

## Assessment of Amphibian Diversity and Status of Their Habitats through Physico-Chemical Parameters in Sindh, Pakistan

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**Abstract :** Our study aimed to assess diversity and habitats of amphibian fauna in Sindh province as amphibians are among most vulnerable animals and the risk of their extinction is increasing in many parts of world mainly due to habitat degradation. Present study consisted of field surveys and laboratory analytical work; field surveys were carried out to confirm amphibian diversity and collection of water samples from their habitats, whereas laboratory work was conducted for identification of species and analysis of water quality of habitats through physico-chemical parameters. For identification of amphibian species, morphology was thoroughly examined using taxonomic key, whereas water quality was assessed via physico-chemical parameters including pH, electric conductivity (EC), total dissolved solids (TDS), total hardness (T. Hard), total alkalinity (T. Alk), chloride (Cl), carbon dioxide (CO<sub>2</sub>), sulfate (SO<sub>4</sub>), phosphate (PO<sub>4</sub>), nitrite (NO<sub>2</sub>) and nitrate (NO<sub>3</sub>) using material and methods of analytical grade. pH value was analyzed using pH meter, whereas levels of EC and TDS were recorded using conductivity meter and TDS meter, respectively. Other parameters with exception of non-metallic parameters (SO<sub>4</sub>, PO<sub>4</sub>, NO<sub>2</sub>, and NO<sub>3</sub>) were analyzed through distinct titration methods. Concentration of non-metallic parameters was evaluated using ultra-violet spectrophotometer. This study revealed existence of four amphibian species including *Hoplobatrachus tigerinus*, *Euphlyctis cyanophlyctis*, *Allopa hazarensis* belonging to Family Ranidae and *Bufo stomaticus* (Family Bufonidae) randomly distributed in district Ghotki, Jamshoro, Kashmor, Larkana, Matiari and Shikarpur in Sindh. Assessment of aquatic habitats in different areas found value of parameters as followed: Habitats in district Ghoki (pH: 7.8 ± 0.3, EC: 2165.3 ± 712.6, TDS: 1507.0 ± 413.1, T-Hard: 416.4 ± 67.5, T. Alk: 393.4 ± 78.4, Cl: 362.4 ± 70.1, CO<sub>2</sub>: 21.1 ± 3.5, SO<sub>4</sub>: 429.3 ± 100.1, PO<sub>4</sub>: 487.5 ± 122.5, NO<sub>2</sub>: 13.7 ± 1.0, NO<sub>3</sub>: 14.7 ± 2.5), district Jamshoro habitats (pH: 8.1 ± 0.4, EC: 2403.8 ± 55.4, TDS: 1697.2 ± 77.0, T. Hard: 548.7 ± 43.2, T. Alk: 294.4 ± 29.0, Cl: 454.7 ± 50.8, CO<sub>2</sub>: 16.9 ± 2.4, SO<sub>4</sub>: 713.0 ± 49.3, PO<sub>4</sub>: 826.2 ± 53.0, NO<sub>2</sub>: 15.2 ± 3.4, NO<sub>3</sub>: 21.6 ± 3.7), habitats in Kashmor district (pH: 8.0 ± 0.5, EC: 2450.3 ± 610.9, TDS: 1745.3 ± 440.9, T. Hard: 624.6 ± 305.8, T. Alk: 445.7 ± 120.5, Cl: 448.9 ± 128.8, CO<sub>2</sub>: 18.9 ± 4.5, SO<sub>4</sub>: 619.8 ± 205.8, PO<sub>4</sub>: 474.1 ± 94.2, NO<sub>2</sub>: 15.2 ± 3.1, NO<sub>3</sub>: 14.3 ± 2.6), district Larkana habitats (pH: 8.4 ± 0.4, EC: 2555.8 ± 70.3, TDS: 1784.4 ± 36.9, T. Hard: 623.0 ± 42.5, T. Alk: 329.6 ± 36.7, Cl: 614.3 ± 89.5, CO<sub>2</sub>: 17.6 ± 1.2, SO<sub>4</sub>: 845.1 ± 67.6, PO<sub>4</sub>: 895.0 ± 61.4, NO<sub>2</sub>: 13.6 ± 3.8, NO<sub>3</sub>: 23.1 ± 2.8), district Matiari habitats (pH: 8.0 ± 0.4, EC: 2492.3 ± 928.1, TDS: 430.0 ± 161.3, T. Hard: 396.7 ± 183.3, T. Alk: 388.1 ± 97.4, Cl: 551.6 ± 73.4, CO<sub>2</sub>: 15.8 ± 2.9, SO<sub>4</sub>: 576.5 ± 200.0, PO<sub>4</sub>: 434.7 ± 100.6, NO<sub>2</sub>: 15.8 ± 2.9, NO<sub>3</sub>: 15.2 ± 3.0) and habitats in Shikarpur district (pH: 8.1 ± 0.6, EC: 2191.7 ± 765.1, TDS: 1764.9 ± 409.2, T. Hard: 431.9 ± 68.4, T. Alk: 350.3 ± 44.3, Cl: 381.5 ± 29.5, CO<sub>2</sub>: 18.0 ± 4.0, SO<sub>4</sub>: 518.8 ± 97.9, PO<sub>4</sub>: 493.6 ± 64.6, NO<sub>2</sub>: 14.0 ± 0.8, NO<sub>3</sub>: 16.1 ± 2.8). Values of physico-chemical parameters were found higher than permissible level of Environmental Protection Agency (EPA). Monthly variation in concentration of physico-chemical parameters was also prominently recorded at all the study locals. This study discovered poor diversity of amphibian fauna and condition of their habitats was also observed as pitiable. This study established base line information that may be used in execution of an effective management plan and future monitoring of amphibian diversity and their habitats in Sindh.

**Keywords :** amphibians, diversity, habitats, Pakistan, Sindh

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