

Development Planning Process for Earthquake Resistant City

March 16, 2010

Center for Urban Earthquake
Engineering (CUEE)
Tokyo Institute of Technology

Professor Hideki Kaji

Development and Disaster

(Cause) (Effect)

Disaster → **Economic Growth and Development**

-Infrastructure for economic production may be seriously damaged by natural disasters, resulted in lowering industrial productivity



-Development may be declined, resulted in stagnation of economic growth

(Cause) (Effect)

Development → **Disaster**

Vulnerability to natural disasters may increase due to development, resulted in more serious damage caused by disasters

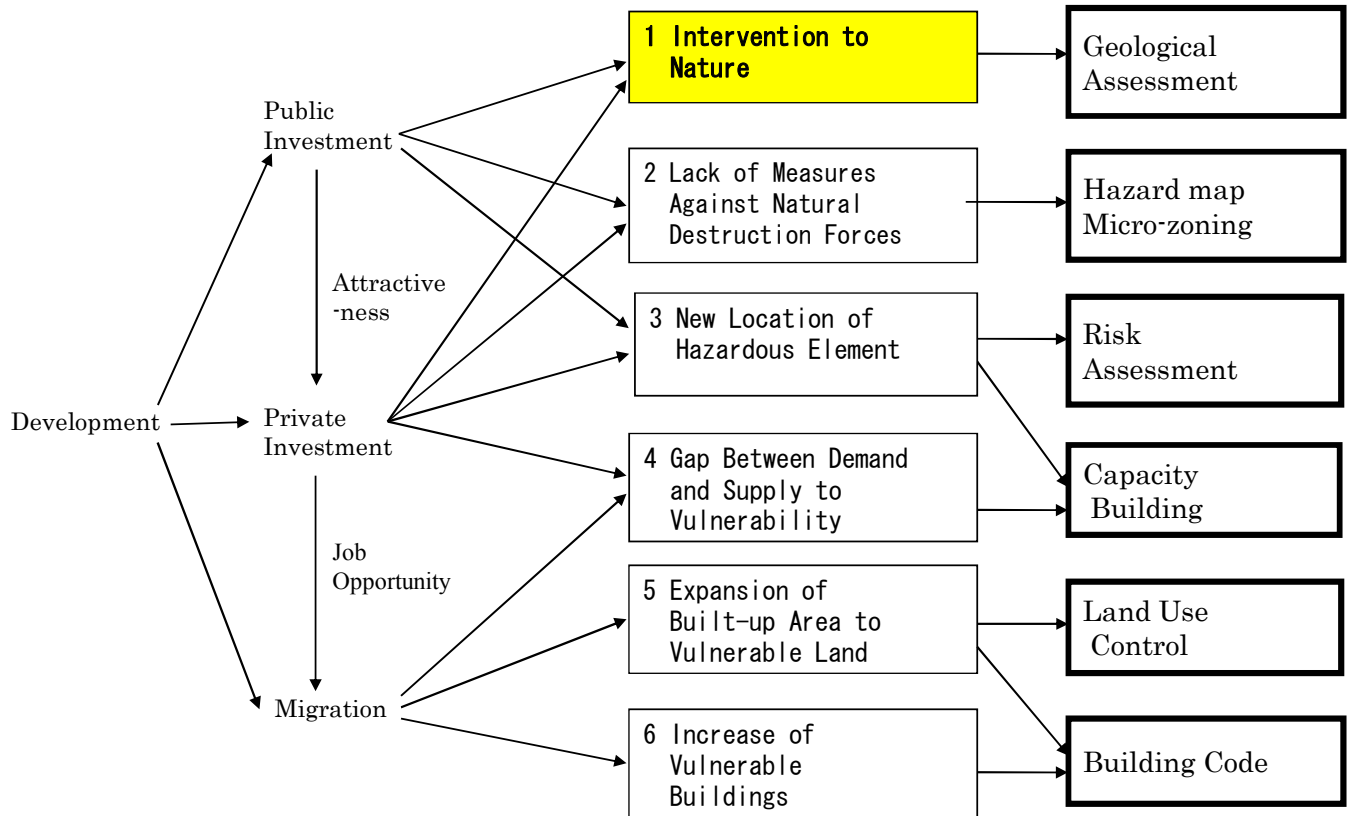
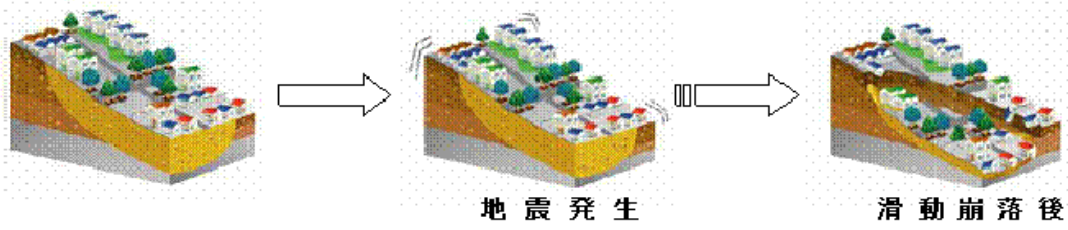


