

Flood Damage Assessment in Taipei City, Taiwan

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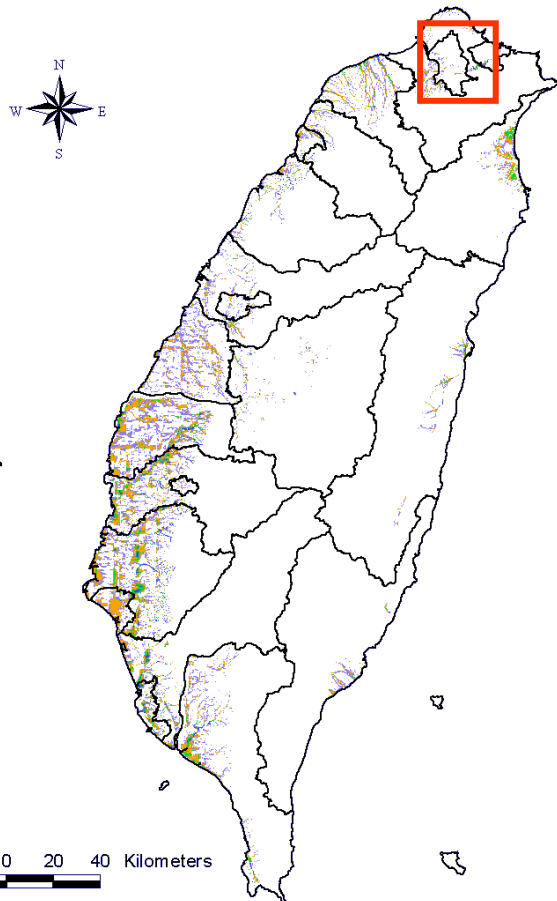
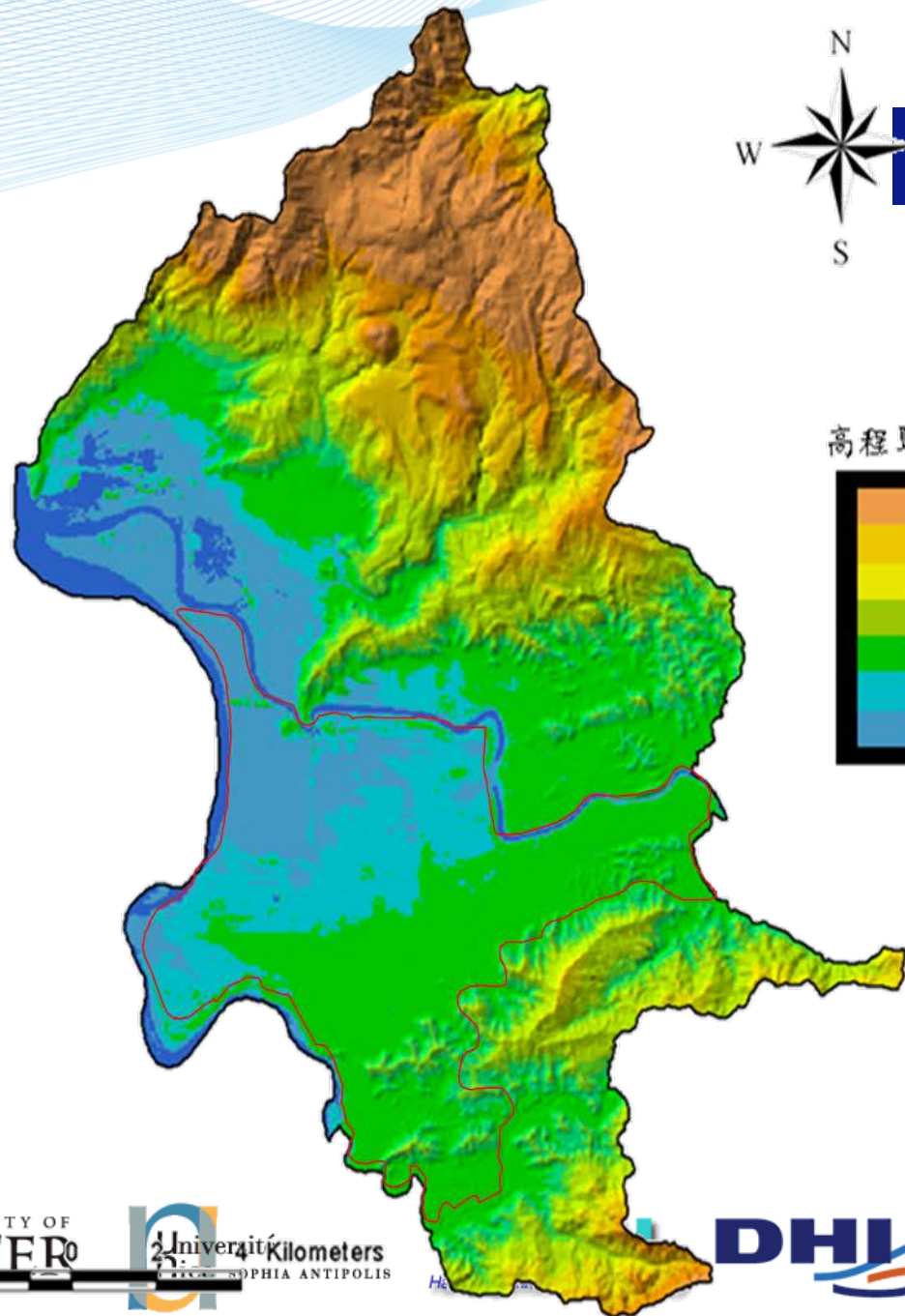
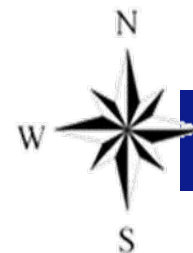
A.S. Chen, M.J. Hammond, S. Djordjević & D. Butler
University of Exeter, UK



- Introduction
- Hydraulic modelling
- Flood damage assessment
- Discussions
- Conclusion



