This study evaluated the occurrence of flood hazards and associate damages with respect to extreme rainfall events in the past and future across Japan. A two-dimensional non-uniform inundation model was run with the estimated extreme rainfall events to obtain the maximum water depth and inundation period. Moreover, resulting flood damage cost was estimated for 11 land use types based on the flood control economy investigation manual published by the Ministry of Land, Infrastructure, Transportation, and Tourism (MLIT). From our analysis, it is noted that the rate of increase in extreme rainfall varies linearly with the rate of increase in damage cost. When it is assumed that flood protection is completed for a 50-years return period of extreme rainfall, the benefit of flood protection for a 100-year return period of extreme rainfall is estimated to be 210 billion USD. Under the same assumption, the extreme rainfall shifting from 50 to 100 year return period results in damages of approximately 10 billion USD per year. Also the analysis provides spatial information of flood damage in Japan showing the big different damage costs between urban and rural regions. The completion of flood protection measures largely benefits in urban contexts due to the possibility of large costs of flood damage in dense areas. The estimation of distribution of damage cost is proved to be helpful for prioritizing the vulnerability regions for making appropriate countermeasures and allocating national budget efficiency in Japan.