



# Towards (spatially) unbalanced development? A joint assessment of regional disparities in socioeconomic and territorial variables in Italy



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## ABSTRACT

The present study assesses disparities in the spatial distribution of three indicators evaluating respectively economic growth (per capita value added), sustainable development (a sustainable development index composing 99 individual variables) and the quality of the natural capital (Environmental Sensitive Area Index composing 14 individual variables) in Italy. The analysis was carried out on three different geographical domains (3 divisions (north, central and south Italy), 20 administrative regions and 103 provinces) with municipalities as the elementary spatial unit. While the distribution of the three indicators was coherent across space, the coefficient of variation of the three indicators, taken as a proxy of regional disparities, showed a contrasting spatial pattern. Domains with higher average values of the sustainable development index showed a lower variability among municipalities, indicating a less divided territorial context. By contrast, income and natural capital disparities are decoupled from the average level of the respective indexes. Multivariate analysis identifies a north–south gradient reflecting the divide between competitive and economically-disadvantaged regions in Italy. Results provide an informative base to implement sustainability policies in countries characterized by persistent socioeconomic disparities.

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## 1. Introduction

Environmental trends – together with socio-demographic processes and economic factors – represent a crucial issue for spatially-balanced sustainable development (Tumpel-Gugereil and Mooslechner, 2003). Monitoring complex socio-environmental dynamics over time and space is an important challenge for science and may support the development of advanced policy strategies towards sustainability (Steer, 1998). The analysis of sustainable socio-environmental systems is a key target in multi-disciplinary research focusing on economic growth, environmental degradation and the related policy response (Briassoulis, 2011). Taken as a leading path of balanced development from both socioeconomic and environmental perspectives, sustainability is a normative concept and requires to be correctly implemented at all decision levels (Dinda, 2004; Stern, 2004; Galeotti, 2007). Once benchmarking conditions are identified for the various dimensions of sustainability (e.g. economic, social, ecological, cultural, institutional, political), normative criteria define the opportunity space for sustainable development (Lawn, 2003).

However, while sustainable development has meant, for a long time, how to reconcile economic growth with environmental quality, it is now widely recognized that a really sustainable and balanced development should involve much more complex issues with social, economic and, especially, territorial relevance (Zuindeau, 2006). Environmental degradation coupled with socio-cultural divides and economic polarization may accelerate territorial unbalances which ultimately lead to increased social conflicts and prevents the sustainable development of entire regions (Kok et al., 2004; Iosifides and Politidis, 2005; Onate and Peco, 2005).

Key examples of the interplay between proximate causes and underlying factors of complex sustainable development paths have been provided analyzing jointly economic performances, social inequality, institutional policies and their relations with the quality of the environment (Singh and Singh, 1995; Chopra and Gulati, 1997; Steer, 1998; Barbier, 2000; Scherr, 2000; among others; for the specific issue of sustainable urban development see the review in Hassan and Lee, 2015). Within this perspective, sustainability has been related to a theoretical definition of dynamic balance among development domains (Hamdouch and Zuindeau, 2010) and an additional condition has been added, that sustainable development should be defined as spatially balanced and consistent over time (Zuindeau, 2007).

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In Europe, territorial cohesion is considered a relevant policy issue and this objective has been regarded as a third dimension to most traditional policy targets such as economic and social cohesion (Tumpel-Gugerell and Mooslechner, 2003). At the same time, the increased pressure on ecosystems determined, especially over the most recent decades, a decline in the quality of the environment associated with the progressive loss in natural resources, the consequent reduction of ecosystem services and negative effects on rural, marginal and economically-disadvantaged areas (Salvati and Carlucci, 2011). More effective policy strategies – mainly in the form of integrated assemblages of strategic environmental-economic measures (Briassoulis, 2011) – are necessary to promote a spatially-balanced development (Zuindeau, 2006).

Although the unbalanced distribution of natural resources, economic polarization and social disparities revealed particularly complex to assess and to approach with effective policy strategies in Europe, economic-environmental gaps are particularly intense in traditionally-divided countries (Zuindeau, 2007) such as those in the northern Mediterranean area (Puigdefabregas and Mendizabal, 1998). The joint evaluation of economic and environmental divides requires a multidisciplinary approach based on the analysis of the interplay between regional processes and place-specific factors (Horlings and Kanemasu, 2015). Multivariate approaches proved to be useful to identify territorial development paths with deviations from an *a-priori* defined spatially-balanced condition (Salvati and Carlucci, 2011).