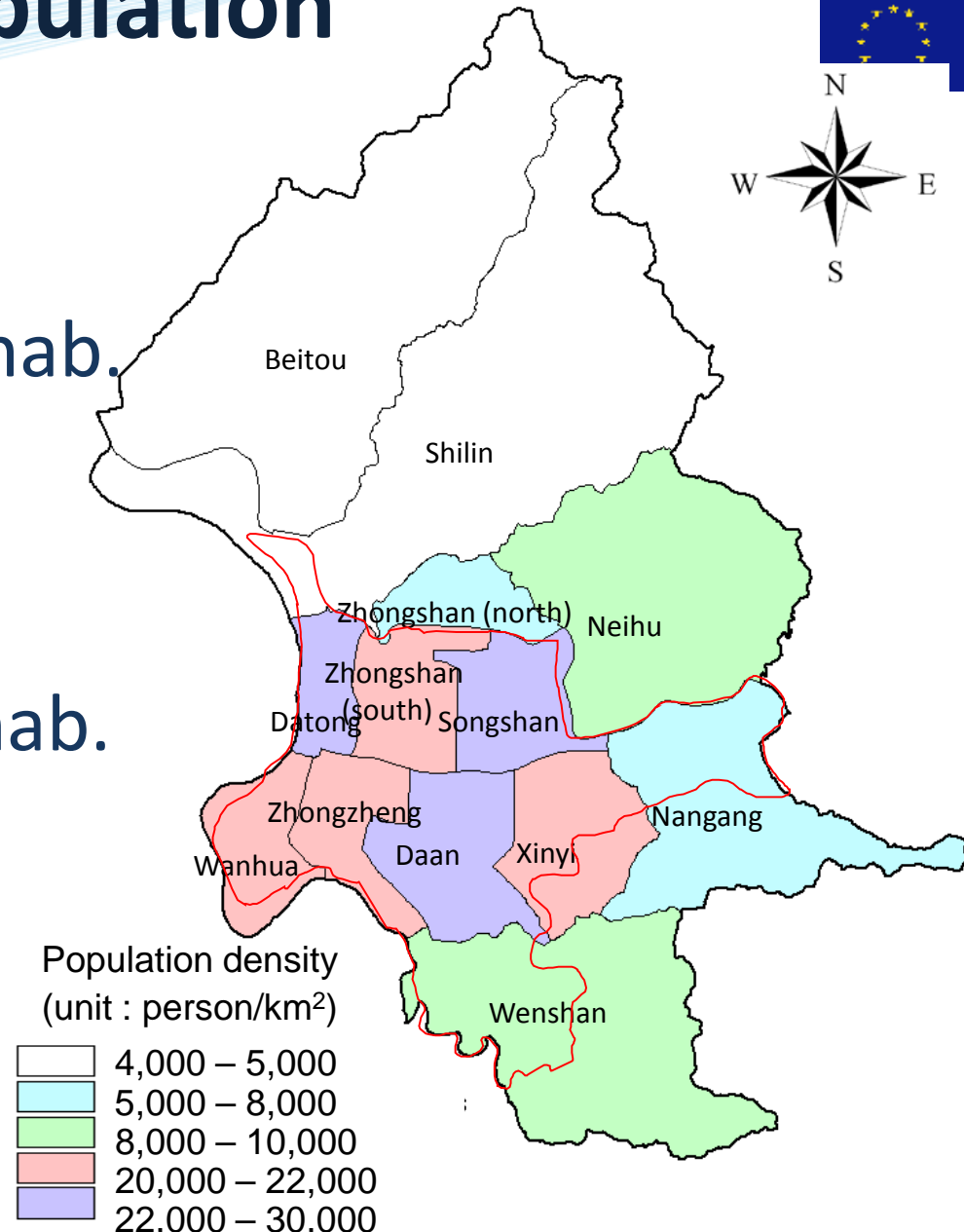
Taipei City



Area and population



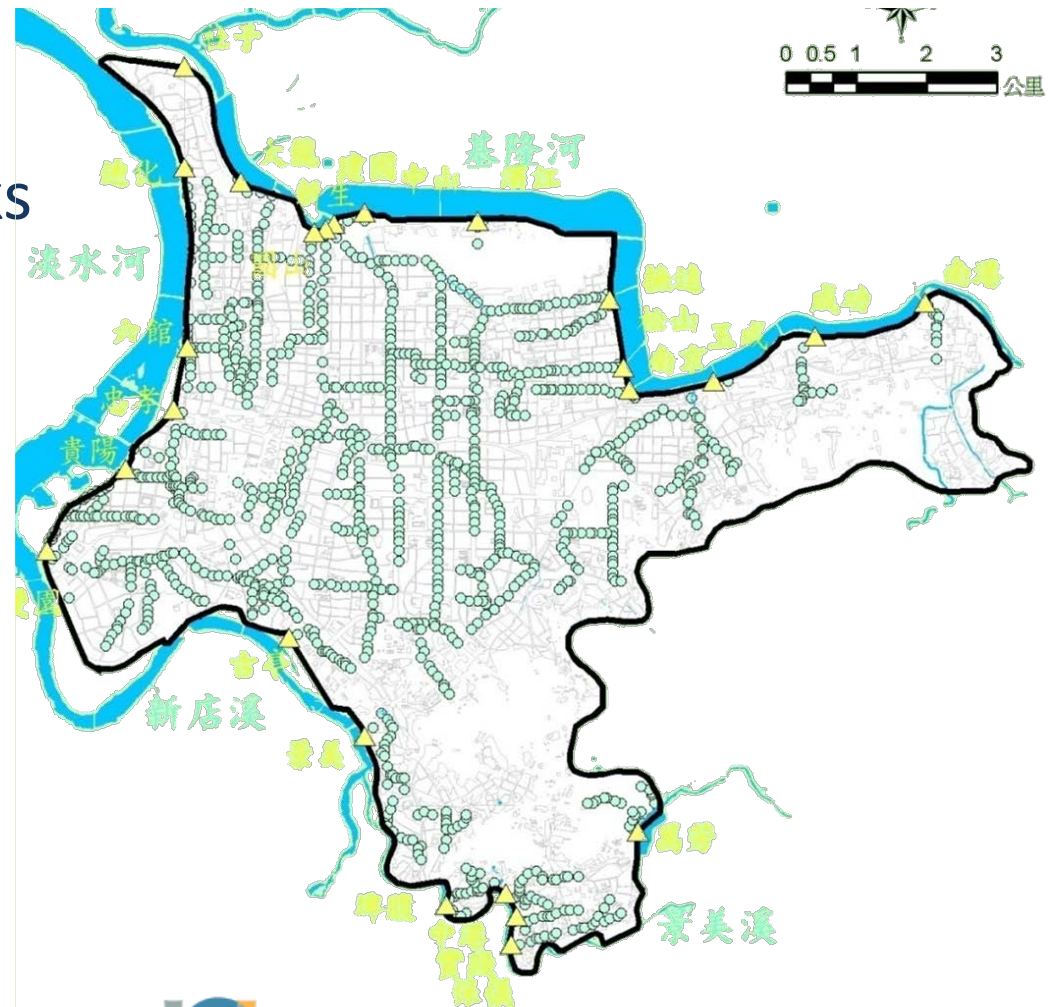
- Taipei City
 - 272 km²; 2.6 M inhab.
 - 9,600 inhab./km²
- Central Taipei Area
 - 120 km²; 1.7 M inhab.
 - 14,200 inhab./km²



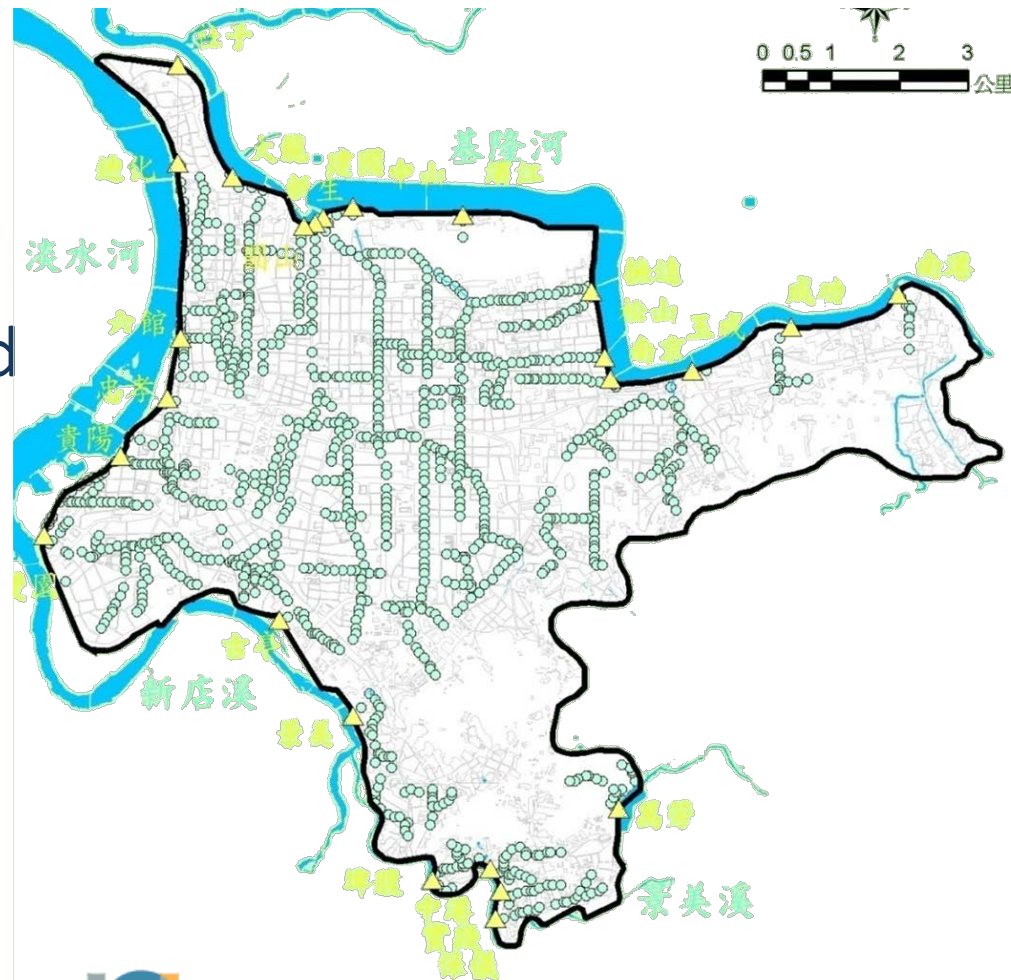
Hydrology and hydraulic attributes



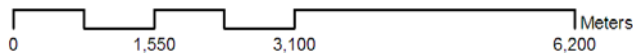
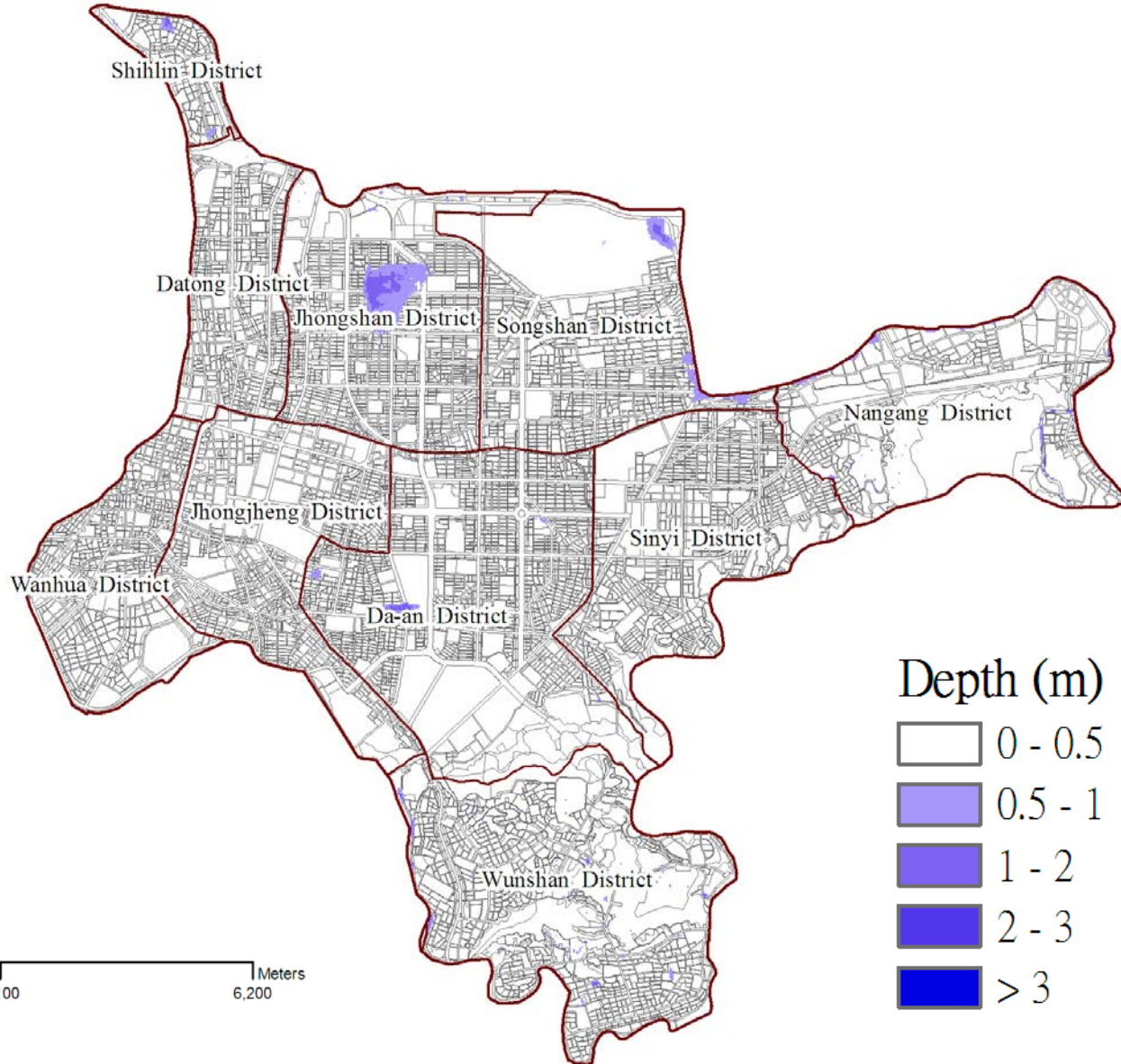
- 200yr levees
- 25 drainage networks (5y, 78.5mm/h)
- 900cms pumping capacity
- 100 + mm/h by typhoons



