The main topic of this Thesis is a new simplified proof of the Sunyach theorem that provides sufficient conditions for existence and uniqueness of an invariant measure for a Markov kernel on a complete separable metric space equipped with its Borel σ-algebra. Weak convergence of measures following from Sunyach's theorem is strengthened to convergence in the total variation norm provided that the Markov kernel is strong Feller. Furthermore, sufficient conditions for geometric ergodicity are stated. Another topic treated is the strong Feller property: its characterization by absolute measurability and uniform integrability and derivation of some other sufficient conditions.