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Marginal Lands In Taipei Metropolitan Area*

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摘要

邊際區域，通常指地理位置偏僻、自然環境極端、人文活動艱難的地區。台北都會區在地理位置上偏侷台灣島北隅，自然環境上多風災、水災間有震災，平原既小，勉強可利用的陡坡易生坍方，剩下約 65% 山林地，南爲泰雅族原住民的生活區，亦爲都會區的水源地；北有陽明山國家公園生態保育地，這樣的自然環境有相當的邊際性。

然而，就 1990 年統計資料，僅佔全區面積約 6% 的可建基地上，居住近六百萬人。其中，淨人口密度最高者永和市，每平方公里約 97,174 人；其次，萬華區有 78,429 人；而板橋市、中和鄉、三重市等淨人口密度亦達每平方公里六萬人以上。以這些市、鄉爲核心的人口稠密區，正是水患最嚴重的地區，該地居民生命及財產安全，有賴二十年來的防災措施，譬如防水牆由 5 公里增建爲 24.58 公里；土堤由 25.77 公里延長爲 72.07 公里；抽水站由 5 座增爲 39 座等。

盆緣坡地的開發利用，在此情況下是必然趨勢，較平坦的緩坡，常建爲社區；較狹窄的陡坡則闢爲墓園等，故陡坡邊際地是陰、陽兩界競爭空間的地段。至於山區保留地，雖有保障原住民生活空間及都會區水源地等多重意義，但是這塊廣大的邊際地區，在人口壓力下，較低河谷開發爲聚落、具山水勝景之處則開發爲觀光遊憩地；至於，陽明山國家公園及其他生態保育地，雖以保育爲主，但無可避免地，在展現其特色的季節裡，吸引大批都會區的人潮前往。

台北都會區由原先邊際性極高的地區發展成爲今日世界性大都會，其開發過程中引發的問題，不論是正面或負面的、實象或潛在的，都提供地理學者相當豐富的研究課題。

(Keywords: marginal land, marginal region, Atayal tribe, buildable area, net population density, typhoon , inundation, slope land, Taipei Metropolitan Area (TMA))

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"Explosive world population growth, the need for increased food resources and other political, economic and social stress have increased the pressure for development upon marginal regions in both developed and developing countries. Regions may be marginal due to environmental, economic and social conditions. Efforts to improve, maintain or change the socio-economic character and sustainability of such marginal regions vary considerably from country to country...."

--Opening sentences in the Communique of the Study Group on Development Issues in Marginal Regions, IGU, 1993

1. INTRODUCTION

Not long ago, owing to her status as a developing country with high population density but lacking natural resources, Taiwan was commonly regarded as a marginal region. Her geographic periphery from American-European stands had certainly reinforced the impression. Now visitors from the world over, the study group on marginal regions of IGU included, descend upon Taiwan to see what have happened. A wonder, for example, is that, Taiwan, among all countries in the world including especially Germany and Japan, ranks the very first this year in terms of foreign exchange reserve. Thus, whether a region is marginal or not depends on which measurement is chosen.

This short paper is to provide a very brief geographic account of Taipei metropolis, the capital area within Taiwan, in terms of her precarious situation, or marginality if one prefers. Why this situation has sustained an enormous economic-population growth will not be explained. It leaves this question unanswered but that just serves the purpose of this paper well: to stimulate our reflection on the meaning of marginality on the basis of concrete examples.

A sketch of the metropolis in the next section is followed by Section 3 describing the physical constraints of the area. Population reality is outlined in Section 4. Section 5 introduces three cases to illustrate the responses to the constraints. Those readers living in the area can easily follow to provide many more cases for study. A few lines as conclusion in Section 6 suggests that this is just the beginning to understand Taipei in terms of marginality and vice versa.