- Coupled 1D/2D model
 - 1D SWMM
 - 2D UIM
- Trunk sewer considered
- Pluvial flooding only
- Uniform spatial rainfall distribution
- 24 hours events

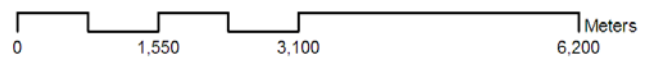
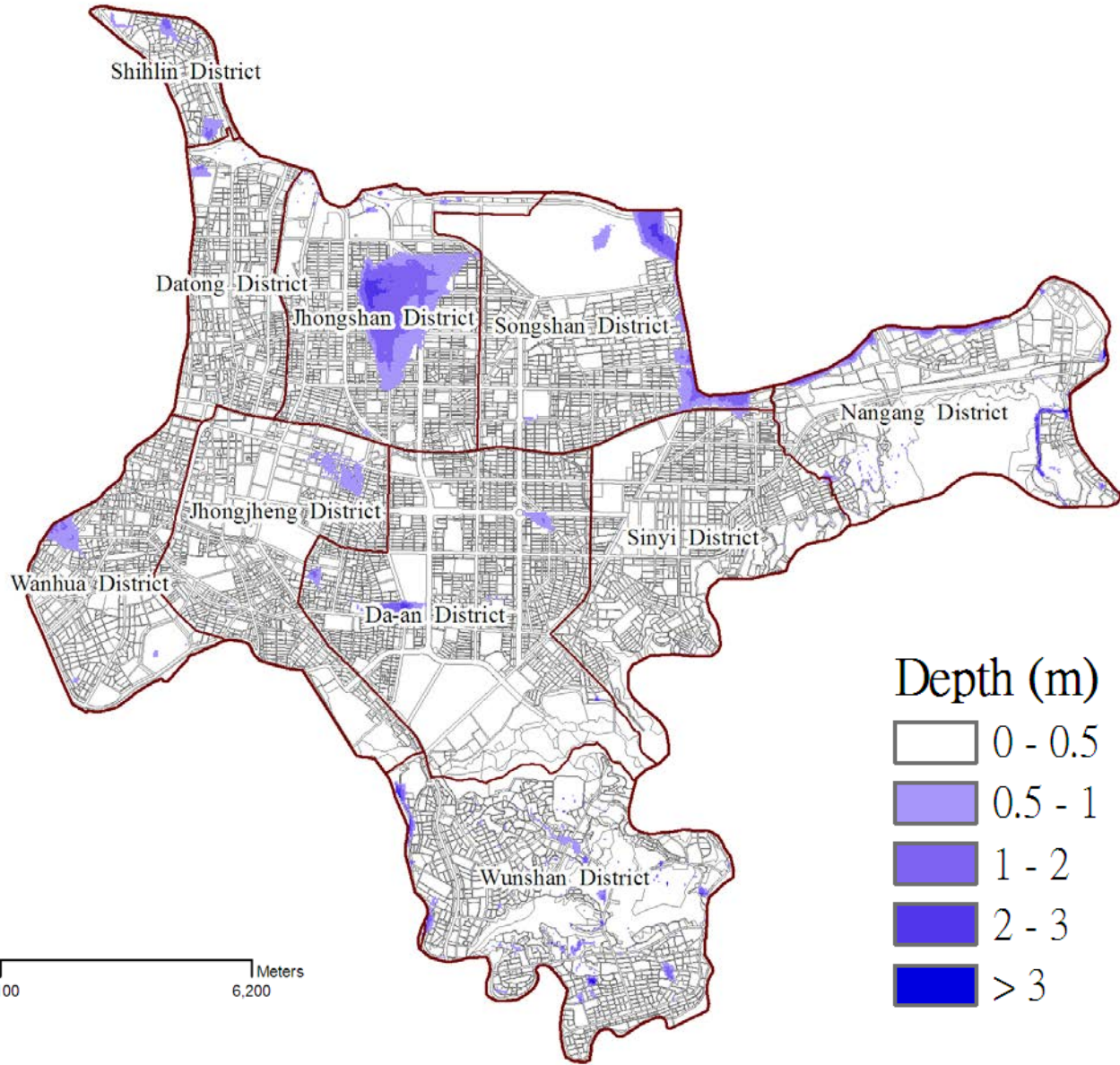


Inundation hazard map (10y)

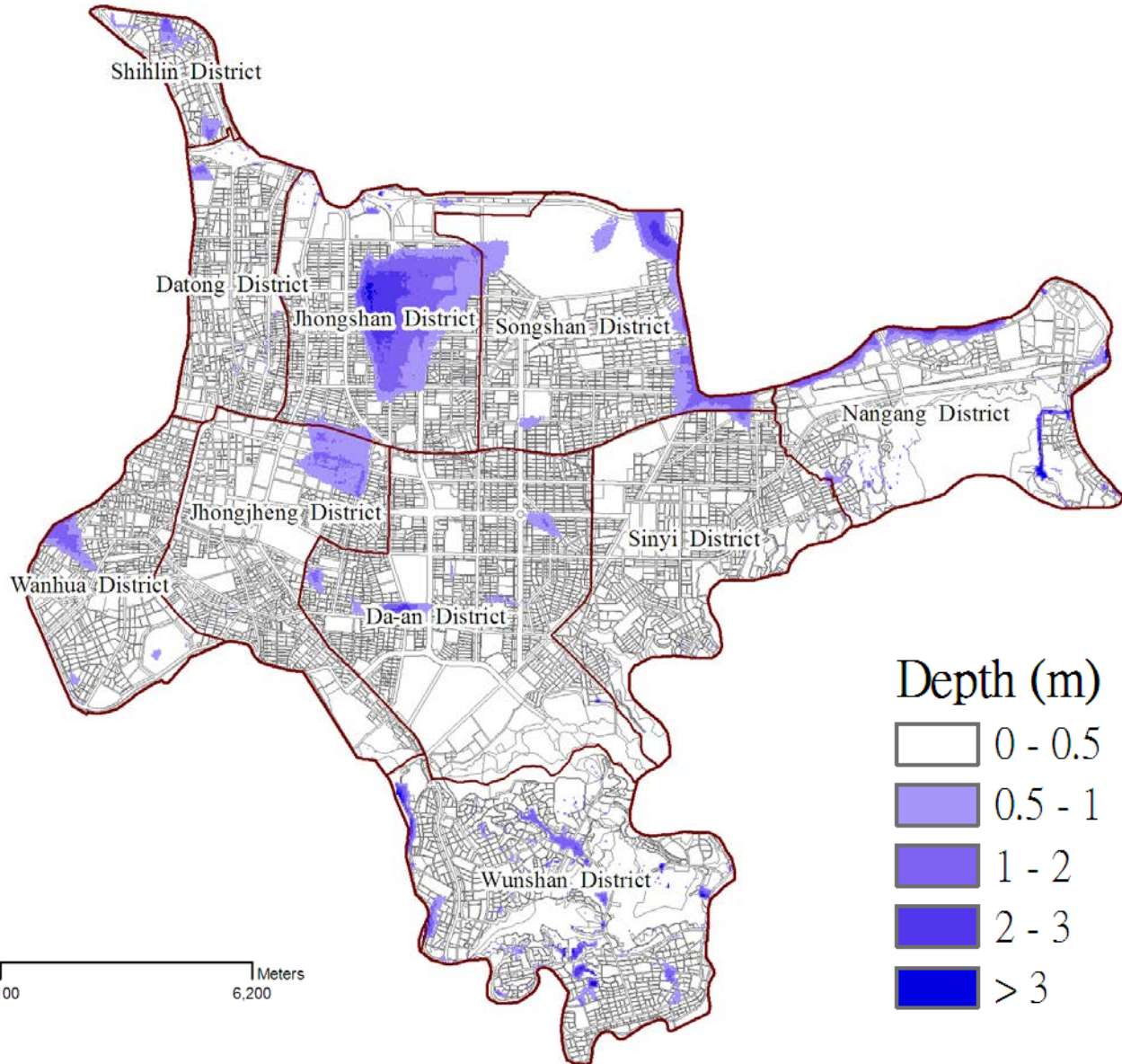




Inundation hazard map (25y)



Inundation hazard map (50y)

