Chapter 22
Designing an Information Infrastructure for Policy Integration of Spatial Planning and Flood Risk Management

Jing Ran
Cardiff University, UK & University College Dublin, Ireland

Zorica Nedovic-Budic
University of Illinois at Chicago, USA & University College Dublin, Ireland

ABSTRACT

The policy integration of spatial planning and flood risk management is a promising approach to mitigate flooding. Scholars indicate that the absence of appropriate information base and technological capacity is among the factors impeding this integration. This study found that what needs to be improved is the access to geographic information and geographic technologies by individual policy makers, rather than the ownership of such resources by one organisation as a whole. Based on this finding, we designed the goals and functions for a Spatially Integrated Policy Infrastructure (SIPI) which shares not only geographic information but also models and analysis tools. A prototype of SIPI was also developed as an illustration of the selected functions of this SIPI. The design of SIPI is consistent with other frontier studies and projects in the field of GIS and planning. The development process also provides experience for future studies and development of infrastructures that aim at supporting policy integration.

INTRODUCTION

Integration of spatial planning and flood risk management at policy levels may help to address the issues related to flooding (Howe & White, 2004; Kidd, 2007; Ward, 2013; White & Richards, 2007). Policy integration implies that the policy-making process is a joint process and that a policy reflects a combined and comprehensive consideration (Underdal, 1980). The comprehensiveness of policy input usually benefits from development of comprehensive and easily accessible Geographic Information (GI)

DOI: 10.4018/978-1-5225-7033-2.ch022

in all the jurisdictions. Dissimilarly, the comprehensiveness of policy making process benefits from Geographic Technologies (GT) and tools which allow policy makers to evaluate policy alternatives with comprehensive consideration of both flood mitigation and development objectives. In our earlier case study of the River Dodder catchment in Ireland, we found the problem was in the fact that development happened against the planning policies and the policies lacked a catchment view (Ran & Nedovic-Budic, 2017). Sharing GI such as flood maps and zoning maps could be helpful to improve the policy implementation, whilst the GT such as flood models and Geographic Information Systems (GIS) can help to improve the awareness of the impact of policies and development on flood risk at the catchment level.

In this context, considerable opportunities lie in providing GI and GT. The value of GI and GT have been tested in various planning tasks (Chang, Parvathinathan, & Breeden, 2008; McCall & Dunn, 2012; Oana, Harutyun, Brendan, & Sheila, 2011; Pettit & Pullar, 2009; Van Haaren & Fthenakis, 2011; Vukicevic & Nedovic-Budic, 2012) and flood management activities (Bahremand et al., 2007; Nedovic-Budic, Kan, Johnston, Sparks, & White, 2006; Pradhan, Shafiee, & Pirasteh, 2009; Werner, 2001; Zhang et al., 2009).GI and GT have potential in acting as an integration medium (Schuurman, 2003) that improve a mutual understanding of issues, collaboration and communication between different policy fields and institutions (Pelzer, Geertman, Heijden, & Rouwette, 2014). Sharing GI without sharing GT, may limit its potential as an integration medium (Boerboom, 2013). For this reason, whether planners and flood engineers had access to GI and GT appeared to be an important factor in the integration of spatial planning and flood risk management policies. However, very few information infrastructures were developed to provide access to both GI and GT for the integration of flood risk management and spatial planning (Ran & Nedovic-Budic, 2016). Boerboom (2013) also indicated that there was no such spatial planning and decision-making infrastructure that shares both GI and GT.

This paper aims to design and develop a prototype for a Spatially Integrated Policy Infrastructure (SIPI) that facilitates the integration of spatial planning and flood risk management policies in the Irish context. SIPI is a complex data, information, and knowledge infrastructure based on both GI and GT. Also, SIPI may potentially integrate tools such as Geographical Information Systems (GISs), Decision Support Systems (DSSs), Planning Support Systems (PSSs) and tools for modelling, analysis and visualization. SIPI is targeted at providing diverse services during spatial planning and flood risk management and bringing institutions and stakeholders together through the Internet, Geo-Libraries, Geo-Web and Geo-Portal on various platforms (e.g. desktop computers, laptops, and mobile phones).

To achieve this aim, first, we investigated whether existing GI and GT base could serve as a medium for policy integration of spatial planning and flood risk management by interviewing planners, flood engineers and GIS technicians. The results informed the design of the goals and functions of SIPI. Secondly, we prototyped the components of such SIPI in the case area of River Dodder catchment, Ireland. For this prototype, we modelled a flood event with 100-year return period under different development scenarios and developed a Web-GIS to share the results. The next section describes the process which led to the design of SIPI and the development of SIPI prototype. The third section of this paper presents the interview results and the design of the SIPI. The fourth section presents the prototyped components of SIPI. The last section summarises this design and development process and discusses the experience learned which could help the development of a fully functional SIPI in the future.