Chapter 7
Land Cover Analysis for Evapotranspiration Assessment in Catania Metropolitan Region

Paolo La Greca
University of Catania, Italy

Daniele La Rosa
University of Catania, Italy

Francesco Martinico
University of Catania, Italy

Riccardo Privitera
University of Catania, Italy

ABSTRACT

Today, the contraction of green zones is a key issue for land use planning with relation to climate change effects on urban areas. Furthermore, the loss of evapotranspiring surfaces and vegetated soils is one of the main consequences of urban sprawl processes. The authors present the case of Catania metropolitan area, the 2nd most populated urban region in Sicily. In particular, three municipalities are analyzed, as they present the most relevant urban sprawl processes. Inside this complex "urban jam," there are still large non urbanized spaces. These patches (cultivated and abandoned agriculture land and lava fields from Mt. Etna), deeply fragmented, are often left for future development. These areas are particularly important in the examined context, considering the lack of green spaces for ecological functions and leisure. This chapter focuses on land cover analysis based on land use maps and oriented to assess evapotranspiration degree of the different land uses. Land use categories have been geographically sampled, and eight land cover types have been extracted with GIS by photo interpretation of high resolution orthophotos. Other sets of geodatabases have been used, including vectorial/raster cartographies and field surveys. Results from this evapotranspiration assessment can be useful for addressing land use planning of non urbanized areas within a sprawled metropolitan area, identifying new forms of agriculture, leisure, and environment protection.

DOI: 10.4018/978-1-4666-1924-1.ch007

INTRODUCTION

Accelerated climate change is posing new challenges to planning. Measures to reduce emissions of Green House Gases, known as mitigation, are only one of the possible actions. The other key issue is how to build settlements that can adapt better to the consequences of these changes, including uncomfortable high temperatures, greater incidences of flooding and strain on quantity and quality of water resources. Adapting to climate change is therefore an essential part of a planning policy aimed at ensuring human health and maintaining high levels of livability. This is a fundamental step for any community that aims at remaining a desirable place to live and work in (Shaw et al., 2007). In this perspective, the role of green areas within the urban fabric of a metropolitan area is crucial in order to achieve better levels of urban and environmental quality, together with adaptation to climate change.

Urban sprawl is the main threat to green non urbanized areas. Sprawl is characterized by a mix of low density land uses, mainly on the urban fringe. It is widespread in several regions of western countries (Piccinato, 1993; European Environmental Agency, 2006) and it is often the result of unplanned or poorly planned developments. Consequently, it has to be carefully considered in any climate change adaptation policy.

This work focuses on a detailed land cover analysis, aimed at assessing the evapotranspiration features of different land use types. Eight land cover types have been identified for each category of land use in order to assess its evapotranspiration degree. Results from this evapotranspiration assessment represent the first step for guiding land use planning of non urbanized areas within a sprawled metropolitan area.

THE STUDY AREA IN CATANIA METROPOLITAN REGION

The case study here presented is the most urbanized area within the conurbation of Catania (Italy) and it includes the municipalities of Mascalucia, Tremestieri Etneo and Gravina di Catania (Figure 1), a settlement system characterized by a considerable amount of urban sprawl. Considering the 27 municipalities included in the official designation of the Metropolitan Area, the total population grew more than 27% in forty years (1961 – 2001), while the main city lost 16% and the other 26 municipalities increased of 107%. In 2001, about 57% of total population lived outside the main city. This process is continuing in recent years: in 2008 this percentage grew over 60%.

The three municipalities considered in the study area are small agricultural towns on the

Figure 1. The study area of the municipalities of Mascalucia, Tremestieri Etneo, and Gravina di Catania (in red) within Catania Metropolitan Area (Italy)