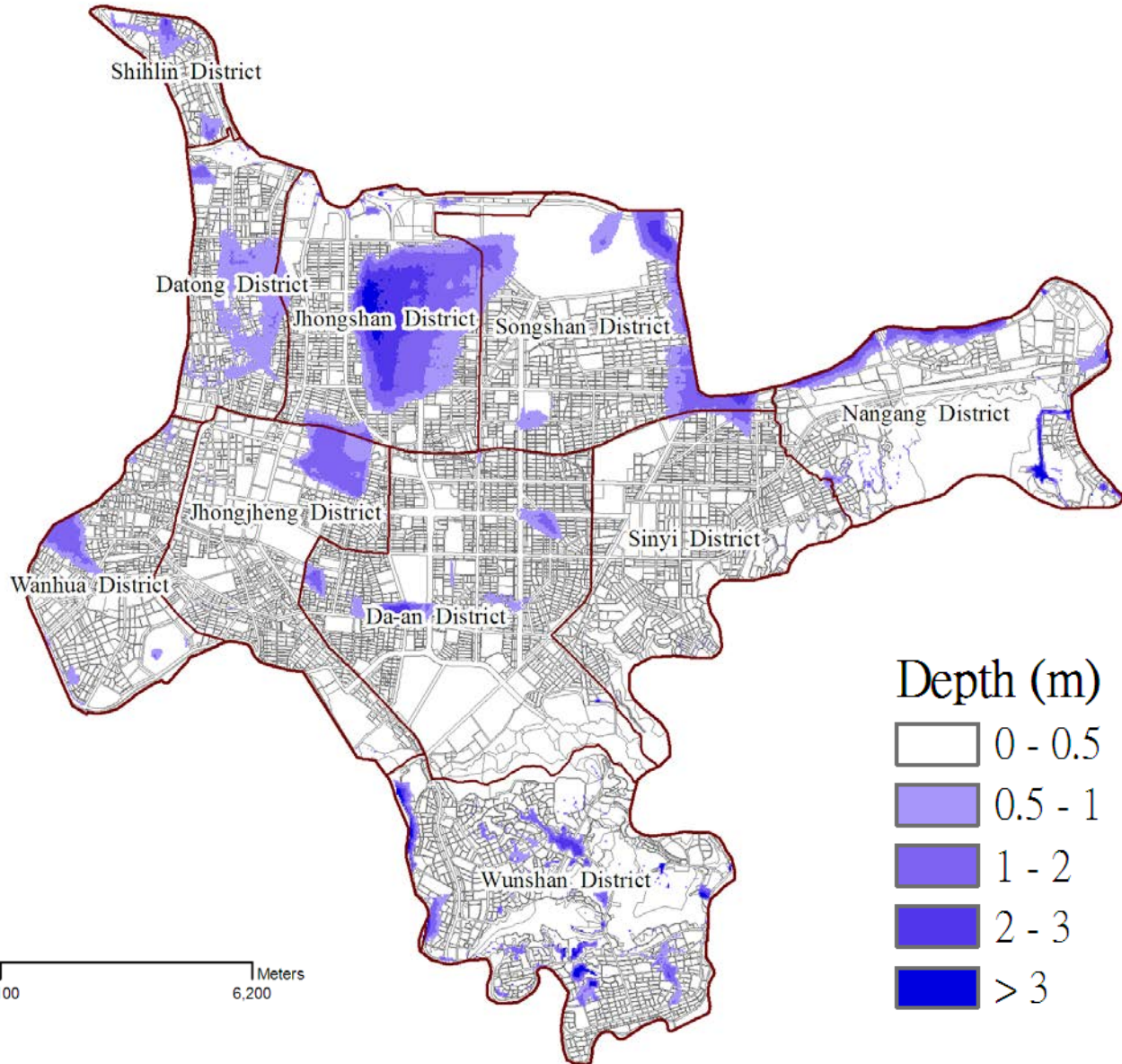


0 1,550 3,100 6,200 Meters

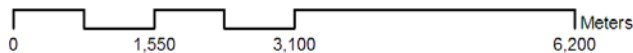
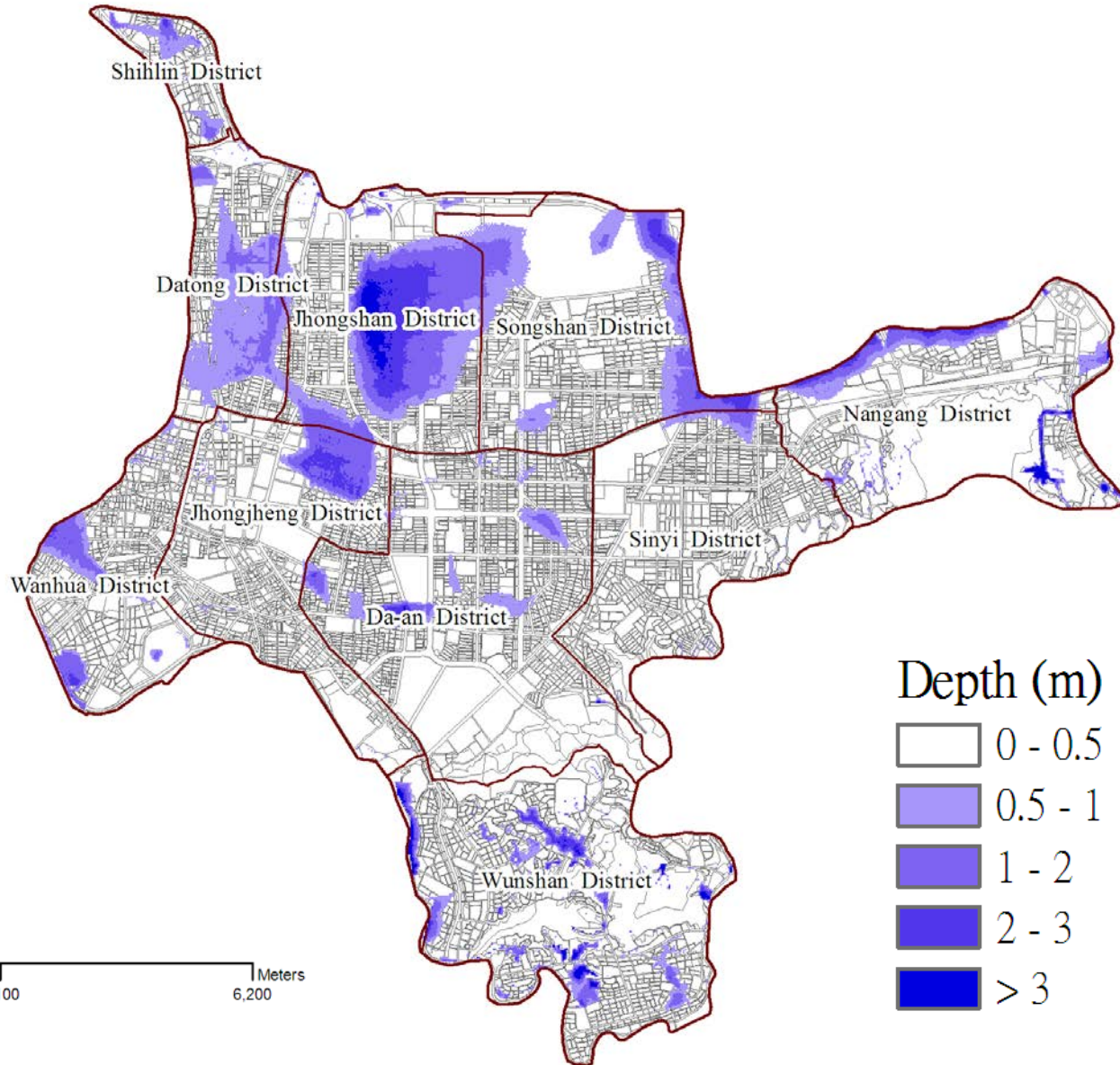




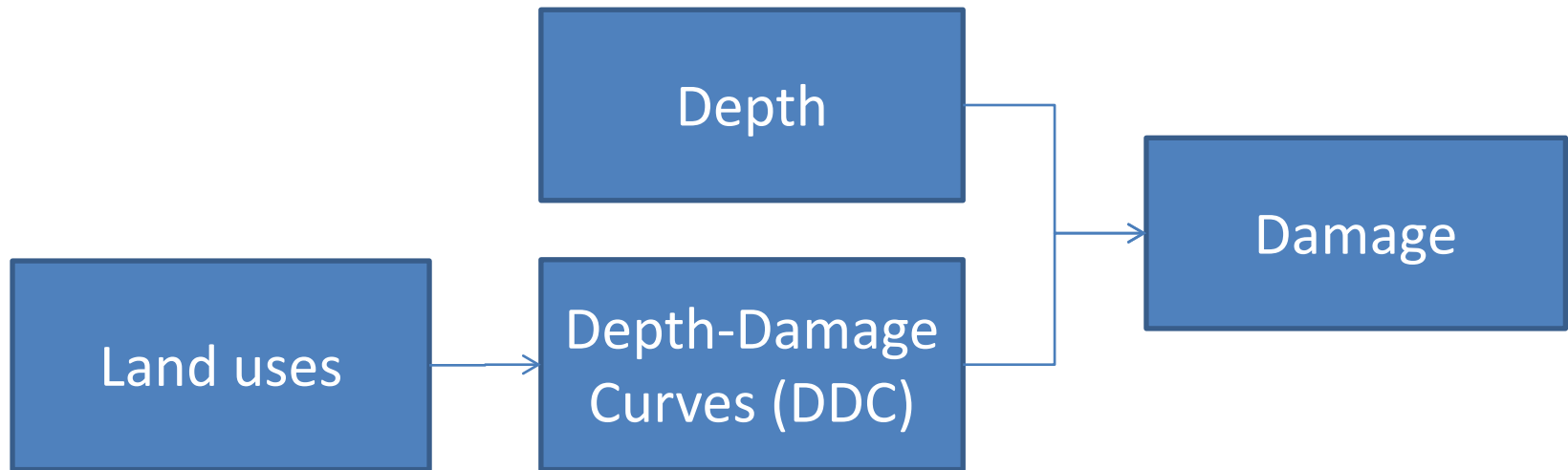
Inundation hazard map (100y)

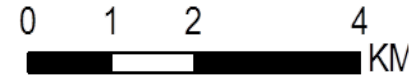


Inundation hazard map (200y)

