2).

Pistia stratiotes is an important plant found in Serani drains connected to the KPOD.

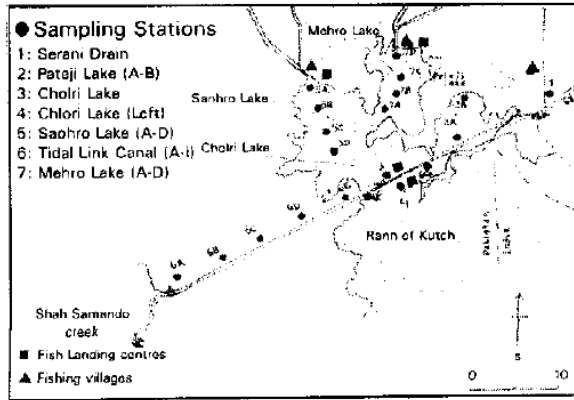
The Sonharo and Mehro lakes possess brackish water habitats. In which 114 species of algae were identified among these 45 (42%) species belonging to Cyanophyta,

44(33%) species of Chlorophyta, 17(15%) Bacillarophyta. 4(3.5%) species Pyrrophyta, and one specie each of Xanthophyta and Rhodophyta (Fig. 3).

All groups of algae are represented in the form of Phytoplankton. Some of these species have also been identified and reported by Pinko and Mutlag (1982) from Aden near the Yamni coast. The dominant genera were *Synechococcus*, *Merismopedia*, *Oscillatoria*, *Gomphosphaeria*, *Chroococcus*, *Spirulina*, to Cyanophyta, (Fig. 1, 1-26). *Euglena*, *Cosmarium*, *Ankistrodesmus*, *Closterium*, *Phacus* to *Chlorophyta* (Fig. 2, 1-19) and *Cymbella*, *Campylodiscus*, *Cocconeis Melosira*, *Navicula* belonging to Bacillarophyta. *Scytonema*, *Lyngbya*, *Johannesbaptistia*, *Calothrix*, *Katagnymene*, *Oedogonium*, *spirogyra*, *Stigeocolonium*, *Rhizocolonium* and *Composopogen coeruleus*, (Fig. 5, 1-5) *Cladophora* found intermingled with submerged vegetation *Chara zeylanica*, *Chara fibrosa*, *Lamprothanium succinatum*, *Nitella hyalina* (Fig. 3, 1-2) (Fig. 7, 1-4), alongwith *Najas minor*, *Najas major* and *Potamogeton* species were found over grown with epiphytic species present in abundance.

Cholri and Pateji lakes are brackish water lakes and receives marine water through the Cholhari weir at high tides from the Shah Samando Creek via Tidal Link. These have

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MAP 2: Maps of Sonahro, Mahro, Cholri, Pateji lakes and Drains of Badin District, Sindh.

(Source: Final Fisheries Report of Tidal Link lakes, Department of Fresh Water Biology and Fisheries University of Sindh, Jamshoro, 1997).

pH 8.31, conductivity 11.8-22.2 mS/Cm, hardness 16602362 mg/L, salinity 8-22.2 PPT, dissolved oxygen 4.5-5.7 mg/L, total hydrolyseable phosphate 80-120 µg/L; silica 6.2 mg/L and ammonia as a Amonium nitrogen 0-0.5 mg/L. The bottom of the lakes is covered by Cyanophyta. *Microcoleus*, *Chroococcus*, *Aphanothece*, *Aphanocapsa* and *Pleurocapsa minor*. Alongwith *Rhizoclonium* (Fig. 6, 1-8). *Enteromorpha salina*, *E. prolifera* and *E. intestinalis* E. procera Ahl (Fig. 4, 1-3) belong to Chlorophyta, Shameel (1987) and Shameel *et al.* (1989) have reported similar species for coastal region of Lasbella, Makran of Baluchistan province. These lakes support 28 species of marine fishes, in which 9 species are of commercial value and 19 species are source of protein for poor people and food for the poultry feed and 8 species of shrimps were recorded (Table 3, 4).

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