

## ABSTRACT

This thesis deals empirically with various research questions in environmental economics. In particular the issues of sustainability and eco-efficiency are approached on three different data-sets. The first paper deals with the analysis of eco-efficiency for 103 provincial (NUTS 3 - Nomenclature of Units for Territorial Statistics 3) capitals of Italy throughout 2000-2008. It focuses on the link among economic growth, energy consumption and air pollution, modeling cities as territorial units that ought to promote growth, while at the same time minimising its environmental impact. Subsequently, the eco-efficiency of this panel of provincial capitals is measured through panel estimates of an input-distance function. Within this procedure, considering some environmental control variables, the paper evaluates if environmental best practices correspond either to those municipalities that adopt environment-friendly policies or to cities characterised by a particular urban context. The evidence points to the existence of a significant link between economic development, energy consumption and air pollution at the provincial capital level. The most ecoefficient provincial capitals are also among the wealthier, which is consistent with an Environmental Kuznets Curve.

The second paper investigates the Ecological Footprint indicator by focusing on the notion of sustainable development and then of carrying capacity of land. The impact of man on nature is explored through an empirical analysis of the growth rate of population, and the percentage of urban and rural population, in Europe. The level of CO<sub>2</sub> emissions per inhabitant in the EU is compared with that of developing countries. Through a sectoral approach, the total CO<sub>2</sub> emissions per capita from fuel combustion, electricity and heat production, manufacturing industries and construction, transport and other sources are separately appraised.

The third paper studies the relationship between rice production and methane emissions. Rice farming is believed to be a major anthropogenic source of methane emissions, which are measured emissions at both country and world levels of aggregation. It presents a quantitative estimation of the statistical relationship between rice production dynamics and methane emissions with regression estimates computed (country-wise and globally) over a large set of countries. The evidence only partly validates the expectation of a positive statistical influence of rice production on methane emissions. In fact a Kuznets-type evidence shows up: increasing rice production is correlated with fewer emissions. This negative relationship holds for a measure of countries sufficient to emerge significantly also at the world level.