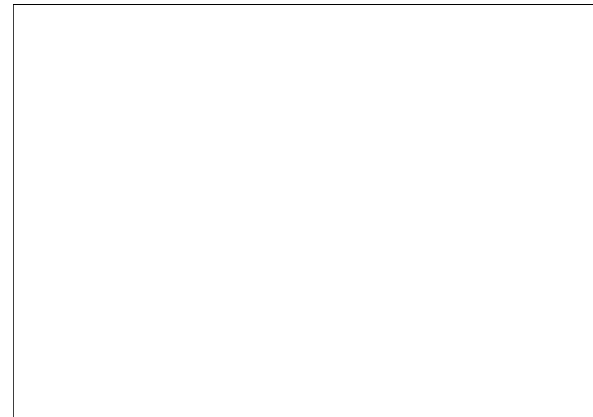
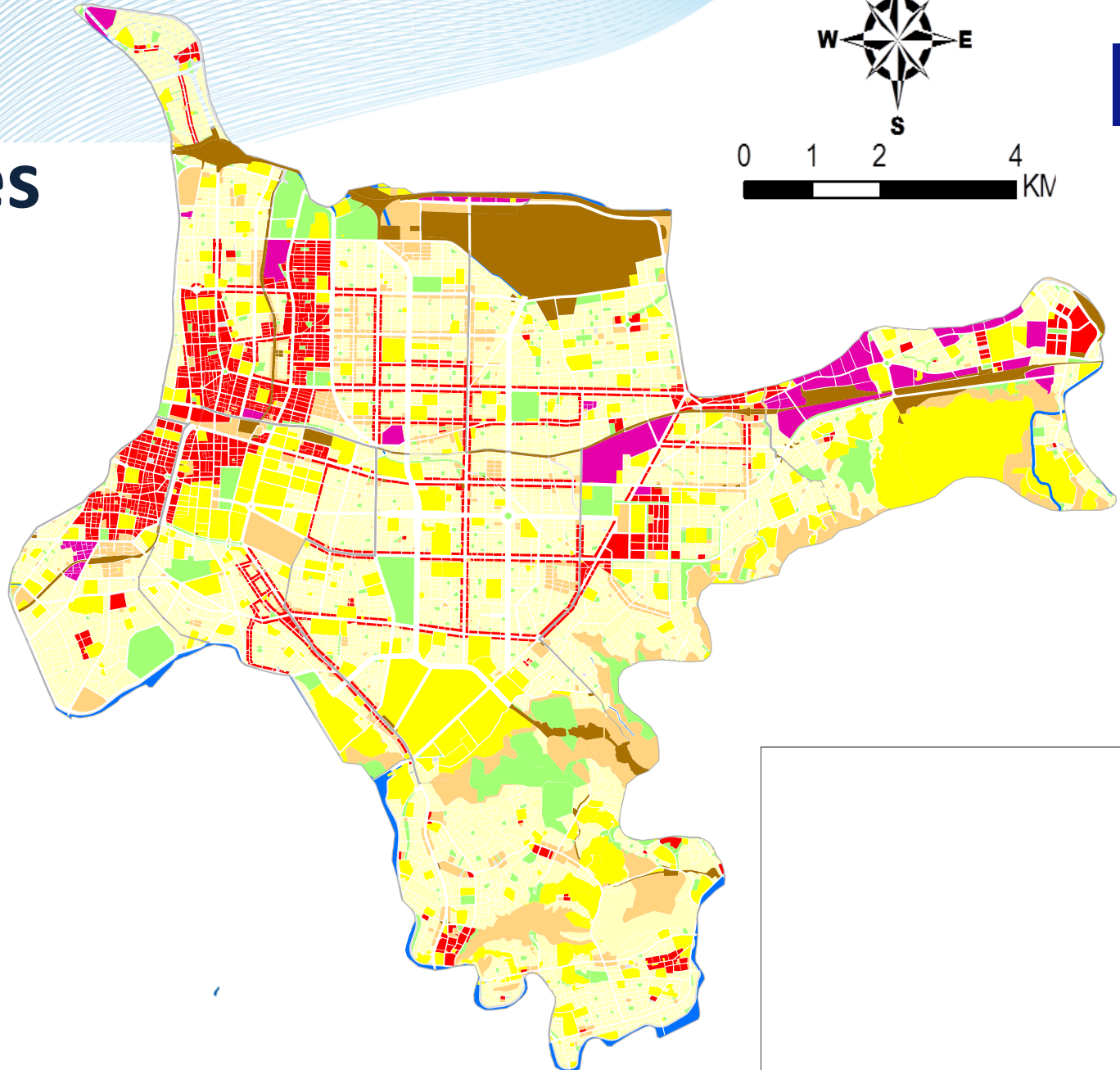


Flood damage assessment





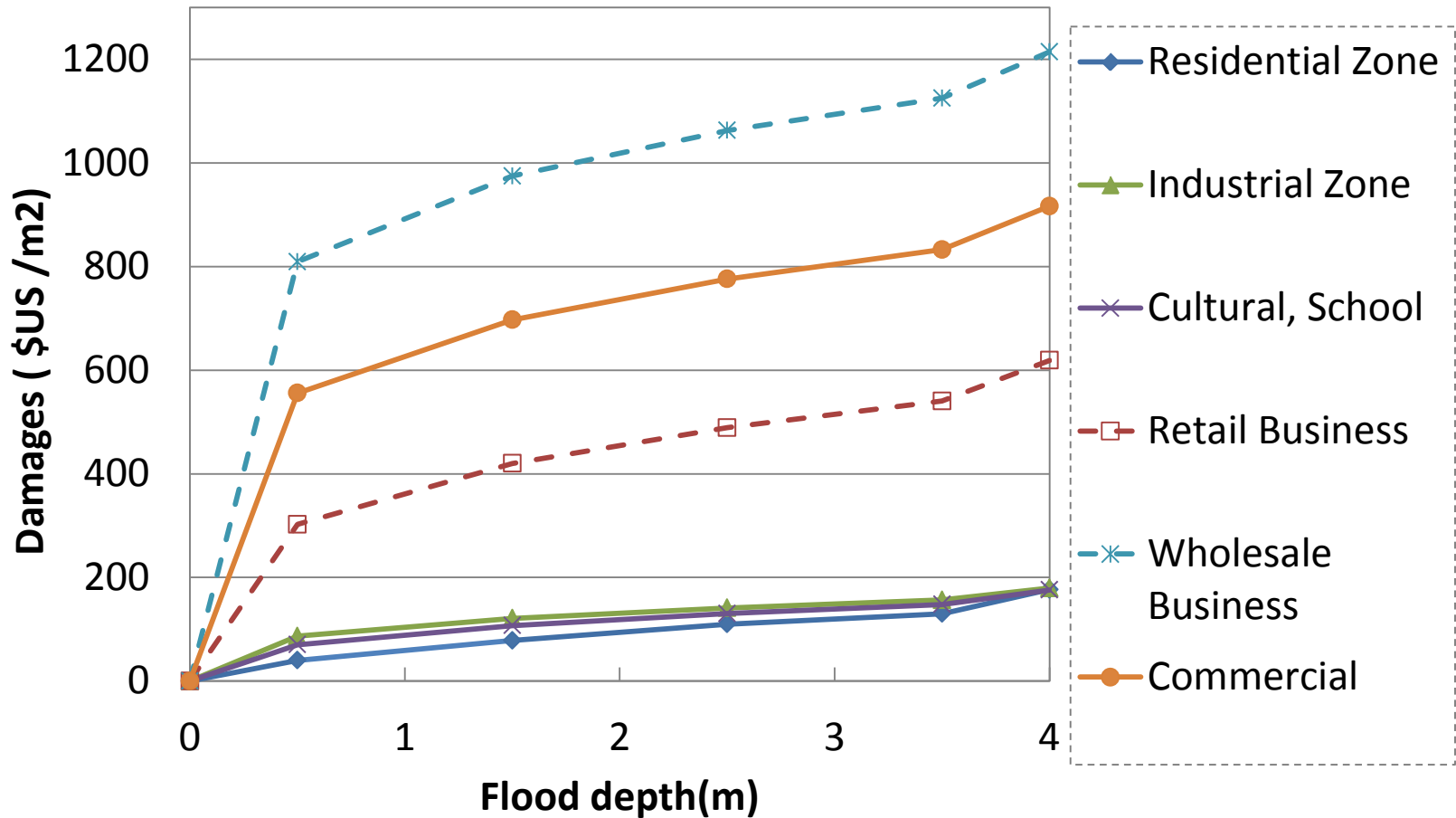
Land uses



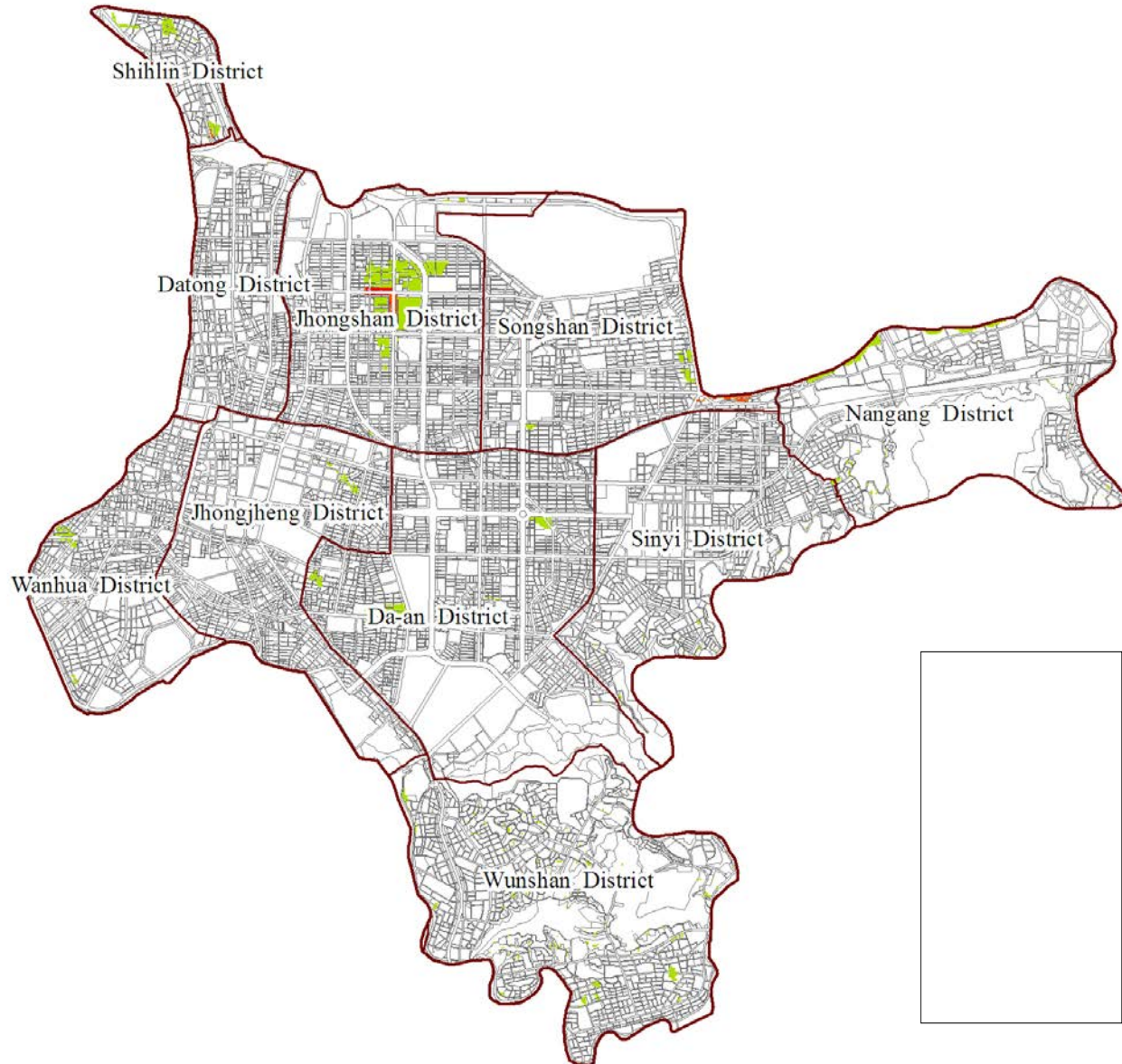
Depth-Damage Curves (DDCs)

- Field investigations
- Tax revenue office
 - Flood damage claim reports of individual household and business (aggregated)
- Wang, et al., 2003. Establishment of Systematic Models for Flood Damage Evaluation.
- Su et al., 2005. A Grid-Based GIS Approach to Regional Flood Damage Assessment.

