
Climatic change in the past and its effect on Aquatic fauna in Sindh-Pakistan

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Climate in the past

In Sindh from 9,000 to 4,000 years ago, was warm and wet period which continue up till 3,800 years ago. Temperature were 2 - 3 °C higher than 1975, causing more rainfall, in winter. While 2,000 - 500 BC was cold period with low rainfall. Warm period with more rainfall from 400 to 650 AD and cold period with low rainfall continued 900 AD. From 1550 - 1850 AD it was cold period in Sindh and is known as Little Ice Age.

Effect of climatic change

When ever climate become warm, the ultraviolet radiation increases, which decreases the population of phytoplankton. Which is the source of food for aquatic animals especially fishes. The population of fresh water fishes and marine water fishes are reduced (see at the back).

Sea anemone, sea urchin, sea horse, lobster, crab, sea cucumber and molluscs also reduce simultaneously.

Due to more ultraviolet radiation the sea-weeds photosynthesis reduced, as a results in the sea-weeds level of Iodine and potassium sulphate reduces. This means the food of aquatic fauna become deficient in Iodine and potassium sulphate.

Common sea-weeds

These are:

- Ulvalactuca (sea lettuce) - Green seaweed.
- Enteromorpha (compress) - Green seaweed.
- Himanthalia elongata - Thongweed.
- Fucus serratus - serrated wrack.
- Fucus vesiculosus - bladder wrack.
- Halidrys siliquosa.
- Laminaria digitala - kelp-redweed.
- Brongniartella by ssoides.
- Chondrus crispus.
- Furcellaria fastigata.
- Callophyllis lactiniata.

Due to change to warm climate, the ultraviolet radiation effect on photosynthesis of phytoplankton population decreases and as a results the following biological process bring further changes on aquatic life by changing the pH of water. These reactions are as follow:

Biologically mediated reactions affecting pH in natural water systems. After Weber and Stumm (1963).

Process	Reaction	Effect on pH
Photosynthesis.	$6 \text{ CO}_2 + 6 \text{ H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$	increase
Respiration.	$\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2 \rightarrow 6 \text{ CO}_2 + 6 \text{ H}_2\text{O}$	decrease
Methane fermentation.	$\text{C}_6\text{H}_{12}\text{O}_6 + 3 \text{ CO}_2 \rightarrow 3 \text{ CH}_4 + 6 \text{ CO}_2$	decrease
Nitrification.	$\text{NH}_4 + 2 \text{ O}_2 \rightarrow \text{NO}_2\text{O}_3 + \text{H}_2\text{O} + 2 \text{ H}^+$	decrease
De-nitrification	$5 \text{ C}_6\text{H}_{12}\text{O}_6 + 24 \text{ NO}_3 + 24 \text{ H}^+ \rightarrow 3 \text{ O}$	increase
	$\text{CO}_2 + 12 \text{ N}_2 + 42 \text{ H}_2\text{O}$	
Sulphide oxidation	$\text{HS}^- + 2 \text{ O}_2 \rightarrow \text{SO}_4^{2-} + 3 \text{ H}^+$	decrease
Sulphide reduction.	$\text{C}_6\text{H}_{12}\text{O}_6 + 3 \text{ SO}_4^{2-} + 3 \text{ H}^+ \rightarrow 6 \text{ CO}_2 + \text{HS}^- + 6 \text{ H}_2\text{O}$	increase

When the pH of water changes this effect on the nutrients absorption by phytoplanton specially at disturbed nitrogen cycle in phytoplanton. This is described in the following diagram

When there is less supply of food to aquatic fauna, the population of following fishes, and prawn also reduces.

The main food fishes are:

S.No.	Technical names	Common local names
1.	Hilsa ilisha (Ham).	Palla.
2.	Notopterus chitala (Ham).	Gandan.
3.	Catla catla (Ham).	Thaila, Thairi, Catla.
4.	Cirrhina mrigala (Ham).	Morakhi.
5.	Labeo calbasu (Ham).	Dehi.
6.	Labeo rohita (Ham).	Kurro/Dambro; rohu.
7.	Wallago attu (Block & Schn.)	Jhharko, Lanchi, Mallee.
8.	Rita rita (Ham).	Khaggo.
9.	Mysatus spp.	Singharee.
10.	Tilapia mossambica (Peters).	Tilapia, paplet.
11.	Channa marulius (Ham).	Shakur.
12.	Channa striatus (Bloch).	Mundho.
13.	Channa punctatus (Bloch)	Mundho.

Ctenopharyngodon idellus (grass carp), Mylopharyngodon piecus (black carp), and Hypophthalmichthys molitrix (silver carp) are also food fishes.

Fresh-water prawns five species have been recorded. All belong to the family palaemonidae, genus Palaemon (119).

S.No.	Technical names	Common names	
1.	<i>Palaemon malcolmsonii</i> .	H. Milne Edwards.	Changhat.
2.	<i>P. Lamarrei</i> .	H, Milne Edwards.	Changhat.
3.	<i>P. rudis</i> .	Hallar	Changhat.
4.	<i>P. dolichodactylus</i> .	Hilgandrof.	Changhat.
5.	<i>P. carcinus</i> .	Fabricius.	Changhat.

This means that due to warming people's food patterns also change. When nitrogen cycle in phytoplankton disturb it affects atmospheric nitrogen, which effect on plant photosynthesis on the land and therefore cropping patterns also change which further affect the fauna population on earth.