Figure Relation Between Development and Vulnerability to Disaster

Road between Vientiane and Luanprabann in Laos





www.giocities.co.jp/NatureLand/6455/takadati_photo08.html 写真「北上風」氏

Reclamation of Tokyo bay Area



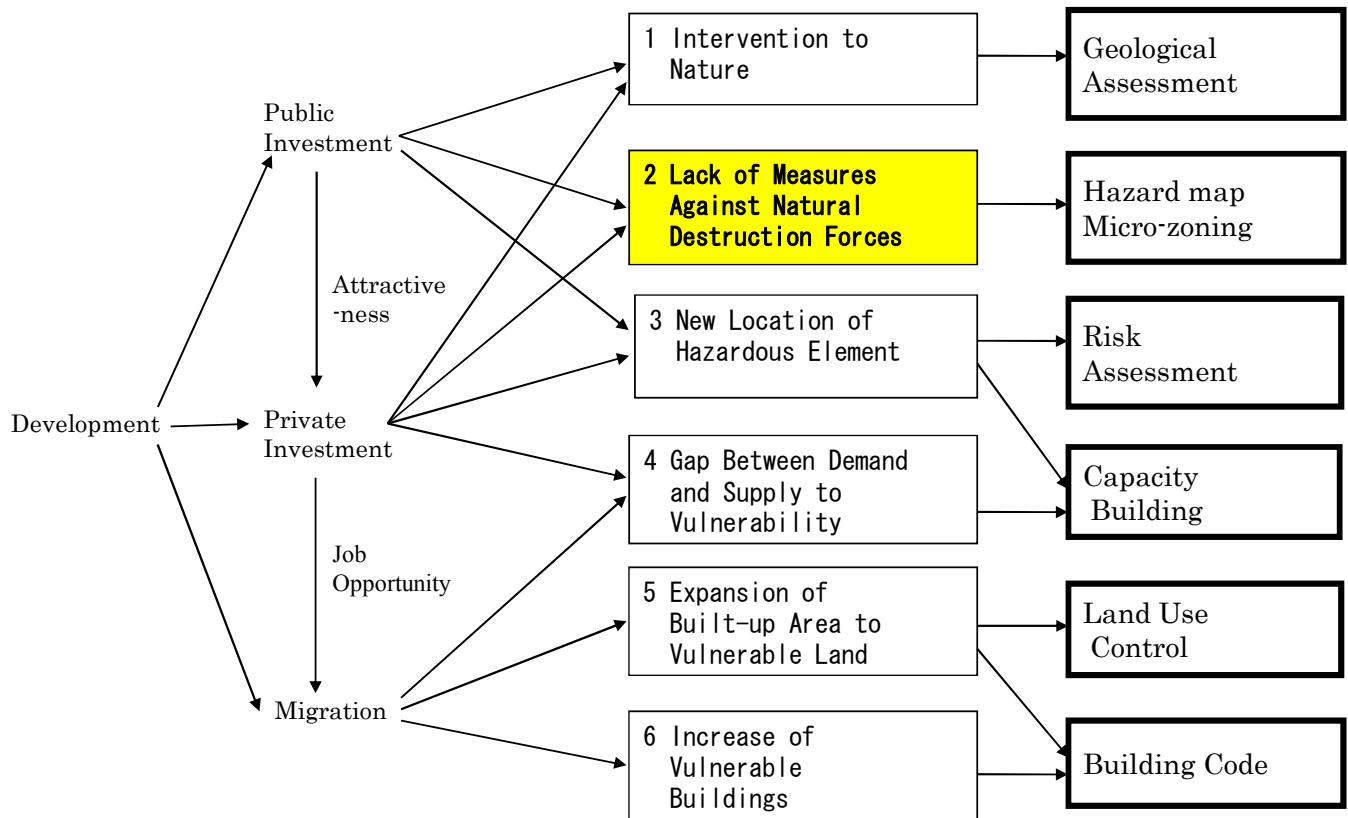
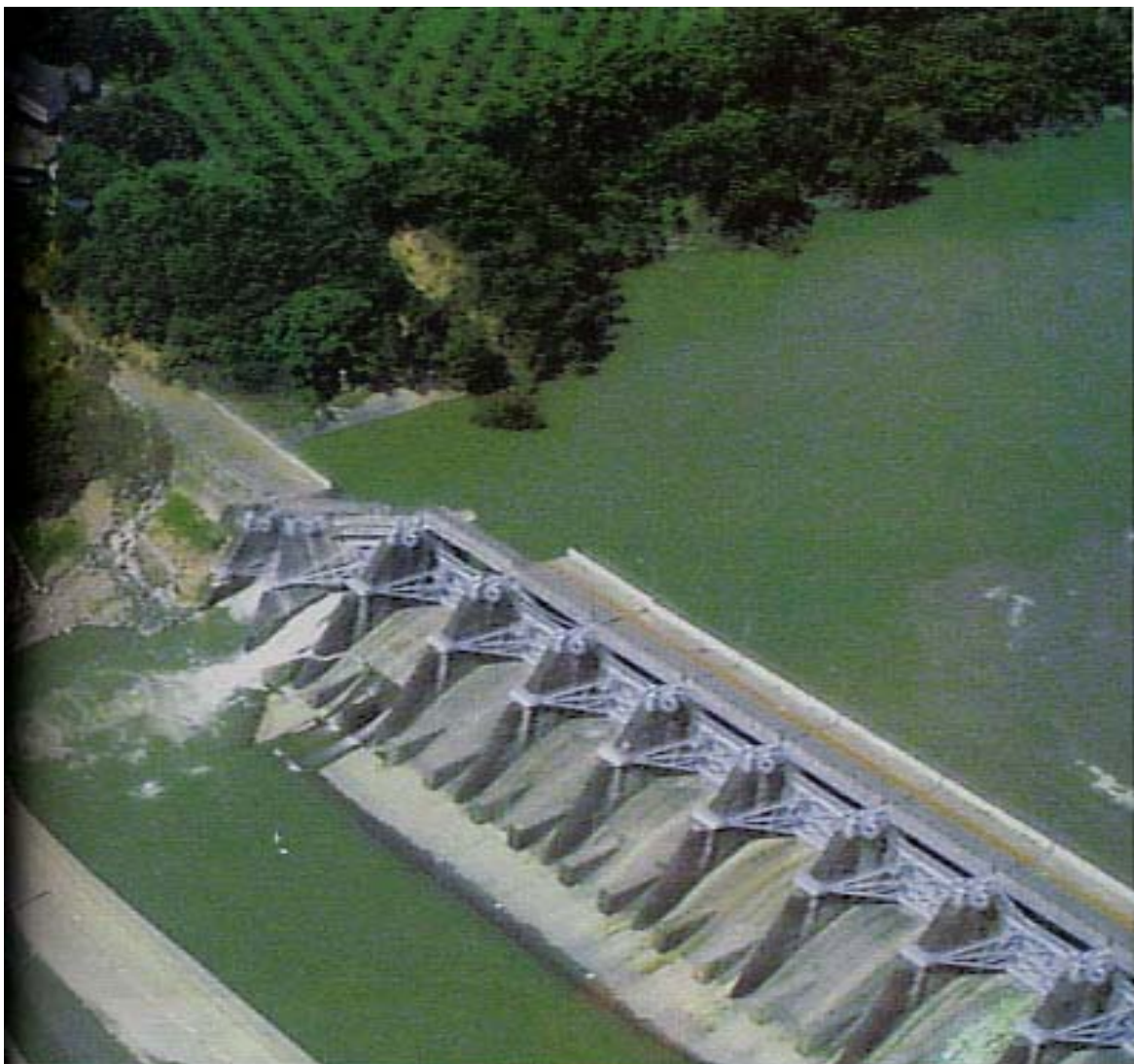