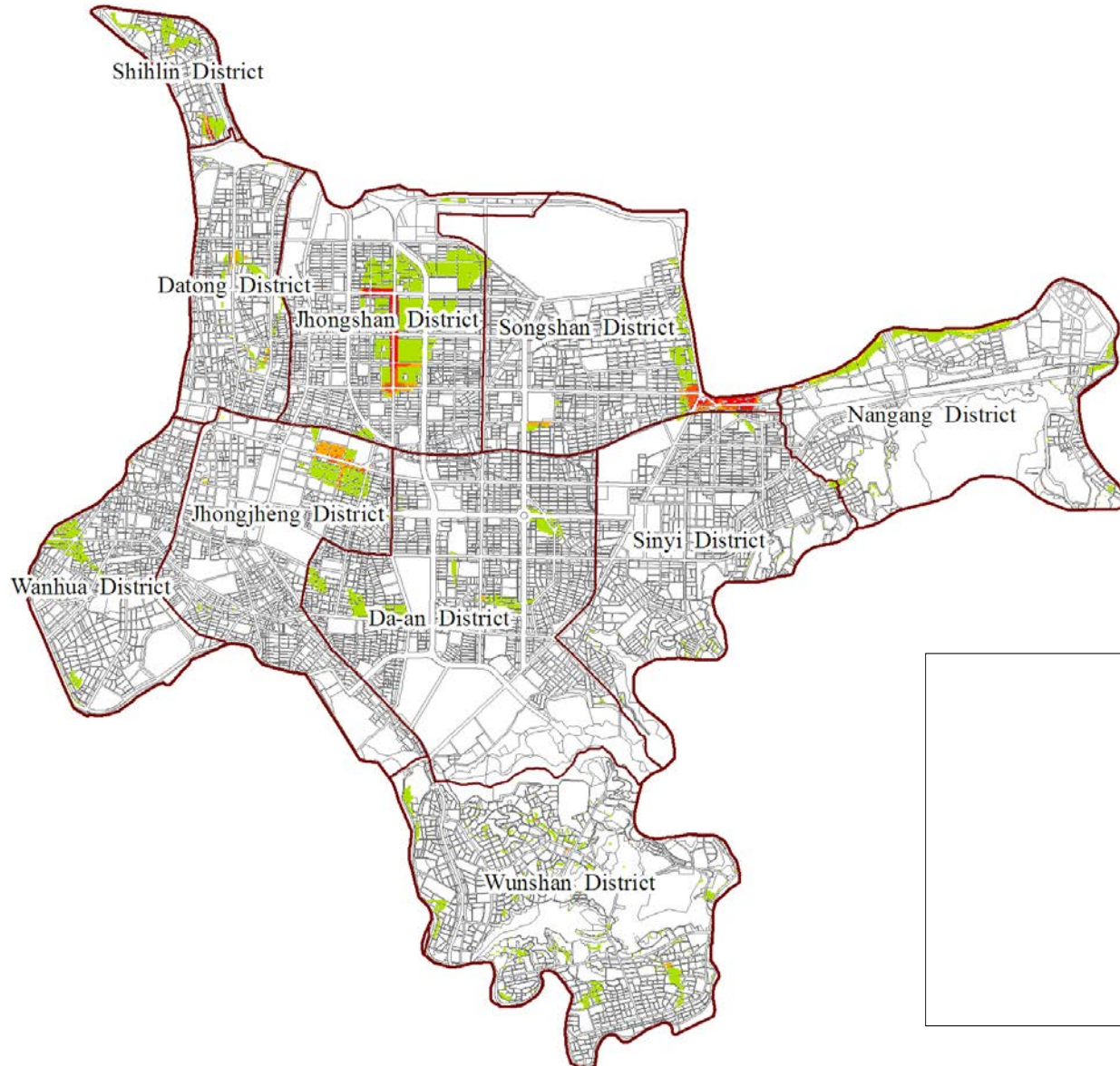
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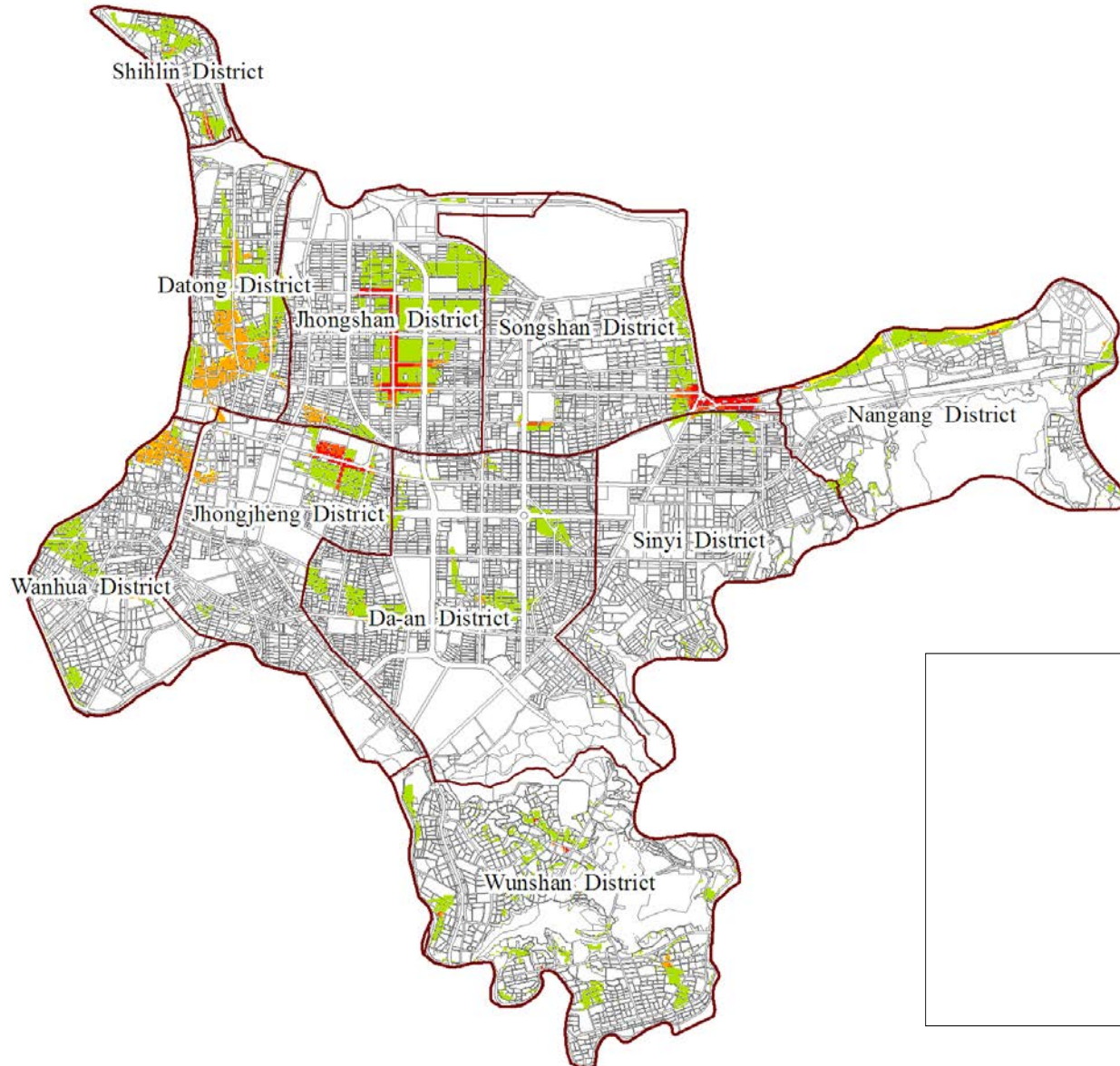
Flood damage map (10y)



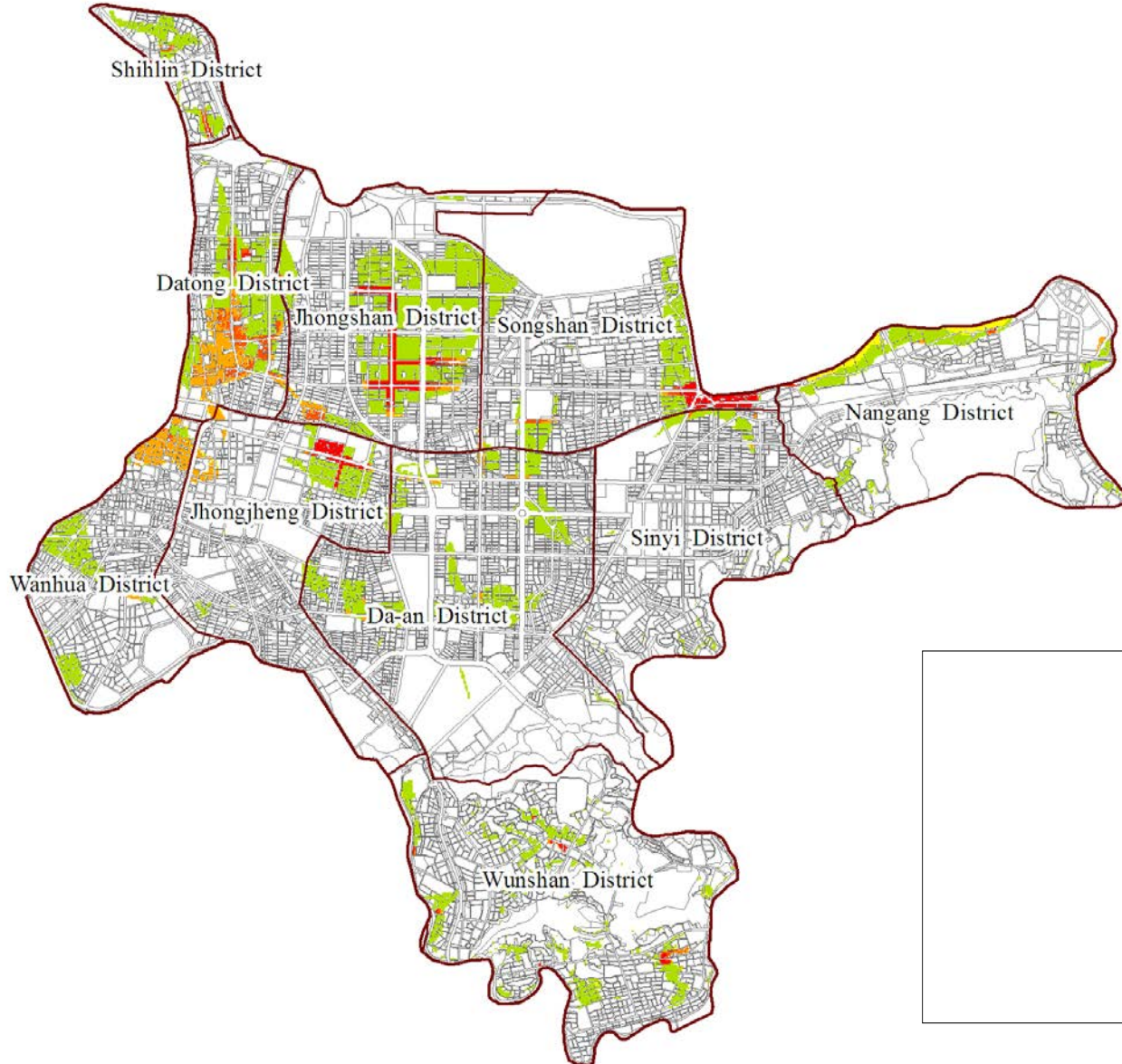
Flood damage map (25y)



