Chapter 5
GeoDesign and Urban Impact Analysis

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ABSTRACT

During the past decades, geographic information systems (GIS) have developed massively to be used in various fields. In this regard, within the urban planning and geodesign fields, practitioners, urban planners, developers, designers, and scientists started using GIS as a tool to digitalize and analyze reality. Hence, in this research, besides an introduction to GIS-based modelling and geodesign, the authors analyze an example of the "Filder" area in Stuttgart city based on a set of pre-identified parameters. This case study demonstrates how GIS can be used to avoid the employment of complex methods and tools.

INTRODUCTION

Since computers help to analyze spatial aspects, urban environments are—besides nature conservation—the most visited field of interest. In the beginning mapping of urban land-use, urban zoning plans and conflict analyses by overlay technique were proudly presented as decision background or as a lay down of decision results. However, the capacity of Geographical Information System (GIS) to support spatial scenario storytelling was immediately used when raster GIS systems have been brought to the market. For example, studies on urban sprawl and forecast of future urban expansion got a common GIS-based exercise.

Since 2010, *geodesign* is a term which summarizes the help of GIS in regional and urban planning. Geodesign uses GIS not merely as a tool to have better-informed decisions, but also to address planning as an iterative GIS supported process in which suggestions, interventions, and visions can be tested against its impacts which result from the change of a region's geography (Schwarz-v. Raumer & Stokman, 2014; Steinitz, 2012). This idea leads to the question of how to estimate the environmental impacts of urban structures when being restricted to the tools GIS commonly provides. Most of those

impacts only can be quantified by models which are able to map complex physical processes based on not easy to get empirical data. Within this research, the authors show that it is possible to use the limited capacities of GIS to at least implement rough screening models which indicate the severity of impacts of existing urban infrastructures or the direction of changes when considering interventions or future developments. In many cases, this is enough, especially when being used in a communicational stage in urban planning. Besides an introduction into GIS-based impact modeling and geodesign, this contribution presents a summary of a case study which demonstrates how GIS can be used to avoid the employment of complex methods and tools.

BACKGROUND

Geoinformation is booming. People orientate via GPS, locate points of interest by smartphones, and thanks to satellites we can always and everywhere find out who or what is currently in our environment. Geodata surveying "by the way" is just as possible as the precise control of events "on the way." It seems natural to assume that this development influences techniques and methods in which our built and natural-oriented living environments are planned and designed. However, this assumption quickly gives way to skepticism when one compares the wishes and hopes of digital landscape planning with what has remained. The big promises of web-accelerated planning today are delivered only (but at least) by the offer that actors and interested persons have the chance to be quickly and comprehensively web-informed (Schwarz-v. Raumer & Stokman, 2013). To successfully transport geoinformation into the sphere of the design process, a field between technology and creativity must be opened. The attempt to engage geo-IT and design as "Geodesign" is burdened with some obstacles (Schwarz-v. Raumer & Stokman, 2012), but it works and is illustrated in this chapter.

Geodesign is not an emerging activity or practice. Nevertheless, it has been practiced for a long time ago. Li & Milburn (2016) and Miller (2012) argued that any action that incorporates dealing with geography, space design or allocation, hunting animals or selecting materials for shelter construction is considered as geodesign activity. Many designers and architects used the methodology of geodesign without mentioning the term though. For example, Ian McHarg (1920–2001), in his book *Design with Nature* (1969), introduced a geo-based methodology for landscape architecture and dealing with the surrounding environment. Not only MacHarg but also Frank Lloyd Wright (1867–1959) and Richard Neutra (1892–1970) gave full attention not merely to their clients but also the context of the design (Miller, 2012).

Nevertheless, the term *geodesign* did not appear until the year 1993 (Kunzmann, 1993); Kunzmann uses it to discuss scenarios communicating spatial structure ideas (Schwarz-v. Raumer & Stokman, 2011). Geodesign is made up of two syllables: *geo-* and *design*. According to the *Cambridge Dictionary* (n.d.), *geo-* is a prefix that is "of or relating to the earth." Hence, anything that is earth related like land, water, material, in or above the earth, 2D or 3D is considered as *geo*. While design could be defined either as a noun or verb, as a noun, it is "the way in which something is planned and made," while as a verb it is, "to make or draw plans for something that will be produced" (*Cambridge Dictionary*). Hence, geodesign could be defined as the process of planning or developing an entity within a geographical context. Alternatively and more scientifically, Flaxman (2010, p. 29) defined geodesign as "a design and planning method which tightly couples the creation of a design proposal with impact simulations informed by geographic context."

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