Figure Relation Between Development and Vulnerability to Disaster



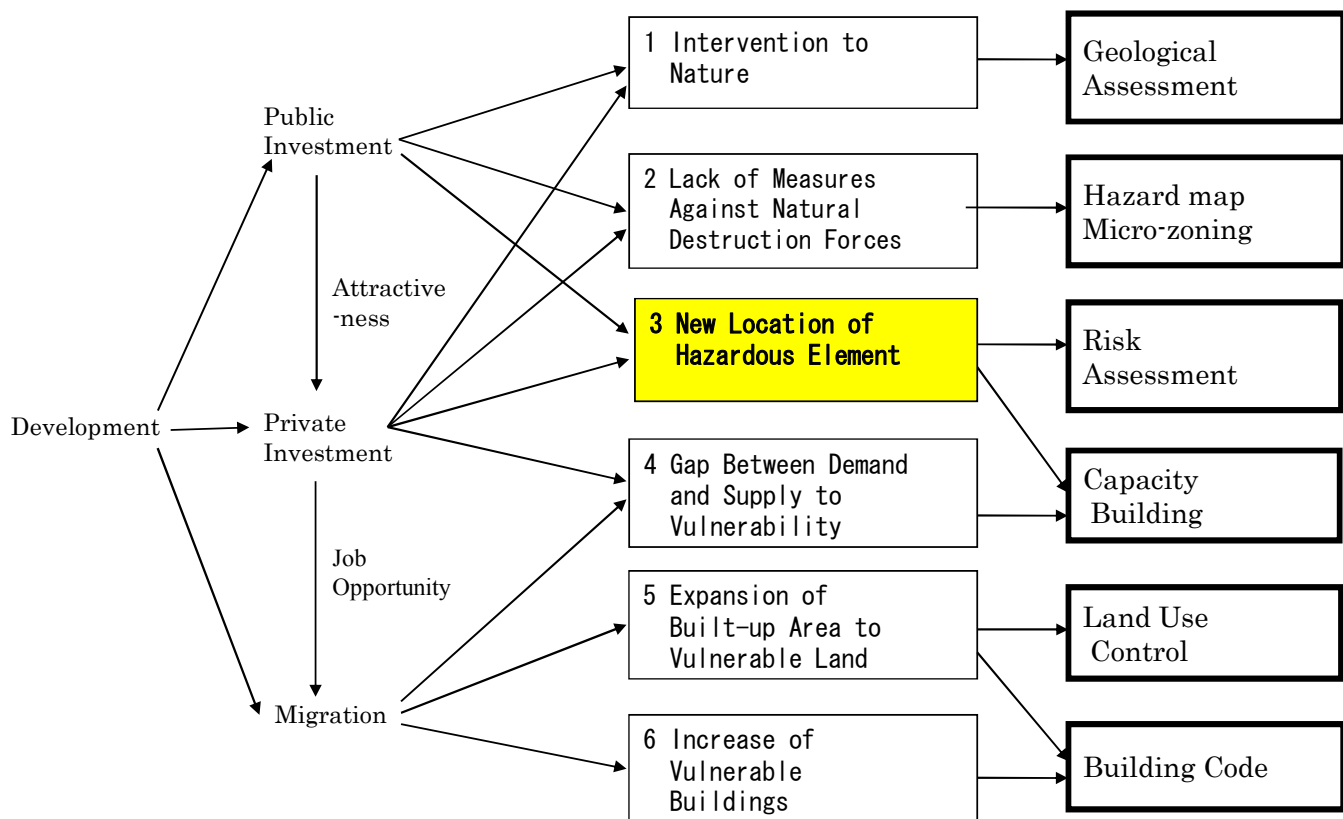


Figure Relation Between Development and Vulnerability to Disaster

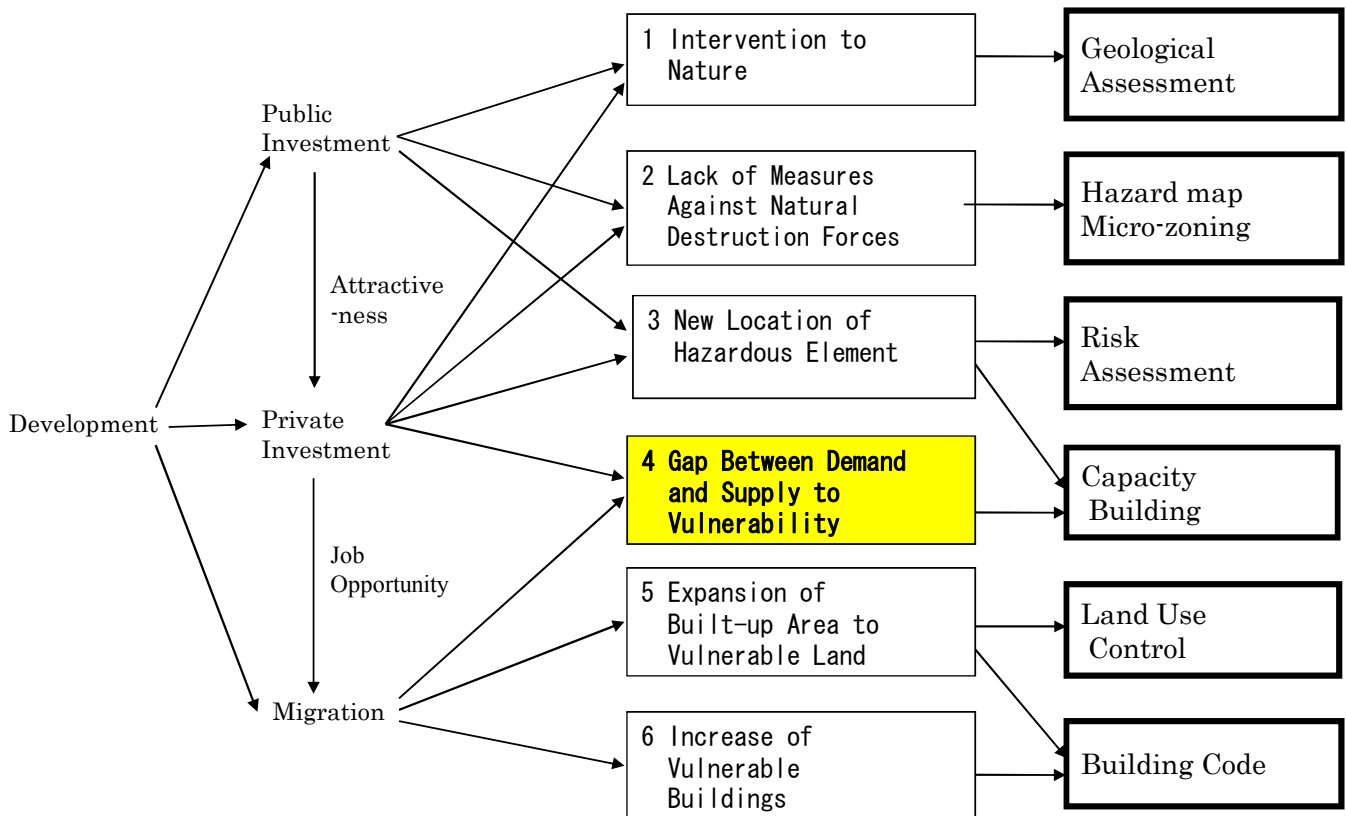


Figure Relation Between Development and Vulnerability to Disaster



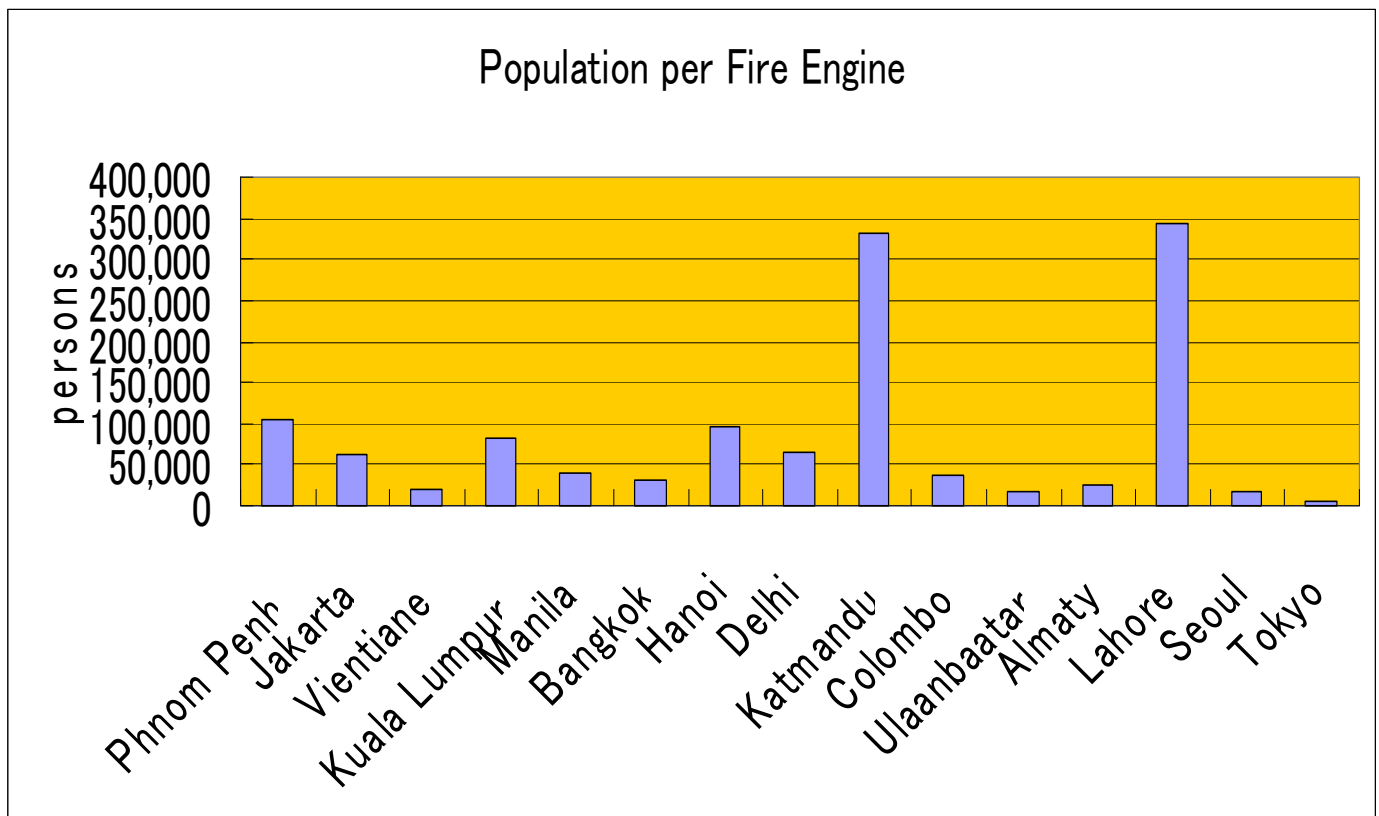
China Central TV Building (53 stories) on Fire, 9 Feb 2009