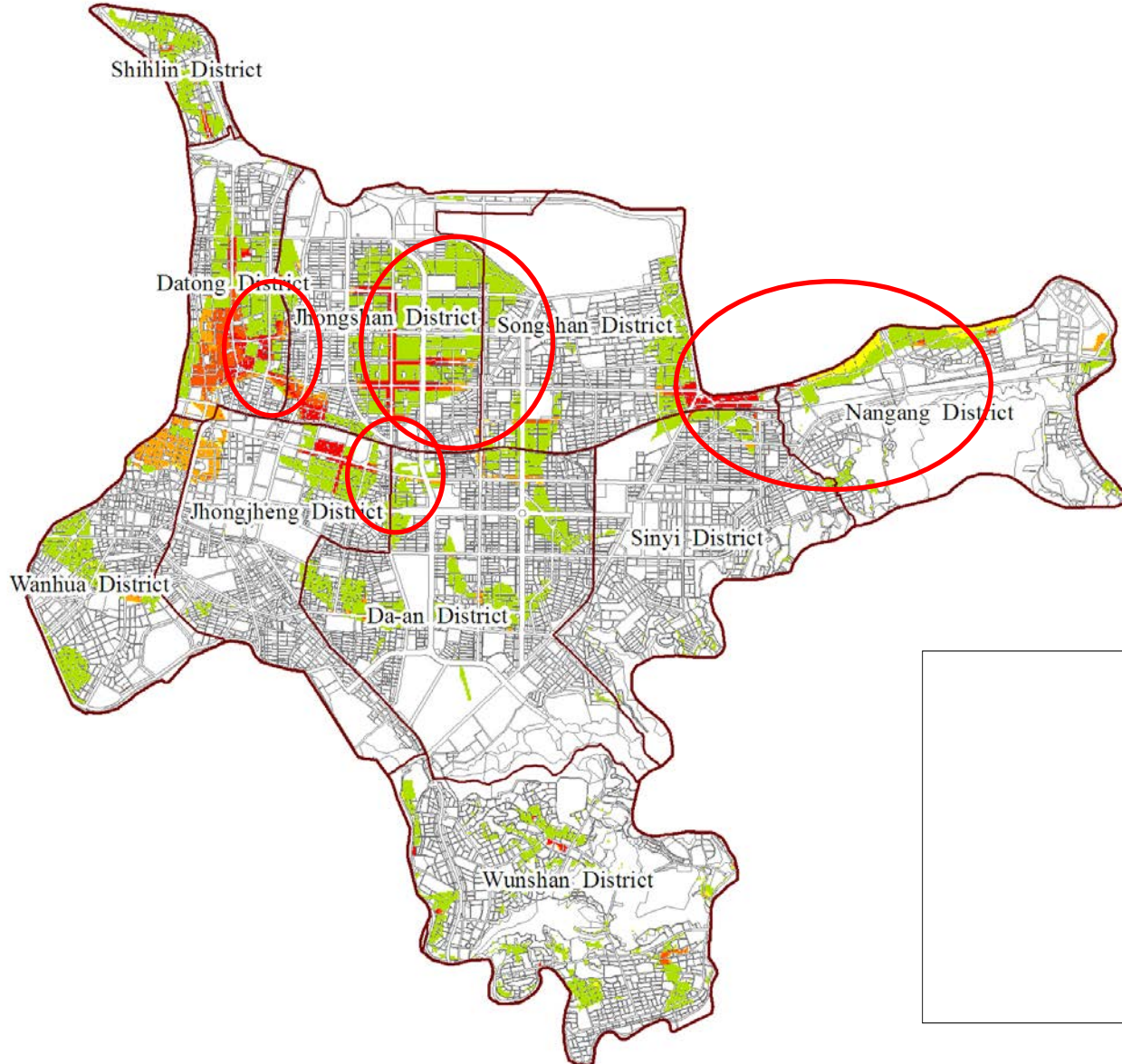
Flood damage map (50y)



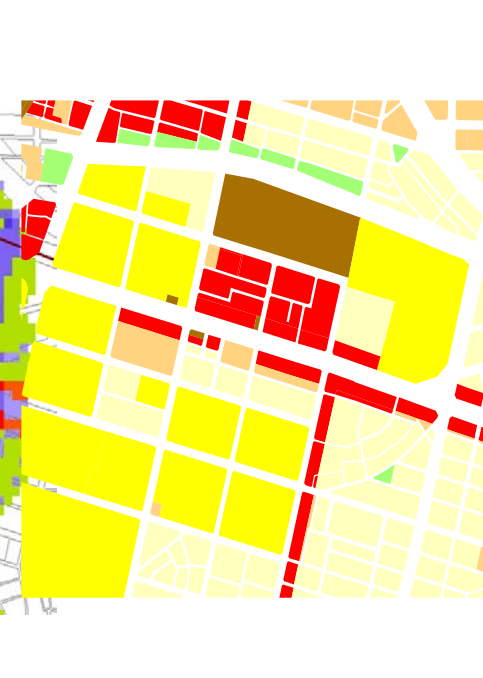
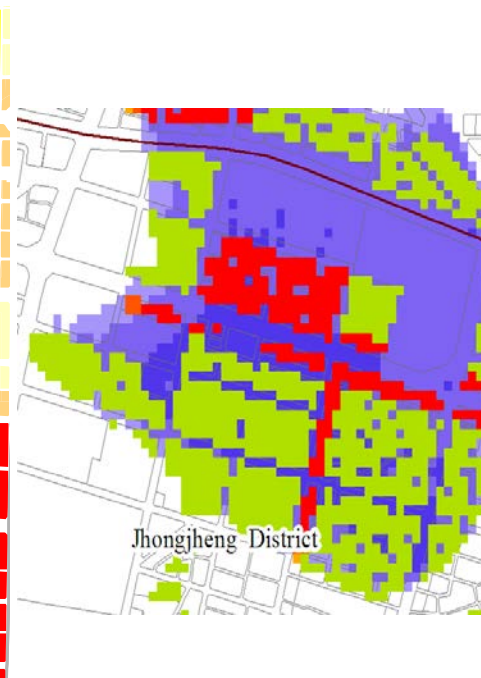
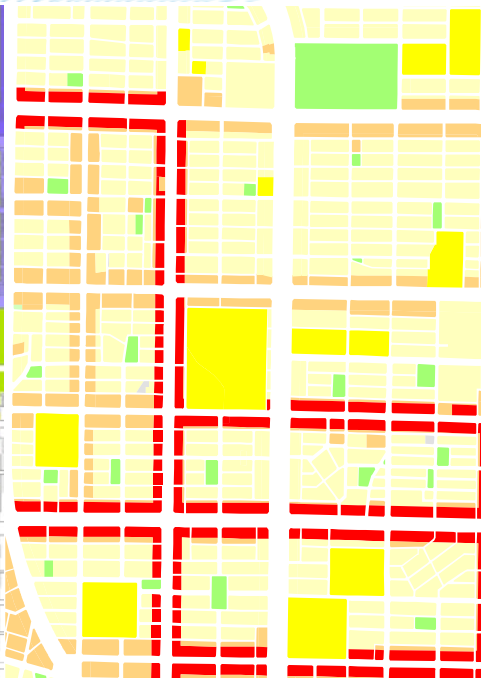
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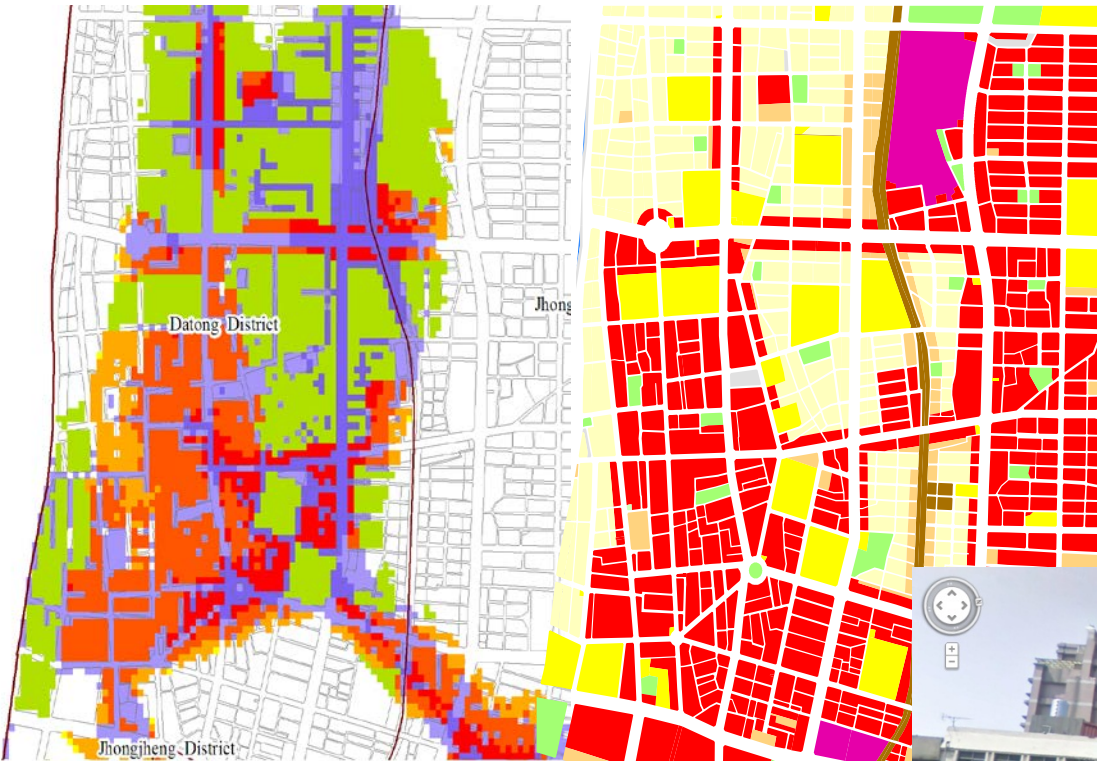
Flood damage map (200y)



