Bimetallic catalysts with Au–Pd supported on zinc hydroxycarbonate (ZOC) were synthesized by a simple deposition–precipitation method and analyzed by transmission electron microscopy to have a narrow-size distribution of predominantly 1–2 nm. The prepared Au–Pd/ZOC catalysts exhibited excellent activity towards 5-hydroxymethylfurfural (HMF) oxidation in water in the presence of the base NaHCO3 at benign conditions of 80 °C and 3 bar O2, resulting in quantitative yield of 2,5-furfurandicarboxylic acid (FDCA). The addition of base not only enhanced the yield of FDCA but also stabilized the support ZOC from the reaction with formed carboxylic acid intermediates/products, thus allowing Au–Pd/ZOC to be recycled for at least six times without significant loss of activity. The basicity of ZOC could play an important role in obtaining the improved yield of FDCA as compared to other supports.