2. TAIPEI METROPOLITAN AREA

Taipei metropolis locates at the northern verge of Taiwan. Being geographically peripheral, but she is the politic, economic, as well as the cultural center of Taiwan. There is no official recognition of a metropolitan area as such. If defined by daily commuting range, the metropolitan area should comprise Taipei City, Chilung City, Taipei Prefecture, and a part of Taoyuan Prefecture. To be compatible with statistic sources, the first three civic units are taken as the constituents of a Taipei Metropolitan Area (TMA) in this paper.

In physical geographic terms TMA encompasses most of the catchment of Tanshui River (Fig. 1). She is surrounded by hills and mountains of sand rocks and andesities of Early Miocene to Pleistocene age. The basin was sunken by fault effects and then covered with alluvium of more recent time (Fig. 2). Both the northern Da-tuen volcano mountain (namely Mount Yangming) and the southern mountains peek higher then 1000 m. while the other hills of the surrounding rim average about 500 m.

TMA covers 2457.15 square kilomenters (sq.km.) and has a population of 6.1 million. The overall population density is therefore 2,491 person/sq.km., with 10,007 for Taipei City, 2,658 for Chilung City and 1,485 for Taipei Prefecture. During the middle of 19th century Han (Chinese) settlements started from the east bank of lower Tanshui River and gradually expanded first to the north, south, and east of the basin, and then, after World War II, rapidly towards the west side of the river. Since cultivation on slopes at the rim of the basin is impossible and buildable lands are small and scattered, population in the hill and mountain parts of TMA is relative thin.

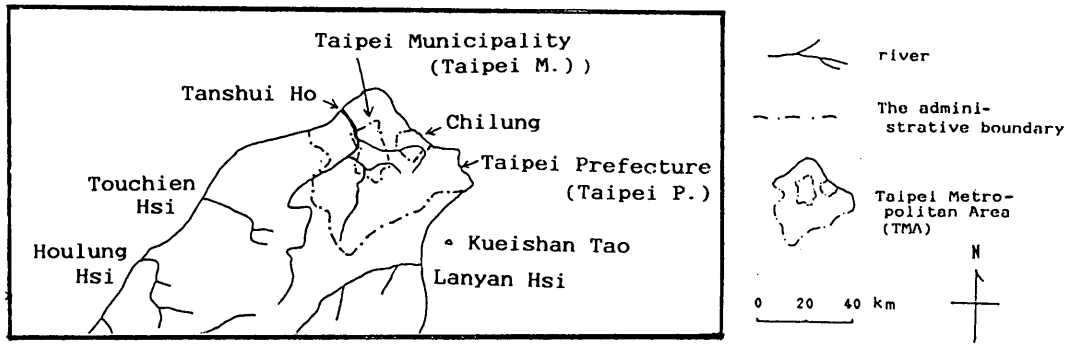
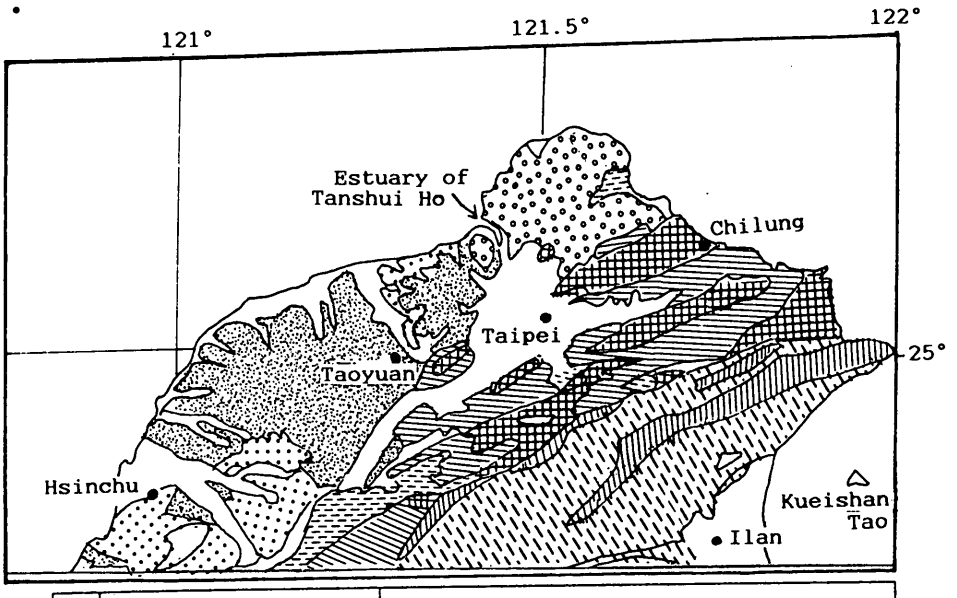