Comparison of Fire Service Level between Asian Cities

	Population	Firefighters	Population per Firefightes	No. of Fire Trucks	Population per Fire Truck	Fires	Fires per Population
	1000 persons	persons	persons	truck	persons		
Phnom Penh	938	99	9,475	9	104,222	32	0.03
Jakarta	8,790	2,606	3,373	140	62,786	789	0.09
Vientiane	380	145	2,621	19	20,000	30	0.08
Kuala Lumpur	1,375	529	2,599	17	80,882		
Manila	9,454	2,920	3,238	240	39,392	4,676	0.49
Bang kok	5,900	1,500	3,933	189	31,217	1,353	0.23
Hanoi	2,050	200	10,250	21	97,619	100	0.48
Delhi	9,000	2,000	4,500	136	66,176	8,314	0.92
Katmandu	1,000	59	16,949	3	333,333	149	0.15
Colombo	713	439	1,624	19	37,526	287	0.4
Ulaanbaatar	658	588	1,119	40	16,450	737	1.12
Almaty	1,061	859	1,235	44	24,114	1,583	1.49
Lahore	6,500	394	16,497	19	342,105	575	0.09
Seoul	10,470	4,963	2,110	626	16,725	6,843	0.65
Tokyo	11,698	18,013	649	1,722	6,601	7,025	0.6

