The noise in the environment of the railway system is one of the most important topics to guarantee the future of railway transportation. In Europe, the noise mapping of the main transportation infrastructures is required by the European Directive 2002/49/CE and the environmental noise is limited by the national standards. In parallel with speed increase of passenger trains, passenger and freight traffics are also rising. Then, mitigation measures at source must be developed to protect residents. Infrastructure managers, rolling stock manufacturers and operators are working to develop cost efficient noise reduction solutions. Since the opening of the passenger transportation market in Europe, in board comfort becomes more and more important. Despite the train speed increase, acoustic comfort must be preserved. The paper deals with the environmental noise and the acoustic comfort of the railway system. The main noise sources are presented. The rolling noise, the aerodynamic noise, the equipment noise are investigated and their relative contribution to the environmental noise is discussed. The corresponding mitigations measures are introduced through several examples. The acoustic comfort is also discussed. The acoustic modelling of passenger coach, the corresponding measurement campaign and the noise reduction solutions are presented. At the end, the main research challenges for the future of the railway system are proposed.