Surface and sub-surface water contamination caused by heavy metals (HMs) is of substantial global concern (Kob- ielska et al. 2018).The maximum permissible limits of HMs reported by the United States Environmental Department of Occupational and Environmental Health, School of Public Health, Lanzhou University, Lanzhou 730000, Gansu, People's Republic of China 2 University, Wonju, Gangwon-do 220-710, South Korea Department of Environmental Engineering, Yonsei 3 Engineering, Hanyang University, Seoul 04763, South Korea Department of Earth Resources and Environmental 4 University, Riyadh 11451, Saudi Arabia 5 Department of Environmental Biotechnology, City of Scientific Research and Technology Applications, New Borg El Arab, Alexandria 21934, Egypt Chemistry Department, College of Science, King Saud 6 University of Minnesota, Saint Paul, MN 55108, USA Biotechnology Institute, College of Biological Sciences, 7 University, Suwon 16627, South Korea Department of Environmental Engineering, Kyonggi no sludge or toxic chemical produced; (6) Macroalgal bio- mass does not essential to be immobilized; (7) algal biomass can be applied in discontinuous and continuous regimes; (8) by using dead biomass, no nutrient or oxygen supply needed; (9) appropriate for anaerobic and aerobic effluent treatment units; (10) algal biomass can be used all around year (Darda et al. 2019); and (11) cost effective (Kotrba 2011).As the presence of HMs in aquatic envi- ronments may limit clean water availability for its intended usage (Dixit et al. 2015), therefore, stringent environmental regulations have been imposed to reduce HMs concentration in wastewater below permissible limits before discharging into natural water reservoirs.Fur- thermore, recent progresses in the development of HMs-tolerant algal strains and directs future research toward the development of sustainable technology for wastewater treat- ment and biomass production are covered.They are non-biodegradable and persistent, have a deleterious impact on both ecosystems and human health (Alqadami et al. 2018; Kwaansa-Ansah et al. 2019).Therefore, considering the importance of algae as a prom- ising agent for HMs removal, this review gives an overview on recent progresses made on HMs remediation by algae.HMs are released into the environment by natural processes including wind and floods, as well as through anthropogenic activities (Gupta et al. 2016).Figure 1 schematically represents the toxic effects of HMs on differ- ent human organs.The main mechanisms of HMs removal, including biosorp- tion and bioaccumulation, are highlighted.The influence of several abiotic factors on HMs removal and changes in algal biocomponents are comprehensively discussed.HMs present in the air and soil end up in water bodies due to pre- cipitation and water run-off (Singare et al. 2010; Warmate et al. 2011).