Population per Fire Truck



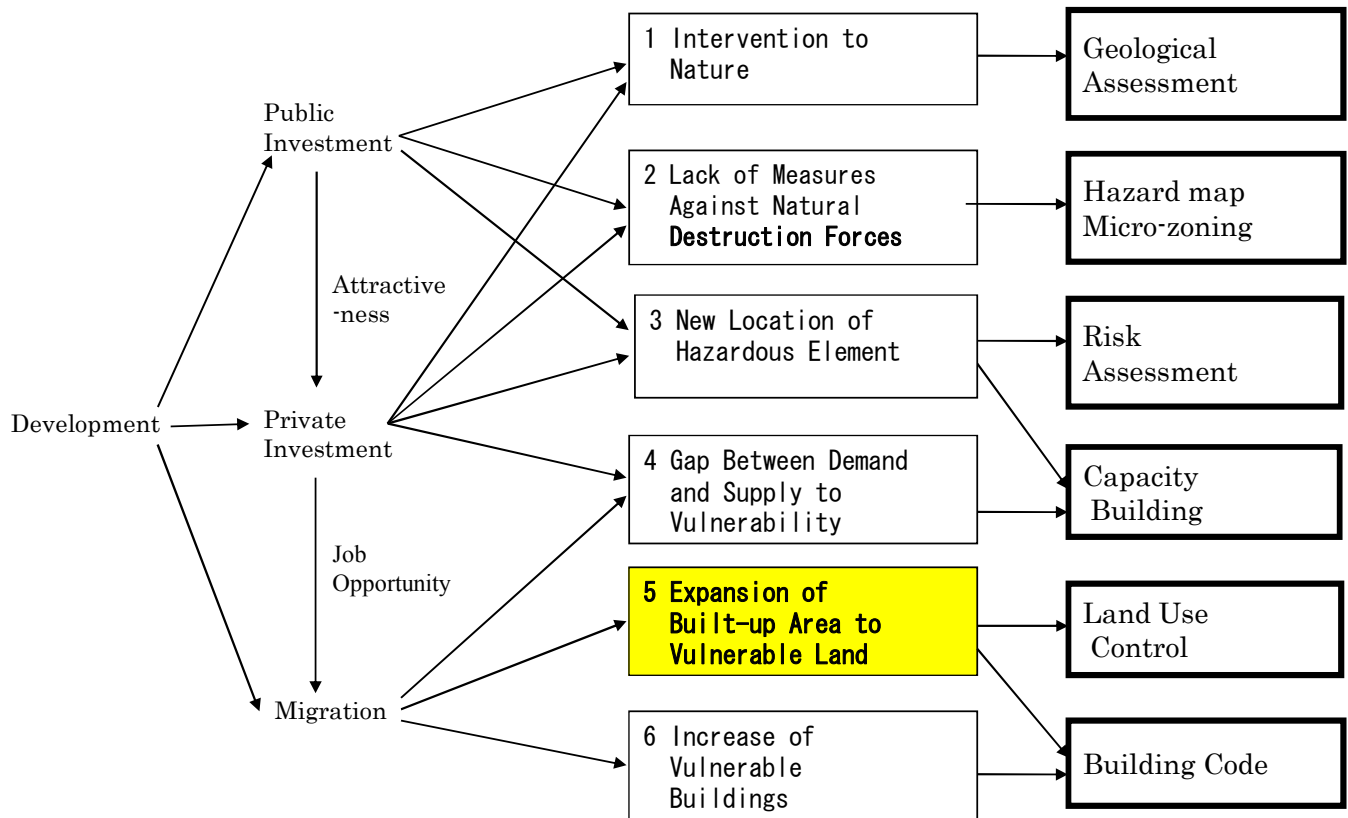


Figure Relation Between Development and Vulnerability to Disaster



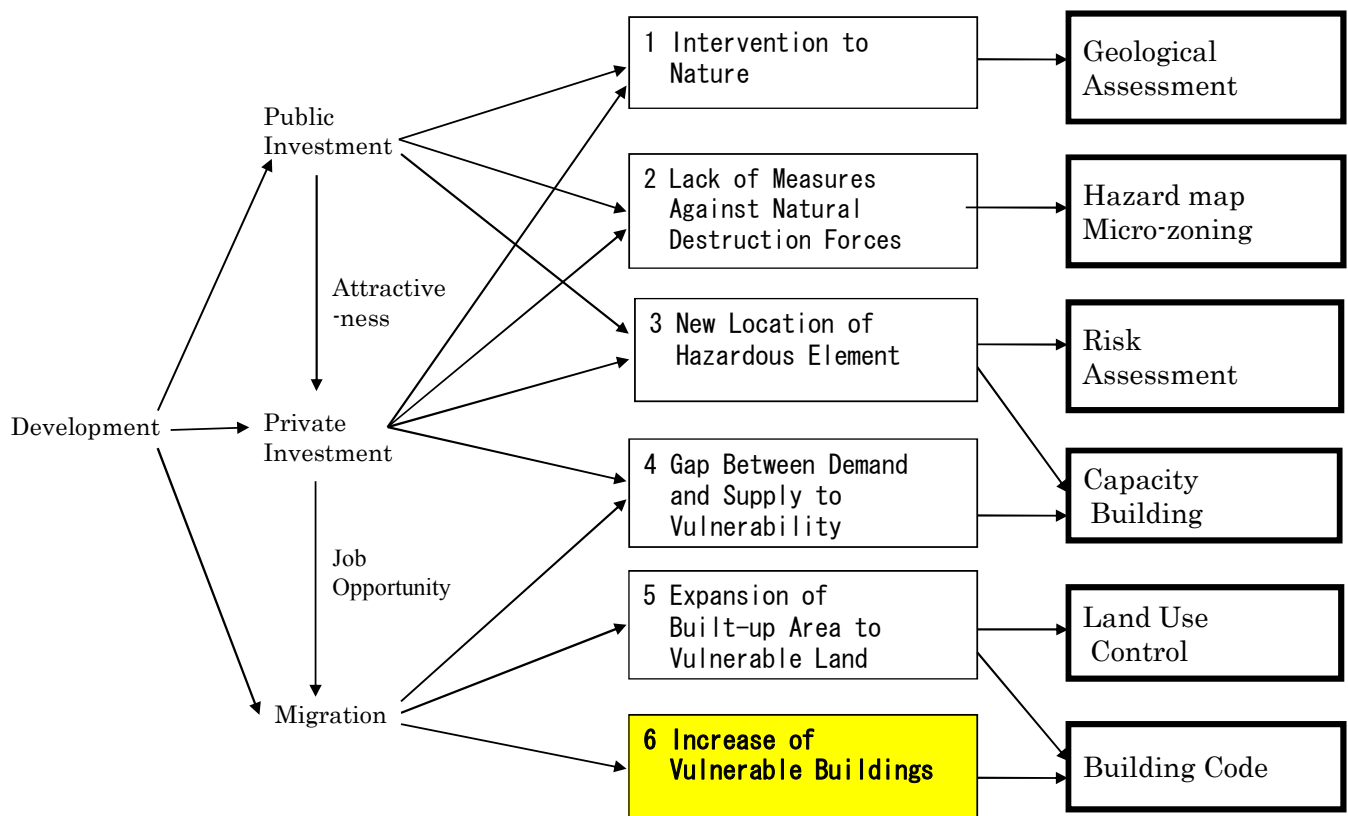
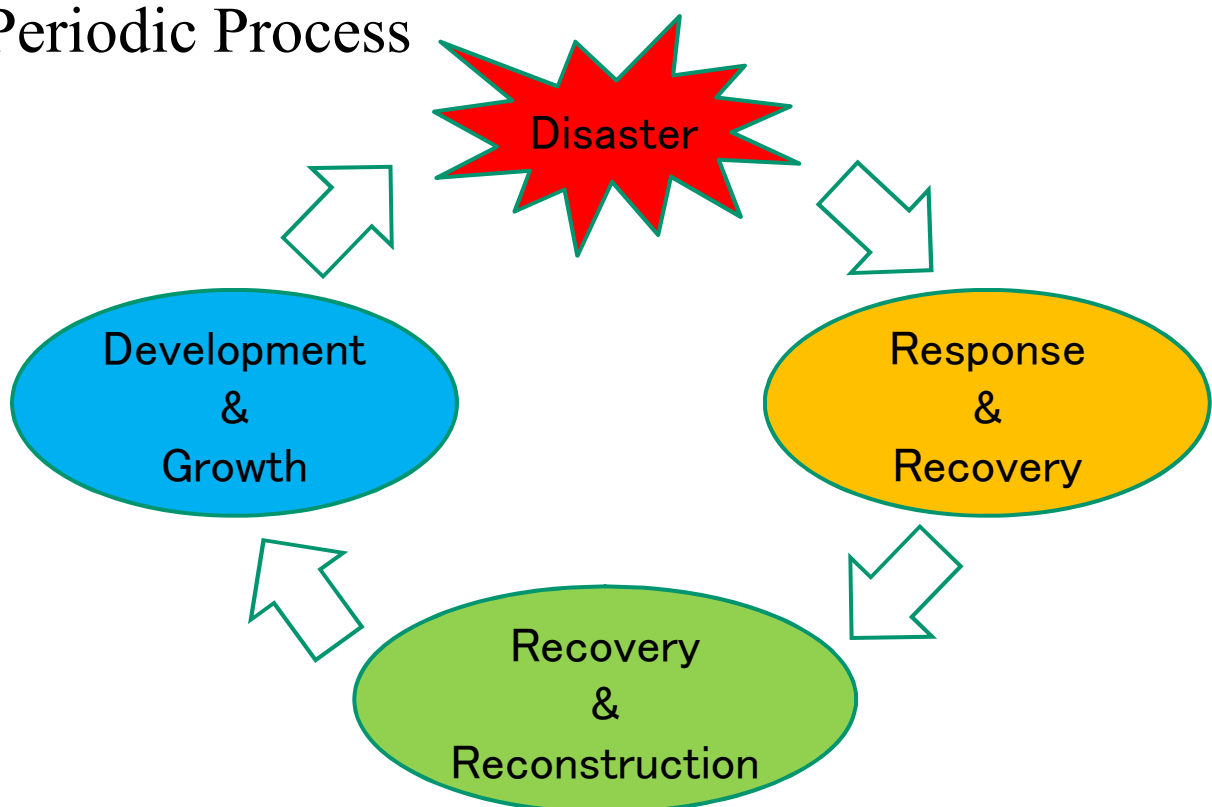


