MULTI-DIMENSIONAL FLOOD DAMAGE ANALYSIS

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In Korea, we have made the flood control plan focusing on the river channel and levee construction without considering the various flood prevention facilities in the watershed. So, the river channel has overloaded from the flood discharge. However, these days, we are trying to distribute the flood flow over a watershed instead of only discharging the flood flow to the river.

There are two methods called 'a simple method' and 'a modified method' (Ministry of Construction and Transportation, Korea, 2001) for the economic analysis for flood control project. However there exist some problems in two methods so this study intends to improve the previous methods and suggests a new method for the economic analysis for flood control project. Economic analysis for flood control project in the River Design Criteria was made based on the modified method (Ministry of Construction and Transportation, Korea, 2002). However, the modified method was made with inaccurate data and there are also some problems such as the limitation of inundation area-damage curve and no consideration of flood frequency in the method.

Therefore, this study investigates the methods of foreign countries like America, Australia, and Japan and also analyzes the previous methods in Korea. Based on the investigations we develop a new methodology for economic analysis for flood control project and call it Multi-Dimensional Flood Damage Analysis (MD-FDA). The figure 1 shows the procedure for the estimation of the expected annual flood damage by the MD-FDA and we applied the MD-FDA to the project of a diversion channel construction in the basin of Gulpo-cheon stream, Incheon, Korea. We compare the results from the modified method and the MD-FDA and the results are shown in Table 1.

As the results, the modified method and MD-FDA show that the analyzed project has a valid conclusion in economic aspect. However, the MD-FDA shows more reasonable results than the modified method. Say, the MD-FDA could estimate the reasonable damage by considering the regional characteristics of inundation area and flood frequency.
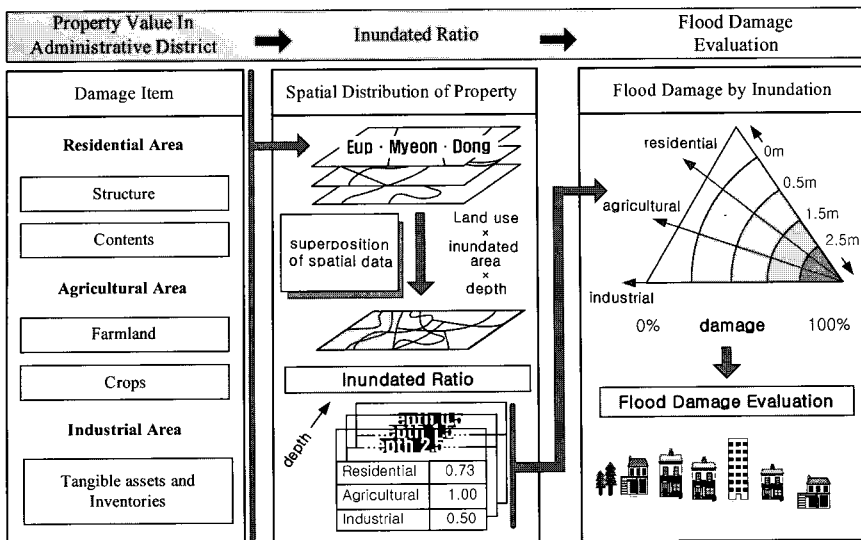
Fig. 1 Procedure of Estimation of the Expected Annual Flood Damage by MD-FDA

Table 1. The results of Economic Analysis for Diversion Channel Construction

		Modified Method(million ₩)			MD-FDA(million ₩)		
		①	②	③	①	②	③
		26,847	23,738	3,502	121,646	34,785	0.36
Expected Annual Flood Damage	①-②	3,109			86,861		
	①-③	23,345			121,646		
	②-③	20,236			34,785		
Project Cost(million ₩)		553,900					
Economic Evaluation Criteria	B/C	1.26			2.39		
	NPV(billion ₩)	136.8			731.0		
	IRR(%)	7.13			11.07		

REFERENCES

MOCT (2001). Improvement Study on the Economic Analysis in Flood Control Projects.
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