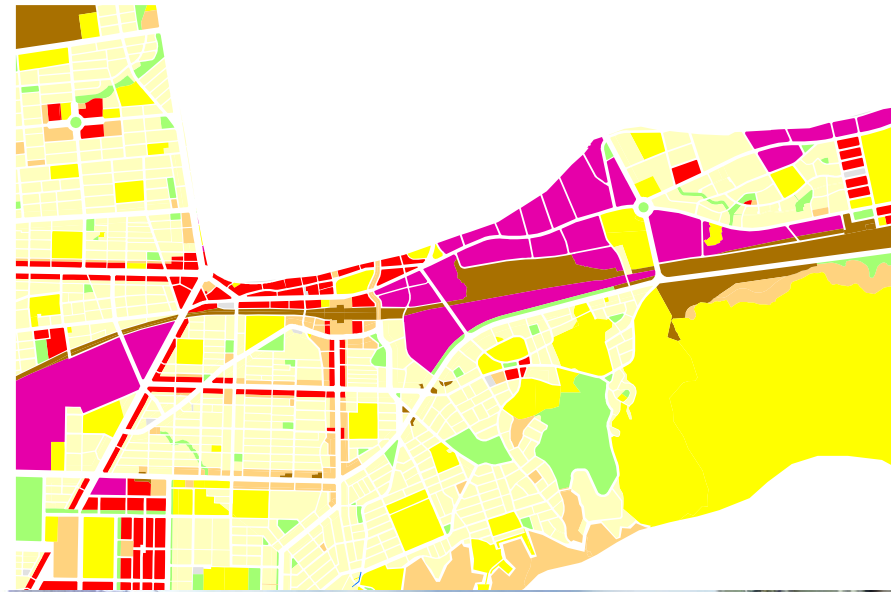
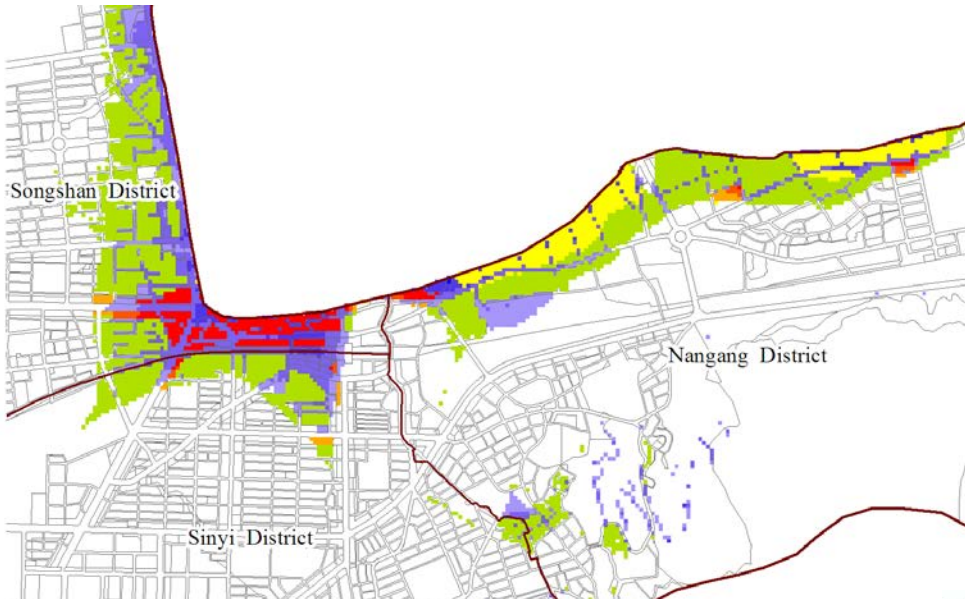
Shops and business office buildings



Shops in old communities



Commercial and Industrial

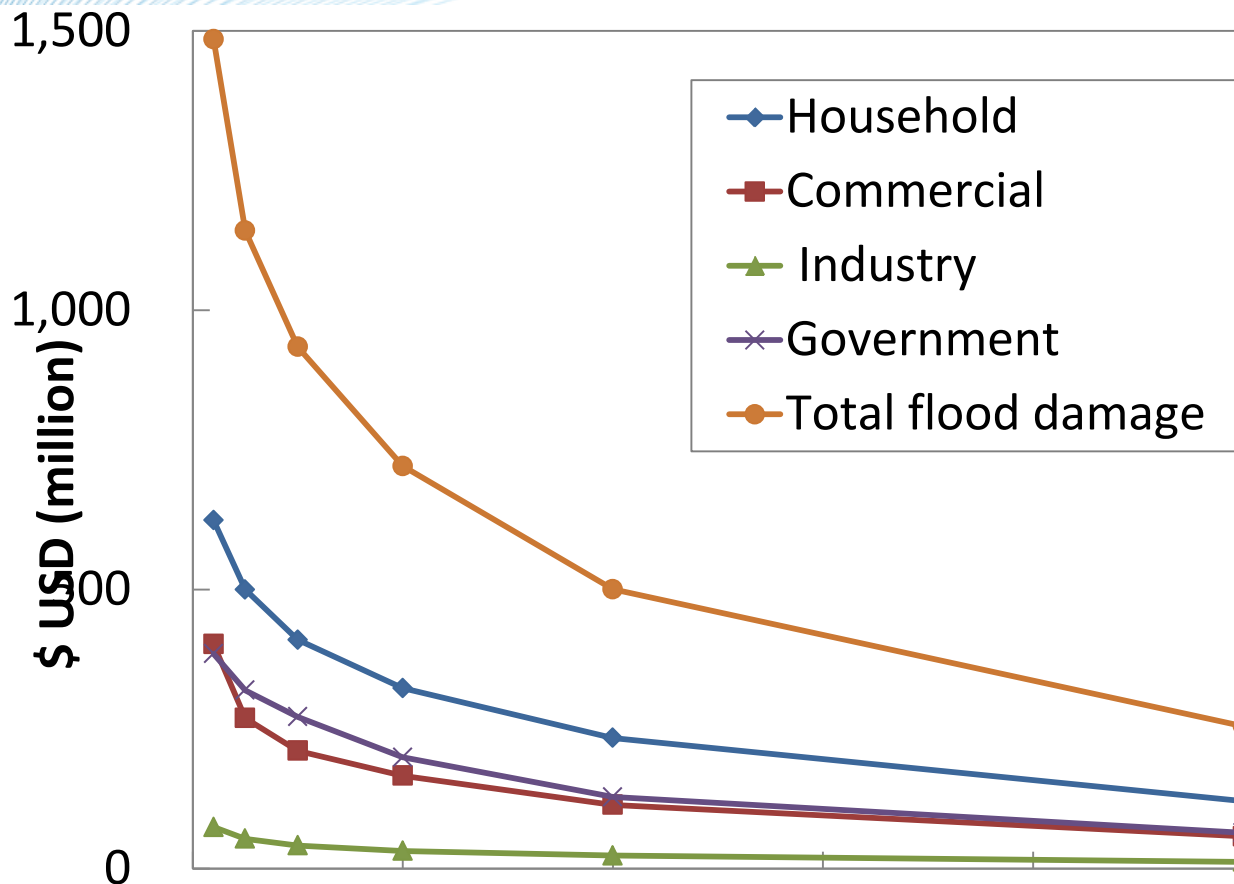


Flood damage assessment



Return period (year)	Inundated area (Km ²)	Flood damage (US \$ million)				
		Res.	Com.	Ind.	Gov.	Total
5	0.93	41.7	12.6	3.7	15.6	73.7
10	2.40	121.0	57.7	12.3	64.1	255.0
25	3.22	234.1	114.2	23.4	128.4	500.1
50	4.01	323.2	166.4	31.8	199.4	720.8
100	5.43	409.7	211.2	41.5	271.7	934.1
200	9.68	499.7	269.5	53.6	319.5	1,142.3
500	31.13	623.6	402.0	74.4	384.8	1,484.9

Flood damage EP curve



/通用格式通用格式通用格式通用格式通用格式通用格式

Exceedance probability

Flood damage assessment



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Average Annual Flood Loss(AAFL) Expected Annual Damage (EAD)		31.98	15.58	3.22	17.93	68.70

On-going studies

- Damage assessment for individual buildings
- Resolution and accuracy
- DDCs for other land uses to be determined
- Roadside parking
- Basements and underground infrastructures
- Urban redevelopment
- Social-vulnerability assessment

Concluding remarks



- Flood damage of various rainfall periods
- Average annual flood loss (AAFL)/
Expected Annual Damage (EAD)
- High risk areas identified
- Needs of better/detailed data
- Potential applications to various impact

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- Taipei case study is funded by the National Science Council, Taiwan (NSC 99-2915-I-002-120).

- <http://corfu7.eu/>
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