Figure Relation Between Development and Vulnerability to Disaster



Development & Disaster Cycle

Periodic Process



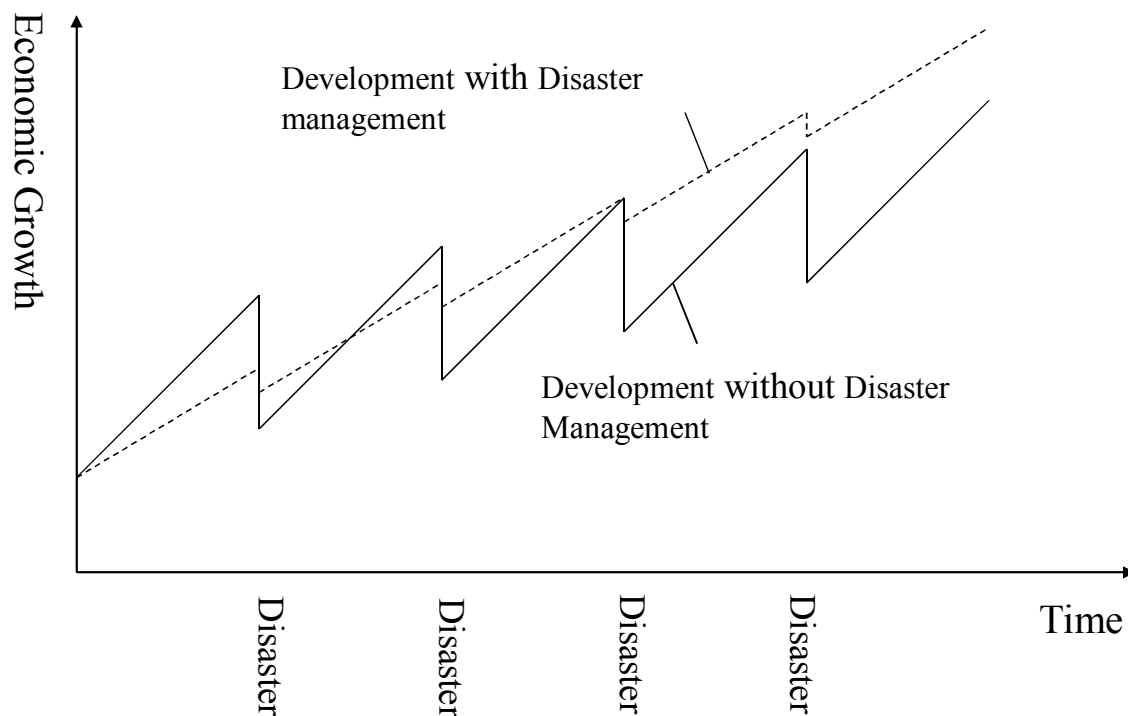


Figure Two types of Regional Development

Integration of development planning with disaster management program

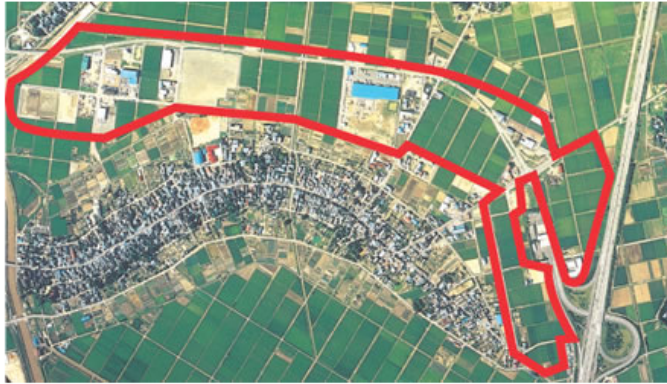
Disaster management program should be integrated with development planning in the following three cases.

- A) Assessment of new development
- B) Guidance of urban expansion
- C) Upgrading of existing built-up area

A) Assessment of New Development

漆山企業団地

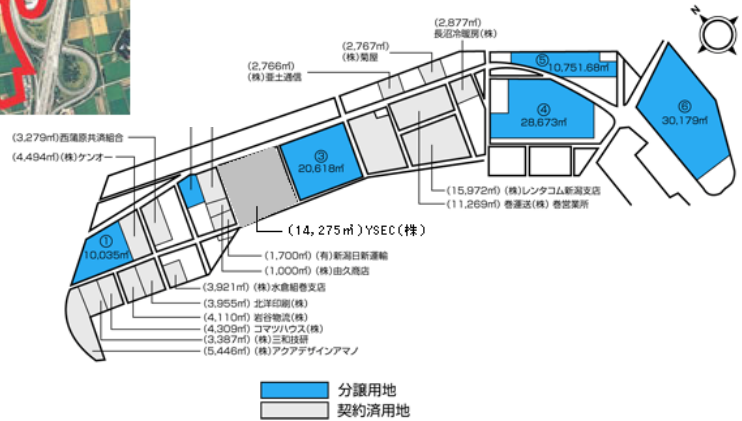
北陸自動車道巻潟東ICから至近距離。海と山自然豊かな町にある交通アクセスに恵まれた流通基地団地。



Urushiyama industrial park,
Niigata, Japan

Development plan, 2008

平成20年4月現在



Development Site Selection Process

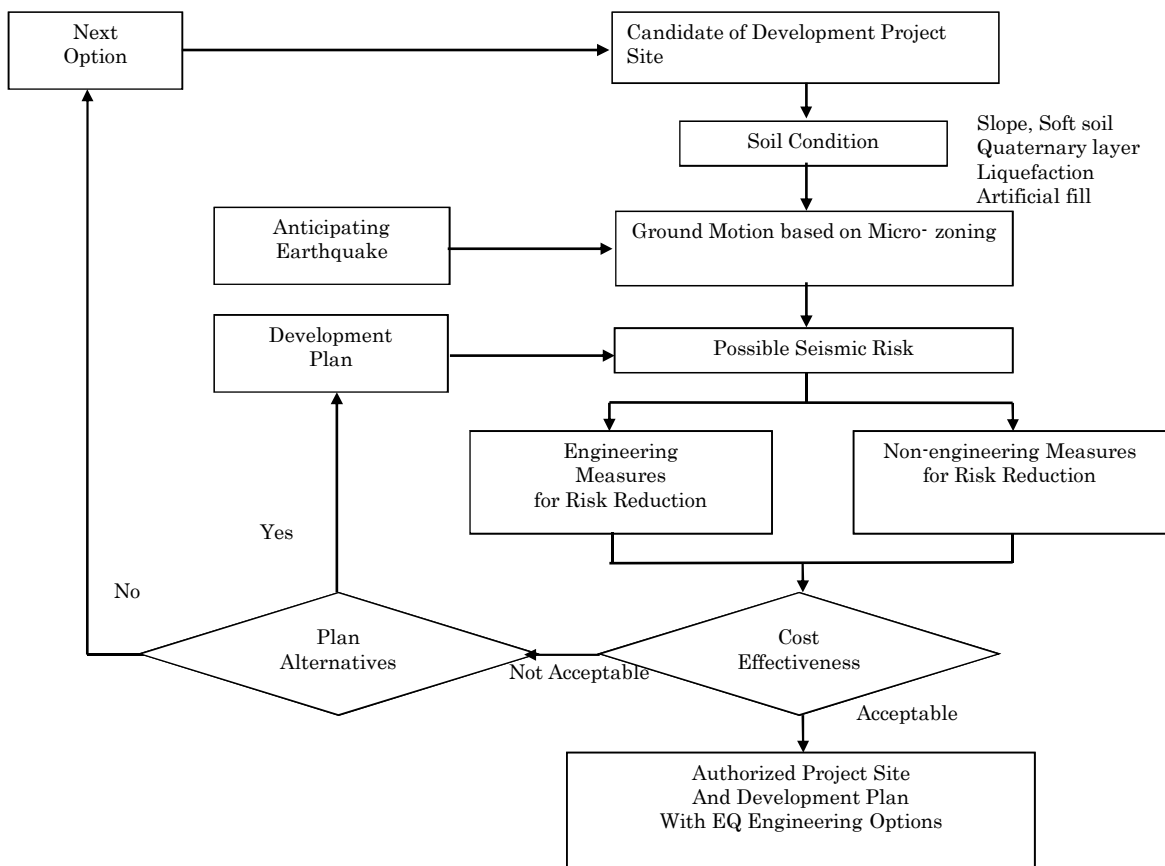


Figure Development Site Selection Based on Vulnerability Assessment to Earthquake Disaster