Empirical analyses devoted to assess socio-environmental disparities and the spatial variability of sustainable development indicators are still scarce (Salvati and Carlucci, 2014). This represents a serious limitation for the implementation of a strategy targeting a spatially-balanced development. Previous studies have analyzed the spatial relationship between specific environmental processes (e.g., land degradation) and socioeconomic conditions based on indicators (see Salvati, 2014 and references therein). Results shed some light on the spatial linkages between economic-environmental dynamics and sustainable development on a local scale. The present paper contributes to this deserving issue illustrating an integrated analysis of economic, environmental and sustainable development disparities in Italy based on simple statistical tools with the aim to verify spatial convergence in the three dimensions. Italy represents a paradigmatic case study in Mediterranean Europe due to of the development divide between north and south Italy. Economic disparities in Italy reveal their wide-range environmental impacts and involve socio-demographic processes acting on vastly different scales, from regional to local (Salvati and Zitti, 2008).

The approach proposed in this study was based on a multivariate analysis of three indicators assessing economic, social and environmental factors at a disaggregated spatial scale: (i) per capita value added (taken as a proxy of economic development and territorial competitiveness), (ii) a composite index of sustainable development which considers together the three pillars of sustainability (environmental protection, social changes, economic growth) by integrating 99 individual variables—and (iii) the Environmentally Sensitive Area Index assessing the quality of natural capital according to 14 biophysical variables. Our study contributes to implement effective policies for a spatially-balanced, sustainable development in affluent but economically-polarized countries.

## 2. Methodology

### 2.1. Study area

Italy extends 302,070 km<sup>2</sup> (23% flat, 42% upland and 35% mountains). The country is characterized by a relevant divide in

socioeconomic conditions between northern and southern regions (Bonaverò et al., 1999; Felice, 2010; Floridi et al., 2011; Dallara and Rizzi, 2012; Iuzzolino et al., 2013; Niedertscheider and Erb, 2014; Jepsen et al., 2015). Northern Italy is one of the most developed and affluent regions in Europe; it extends over the Po river valley being separated from central Europe by Alps. Central Italy, separated from northern Italy by the Apennines is an economically-polarized region with a marked urban–rural divide gravitating around Rome and Florence, and a mixed economic structure centered on small-scale manufacturing, tourism and high-quality agriculture (e.g., wine production). Southern Italy, including the main islands of Sicily and Sardinia, lies backward, with younger population structure, high unemployment rate, more restricted accessibility from Europe and an economic structure centered on low- and medium-income agriculture and traditional tertiary activities (constructions, commerce and the public sector) concentrated in the main urban centers (Naples, Bari, Palermo, Cagliari). As a consequence, Italy shows important regional disparities in population density, urban morphology, agricultural intensity and natural resource endowments (Salvati and Zitti, 2008).

### 2.2. Indicators

Three indicators at the same spatial scale (8101 municipalities) were used in the present study: (i) per-capita value added (euros) provided by Censis (2004) and referring to 2002 (INC), (ii) a Composite Index of Sustainable Development (CISD) introduced by Salvati and Carlucci (2014) and (iii) the Environmentally Sensitive Area Index (ESAI) calculated according to Salvati (2014). Both the CISD and the ESAI refer to a time period encompassing the early-2000s since they are based on census variables collected primarily in the years 2000, 2001 and 2002. These indicators were selected to investigate different economic, social and environmental factors on a municipal scale: a pure economic index (INC) as a proxy for economic development and territorial competitiveness, a pure environmental index (ESAI) quantifying the quality of natural capital based on various biophysical dimensions including soil, vegetation, climate and use of land and a composite index (CISD) integrating the three pillars of sustainability, i.e. environmental protection, social changes, economic growth. The variables collected in our dataset represent the most recent point in time with an enough large availability of socioeconomic indicators at the municipal scale in Italy. Changes in census techniques, the unavailability of some variables in the most recent years, the dissemination program for several variables over passing 2015 prevented us to collect a comparable dataset for the last years.

The Composite Index of Sustainable Development (CISD) proposed by Salvati and Carlucci (2014) was based on a Factor Weighting Model composing 99 variables that cover 5 general themes (Demography, Human capital, Local development and competitiveness, Quality of life, Rural development and environment) in turn subdivided into 14 research dimensions (Population structure, Territorial characteristics/urban structure, Education, Labor market, Economic structure, Tourism specialization, Income and wealth, Crime, Water management, Land tenure, Rural landscape, Crop intensity, Quality and innovation in agriculture, Human capital in agriculture). The weight assigned to each indicator was determined using an objective weighting system based on a Principal Component Analysis (Khatun, 2009). The CISD ranges between 0 and 1 and shows a spatially complex distribution in Italy with a north–south gradient reflecting the socioeconomic disparities observed between competitive (northern) and disadvantaged (southern) regions. The outcomes of the CISD were validated using three independent variables and evaluated for stability using sensitivity to changes in the composing indicators (Salvati and Carlucci, 2014).

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