

## Preliminary studies on the microplastic pollution in Dal lake, Kashmir (first report)

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(Received March 18, 2020, Revised November 9, 2020, Accepted December 3, 2020)

**Abstract.** We provide the first study on the occurrence of microplastics in Dal lake, Kashmir, India. Microplastics act as catastrophe that trigger many environmental problems. The key origins of microplastics are larger plastics, which split into smaller plastics after UV light disintegration. There is relatively little work carried out on the existence of microplastics. The present work has been undertaken on the occurrence of microplastics at four pre-selected sites (surface water) in Dal lake, Kashmir. The samples were taken to the laboratory to dissolve organic matter by using H<sub>2</sub>O<sub>2</sub> (6%). To speed up the organic digestion; the treated mixture was heated on a hot plate at 70°C. The mixture was then subjected to density separation. The supernatant obtained was observed under the microscope (10X) and measurements were taken. At site-I, the microplastics ranged from 2-3 mm, site-II 5-6 mm, site-III 3-4 mm, site-IV 4-5 mm in thickness, indicating the presence of microplastics in the lake. The presence of microplastics indicated that the lake has undergone an anthropogenic change over a period of time. Our research highlights the value of enhancing the quality of the drainage system and sewage disposal. This work can be helpful to recognize successful microplastic control management techniques and possible threats associated with the Dal lake. So far, no such data on the presence of microplastics in Kashmir lakes is available.

**Keywords:** Dal lake; microplastic pollution; microplastics; Kashmir; first report; sewage

### 1. Introduction

Microplastics, made from hydrocarbons, very petite, flotsam and jetsam of plastic, are the most polluting plastics, which are barely visible to the naked eye. Microplastics are microscopic fragments, less than five millimeters in length or much smaller (National Oceanic and Atmospheric Administration) than that. Generally, the key sources of microplastics are larger plastics that undergo photodegradation with the aid of UV rays, resulting in smaller plastic pieces.

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- U.S.A.
- Moyle, J.B. (1946), "Some chemical factors influencing the distribution of aquatic plants in Minnesota", *Am. Midland Nat.*, **34**(2), 402-420. <https://doi.org/10.2307/2421128>.
- Murphy, J. and Reily, J. (1962), "A modified single solution method for the determination of phosphate in natural waters", *Anal. Chim. Acta*, **27**, 31-36. [https://doi.org/10.1016/S0003-2670\(00\)88444-5](https://doi.org/10.1016/S0003-2670(00)88444-5).
- Olsen, S. (1950), "Aquatic plants and hydrospheric factors", *Svensk. Bot. Tidskr.*, **44**(1), 1-31.
- Peng, G.Y., Zhu, B.S., Yang, D.Q., Su, L., Shi, H.H. and Li, D.J. (2017), "Microplastics in sediments of the Changjiang Estuary, China", *Environ. Pollut.*, **225**, 283-290. <https://doi.org/10.1016/j.envpol.2016.12.064>.
- Rochman, C.M, Hoh, E., Kurobe, T. and The, S.J. (2013), "Ingested plastic transfer's hazardous chemicals to fish and induces hepatic stress", *Sci. Rep.*, **3**(3263), 1-7. <https://doi.org/10.1038/srep03263>.
- Rochman, C.M. (2015), *The Complex Mixture, Fate and Toxicity of Chemicals Associated with Plastic Debris in Marine Environment*, Springer, Switzerland.
- Sruthy, S. and Ramasamy, E.V. (2017), "Microplastic pollution in Vembanad Lake, Kerala, India: The first report of microplastics in lake and estuarine sediments in India", *Environ. Pollut.*, **222**, 315-322. <https://doi.org/10.1016/j.envpol.2016.12.038>.
- Thresh, J.C., Suckling, E.V. and Beale, J.E. (1944), *The Examination of Water and Water Supplies*, Taylor and Francis, London, U.K.
- Trivedy, R.K. and Goel, P.K. (1986), *Chemical and Biological Methods of Water Pollution Studies*. Environmental Publications, U.S.A.
- Vendel, A.L., Bessa, F., Alves, V.E.N., Amorim, A.L.A., Patrício, J. and Palma, A.R.T. (2017), "Widespread microplastic ingestion by fish assemblages in tropical estuaries subjected to anthropogenic pressures", *Mar. Pollut. Bull.*, **117**(1-2), 448-455. <https://doi.org/10.1016/j.marpolbul.2017.01.081>.
- Verschoor, A., De Poorter, L., Dröge, R., Kuenen, J. and de Valk, E. (2016), "Emission of microplastics and potential mitigation measures: Abrasive cleaning agents, paints and tyre wear", RIVM Report 0026, National Institute for Public Health and the Environment, The Netherlands.
- Wagner, M., Scherer, C., Alvarez-Muñoz, D., Brennholt, N., Bourrain, X., Buchinger, S., Fries, E., Grosbois, C., Klasmeyer, J. and Marti, T. (2014), "Microplastics in freshwater ecosystems: What we know and what we need to know", *Environ. Sci. Eur.*, **26**(1), 1-9. <https://doi.org/10.1186/s12302-014-0012-7>.
- Weinstein, J.E., Crocker, B.K. and Gray, A.D. (2016), "From macroplastic to microplastic: Degradation of high-density polyethylene, polypropylene, and polystyrene in a salt marsh habitat", *Environ. Toxicol. Chem.*, **35**(7), 1632-1640. <https://doi.org/10.1002/etc.3432>.
- Welch, P.S. (1948), *Limnological Methods*, The Blaskiston Company. Philadelphia, U.S.A.
- Xiong, X., Zhang, K., Chen, X.C., Shi, H.H., Luo, Z. and Wu, C.X. (2018), "Sources and distribution of microplastics in China's largest inland lake - Qinghai Lake", *Environ. Pollut.*, **235**, 899-906. <https://doi.org/10.1016/j.envpol.2017.12.081>.
- Zhang, K., Su, J., Xiong, X., Wu, X., Wu, C. and Liu, J. (2016), "Microplastic pollution of lakeshore sediments from remote lakes in Tibet plateau, China", *Environ. Pollut.*, **219**, 450-455. <https://doi.org/10.1016/j.envpol.2016.05.048>.
- Zutshi, D.P. and Khan, M.A. (1978), "On lake topology of Kashmir", *Environ. Physiol. Ecol.*, **1978**, 456-427.