B) Guidance of Urban Expansion

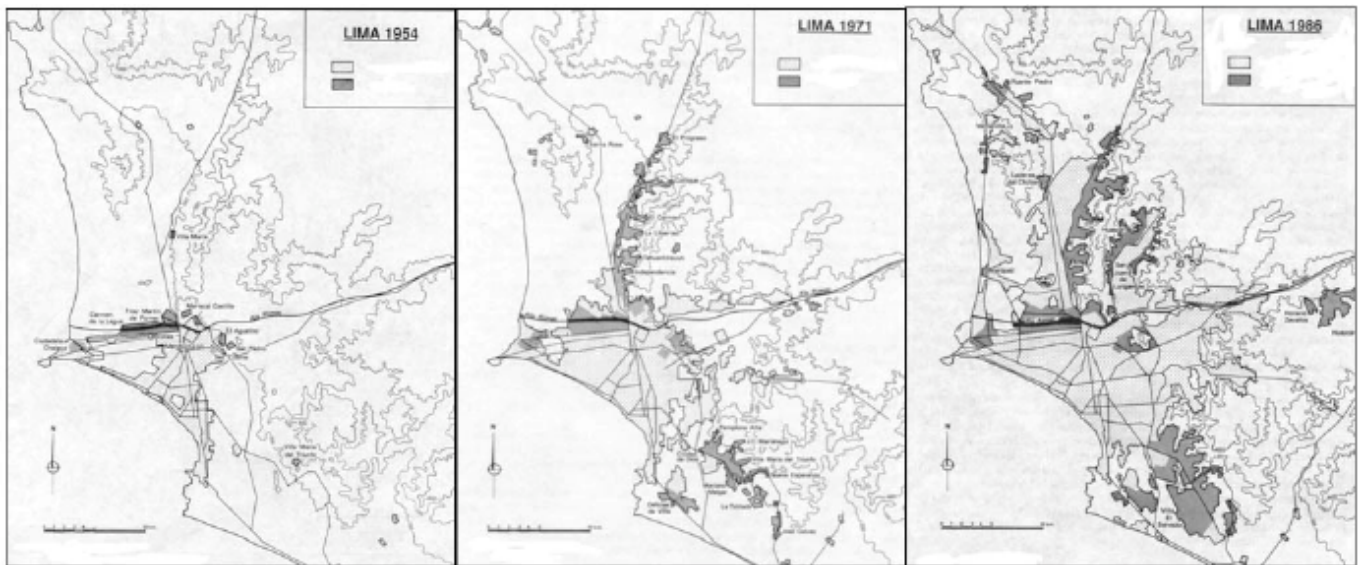


Figure 2. Lima and its barriadas in 1954, 1971 and 1986. (Source: Driant, 1991)

Integrated Process for Land Use Planning

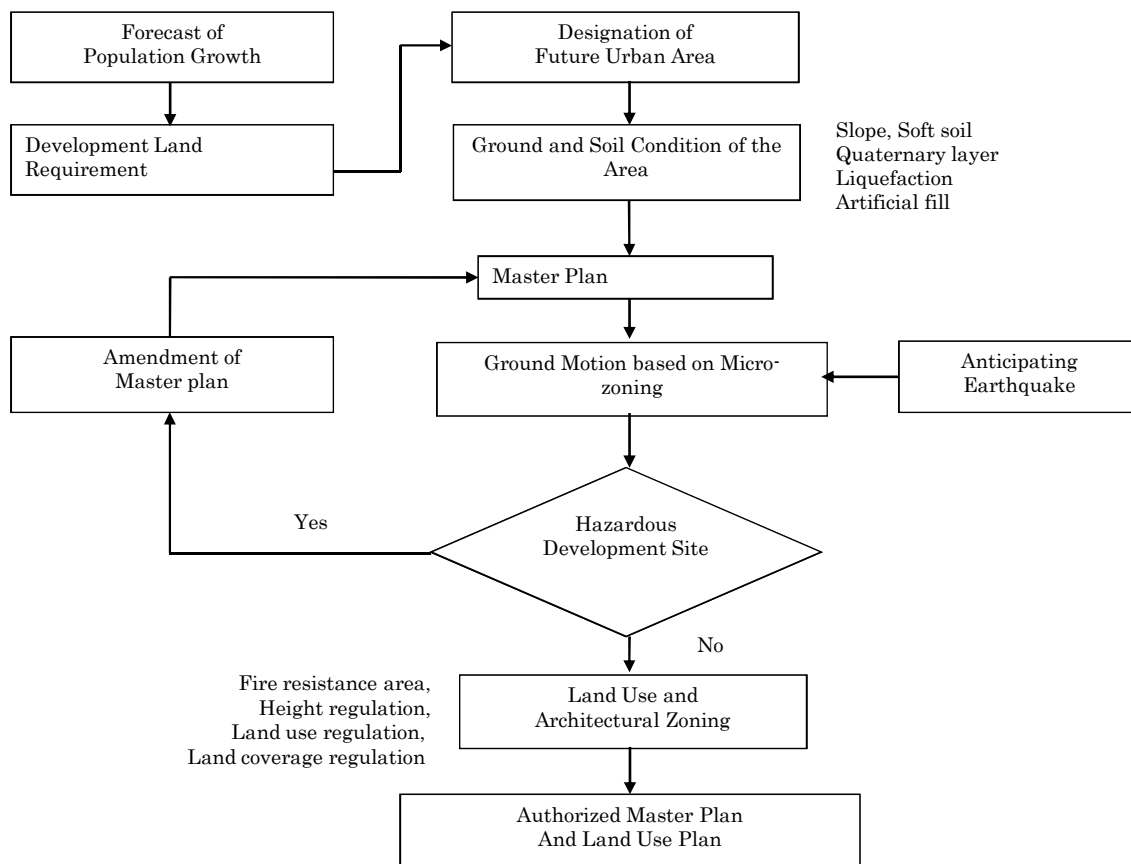


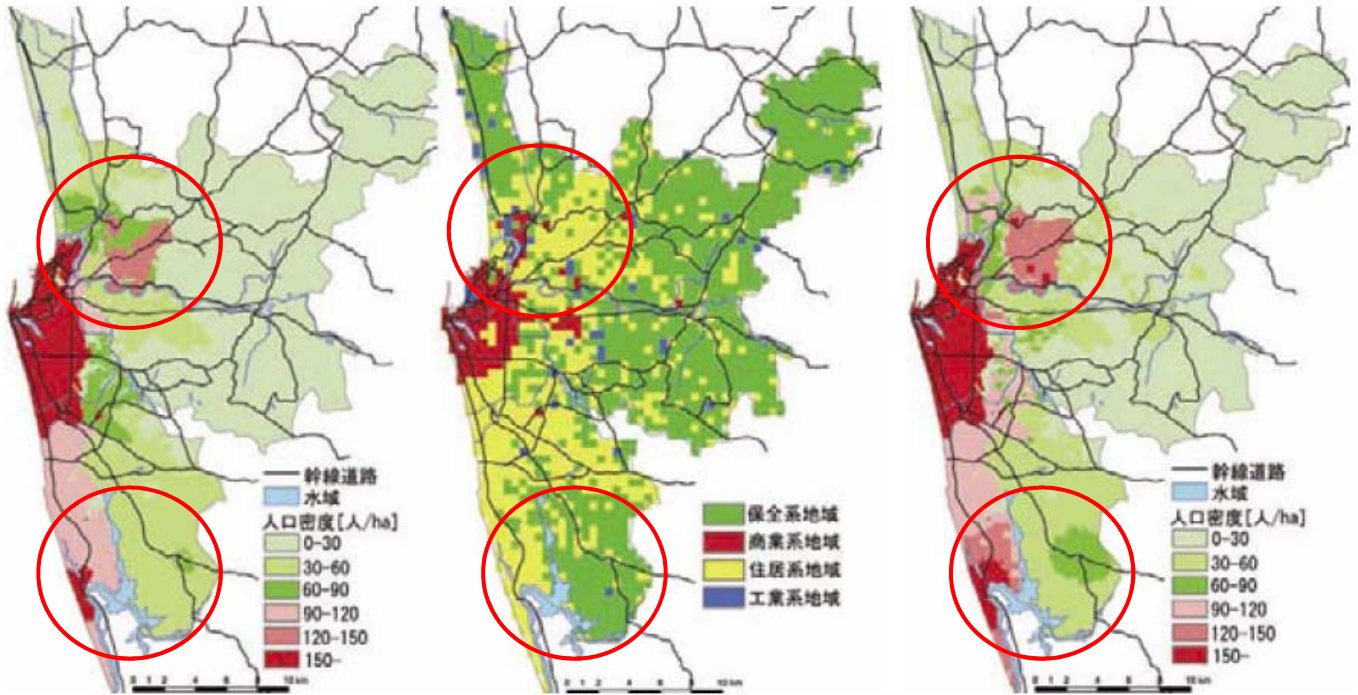
Figure Land Use Planning to Guide Urban Expansion to Safe Direction