Conclusion

Due to small change in the climate, it disturb the whole ecosystem, which change the shape of the atmosphere. So the availability of fauna, flora and aquatic fauna also adopted a new environment. Due to warm climate the phytoplankton of quatic life, as a results the human eating habit change, due to more pressure of crops the food availability to animal reduced so the animal population reduced. This change the food pattern of human. Research is needed to study the nutritional values of past population food which helps us to trace the physical health, diseases, and brain development of the past history in Sindh-Pakistan.

References of Fishes

1. Qureshi, M. Rahimullah, (1965), Common fresh water fishes of Pakistan, Government of Pakistan, Karachi, 61 p.
2. Zahid Hussain, (1972-73), Fish and fisheries of Sindh, Agriculture Pakistan, 322 p.
3. Ministry of Food and Agriculture, Govt. of Pakistan, (1955), Marine fishes of Karachi and the coasts of Sindh and Makran, Government of Pakistan Press, Karachi 80 p.
4. Stephen Spotte, (1979), Fish and invertebrate culture, water management in closed systems, 2nd edition, John Wiley and Sons, Inc., USA, 179 p.

The following fresh water fishes population reduce in Sindh.

S.No.	Scientific name	Local names
1.	<i>Ailichthys punctatus</i> .	Putlas.
2.	<i>Ambassis baculis</i> .	Shisha, Kangree.
3.	<i>Amphipnous cucbia</i> .	Cuchia.
4.	<i>Badis badis</i> .	Chiri.
5.	<i>Bagarius bagarius</i> .	Goonch, Boonch.
6.	<i>Barbus (Tor) putitora</i> .	Mahseer, Cuiniaru, Kurreah.
7.	<i>Callichrous bimaculatus</i> .	Pata, Dimmon.
8.	<i>Chela bacaila</i> .	Kundal, Chal.
9.	<i>Cirrhina latia</i> .	Curru.
10.	<i>Clupisoma atherinoides</i> .	Ahhee.
11.	<i>Danio (Brachydanio) rerio</i> .	Anju.
12.	<i>Esomus danricus</i> .	Soomarah, Chiddulu.
13.	<i>Eutropiichthys vacha</i> .	Chelee, Jhali.
14.	<i>Garra gotyla</i> .	Khooka.
15.	<i>Glossogobius guuris</i> .	Nahi.
16.	<i>Heteropneustes fossi is</i>	Lohar, Noottr.
17.	<i>Hilsa ilisha</i> .	Palla.
18.	<i>Laubuca laubuca</i> .	Dannahrah.
19.	<i>Lepidocephalus guntea</i> .	Kandatoori.
20.	<i>Mastacembelus armatus</i> .	Bam.
21.	<i>Mystus aor</i> .	Singharee.
22.	<i>Nandus nandus</i> .	Gadha, Khotah.
23.	<i>Nemachilus botia</i> .	Soondalee, Saantal.
24.	<i>Notopterus chitala</i> .	Moh, Gandan.
25.	<i>Ophicephalus gachua</i> .	Doarrah.
26.	<i>Rasbora daniconius</i> .	Charl, Dahwiee.
27.	<i>Rita ritz</i> .	Khagga.
28.	<i>Rhynchobdella aculeata</i> .	Gud.
29.	<i>Scaphiodan irregularis</i> .	Boassa.
30.	<i>Sisor rhabdophorus</i> .	Kirridee, Kirlu.
31.	<i>Wallgo attu</i> .	Mullee.
32.	<i>Xehentodon cancila</i> .	Takla, Cowwa, Kenya.

The following marine fishes families population reduced in Sindh.

Some important marine fishes fauna in Sindh, their families names are:

S.No.	Family name
1.	Orectolobidae.
2.	Scyliorhinidae.
3.	Sphyrnidae.
4.	Rhinobatidae.
5.	Pristidae.
6.	Trygonidae.
7.	Torpedinidae.
8.	Myliobatidae.
9.	Mobulidae.
10.	Elopidae.
11.	Clupeide.
12.	Engraulidae.
13.	Chirocentridae.
14.	Synodidae (Synodontidae, sauridae).
15.	Ariidae.
16.	Plotosidae.
17.	Anguillidae (Muraenidae).
18.	Belonidae.
19.	Hemirhamphidae.
20.	Exocoetidae.
21.	Sphyrnaeidae.
22.	Mugilidae.
23.	Polynemidae.
24.	Serranidae.
25.	Theraponidae.
26.	Priacanthidae.
27.	Lactariidae.
28.	Rachycentridae.
29.	Carangidae.
30.	Lutianidae.
31.	Nemipteridae.
32.	Liognathidae.
33.	Pomadasyidae.
34.	Sciaenidae.

S.No.	Family name
35.	Sparidae.
36.	Mullidae.
37.	Kyphosidae.
38.	Ephippidae.
39.	Drepanidae.
40.	Scatophgidae.
41.	Chaetodontidae.
42.	Pomacentridae.
43.	Penguipediada.
44.	Callionymidae.
45.	Zanclidae.
46.	Trichiuridae.
46.	Scombriaae.
48.	Cybidae.
49.	Histiophoridae.
50.	Stromateidae.
51.	Gobiidae.
52.	Periophthalmidae.
53.	Synanceidae.
54.	Platycephalidae.
55.	Dactylopteridae.
56.	Thunnidae.
57.	Psettodidae.
58.	Bothidae.
59.	Soleidae.
60.	Cynoglossidae.
61.	Triacanthidae.
62.	Tetrodontidae.
63.	Diodontidae.
64.	Batrachoidae.
65.	Antennariidae.

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