We have developed an efficient multi-scale approach to treat biomolecular motion in a fluid solvent. The model uses a mesoscopic lattice Boltzmann method to treat the solvent and a Molecular Dynamics scheme to deal with the biomolecule. This scheme has been applied to the problem of polymer translocation through a nanopore, an intensively studied subject due to its variety of applications, with ultra-fast DNA sequencing being one of them.