Example - Colombo, Sri Lanka

Land use in 2005

Land use plan of 2005

Forecasted Land use in 2015



Nagasaki H. et al., "Development of a Land Use Planning Support Tool in Developing Countries" Theory and Applications of GIS, 2006, Vol.14, No.2, pp.85-96

C) Upgrading of Existing Built-up Area



Identification of Priority Project Site

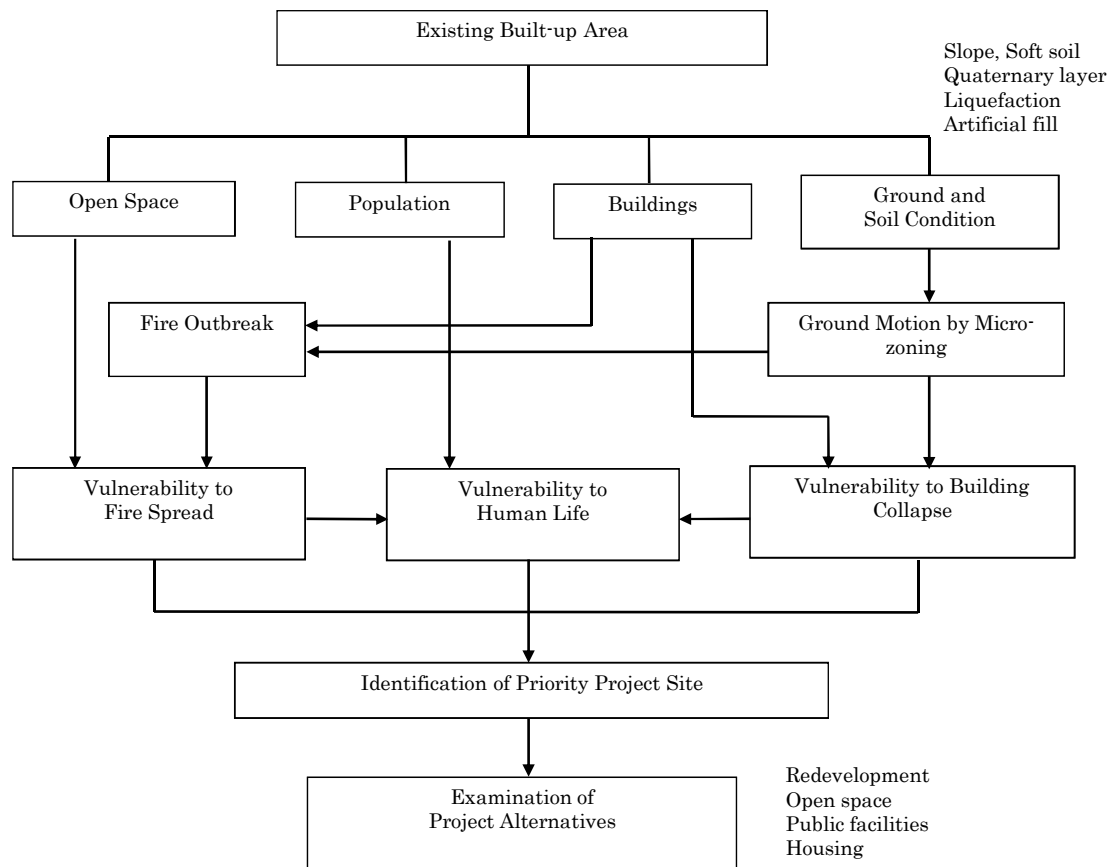
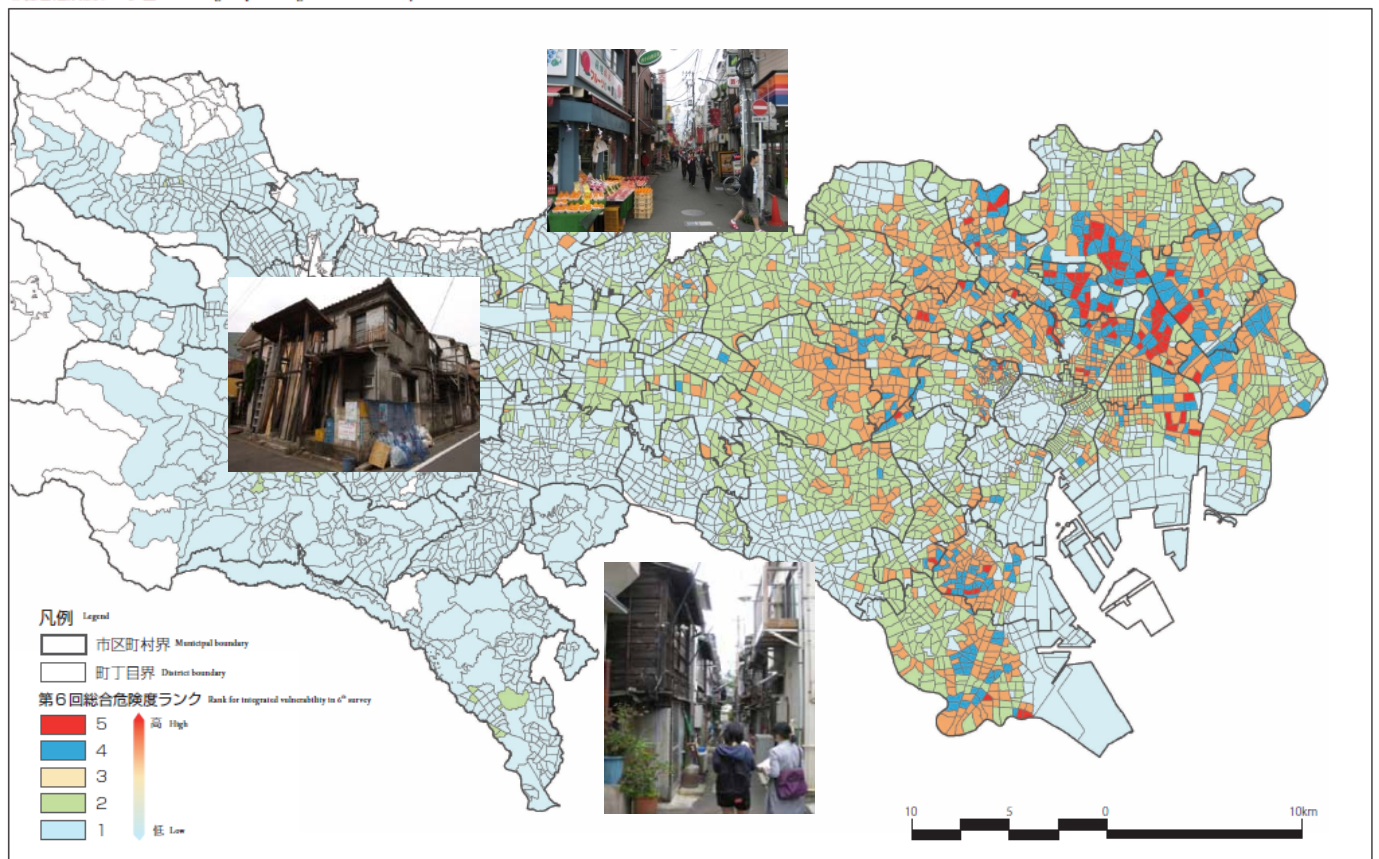


Figure Rehabilitation of Existing Built-up Area

Vulnerability Assessment of Tokyo

○総合危険度ランク図 Ranking Map of Integrated Vulnerability



Thank you for your attention