Figure 1 The Catchments of Tanshui Ho



LEGEND		
	RECENT	Alluvium
	PLEISTOCENE	Andesities and andesitic pyroelastics
	PLEISTOCENE	Terrace Deposits
	PLIOCENE AND PLEISTOCENE	Toukoshan Formation, Pinanshan Conglomerate and their equivalents
	LATE MIOCENE	Sanhsia Group and its equivalents
	MIDDLE MIOCENE	Juifang Group and its equivalents
	EARLY MIOCENE	Yehlia Group and its equivalents
	OLIGOCENE TO MIOCENE	Aoti Formation
	OLIGOCENE TO MIOCENE	Tatungshon Formation, Kankou Formation and their equivalents

Source : The Ministry of Economic Affairs (1982), Tectonic evolution of Taiwan explanatory text of the tectonic map of Taiwan, back cover.

Figure 2 The Geologic Map of Taipei Metropolis

3. MARGINAL LANDS IN TMA

Aborigines in Taiwan can be grouped by habitat into mountain tribes and plain tribes (Fig. 3). In northern Taiwan which is the context of TMA, for example, Atayal stays in mountain areas while Ketagalan and Luilang lives in the plain. The latter has been gradually assimilated through close contact with Han during the last one and half century. In contrast, Atayal in the mountains are separated from Han as most of their habitat are zoned as protected areas for the sake of forest or water resource conservation, the areas to which access by Han is restricted. Due to this restriction, the southern and the south-eastern mountain area of TMA are marginal lands in leglal sense.

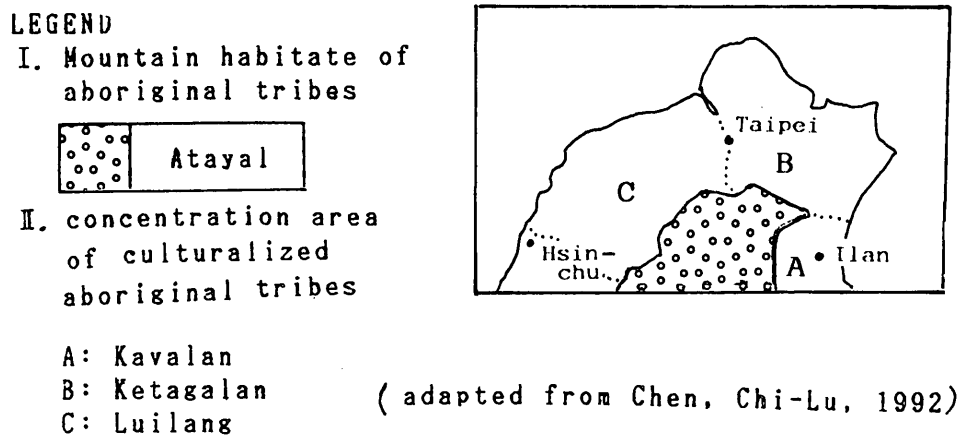


Figure 3 The Formosan Aborigines in North of Taiwan

There are other marginal lands in TMA as outlined below. They can be classified into four types according to natural or human factors for explanation.

I . Gust Zones, the slope lands on the major routes of typhoon in summer or facing strong gust of the trade wind during winter time (Fig. 4-1).

II . Flood Areas, the lower part of the basin on the running course of water brought up by typhoons and the part of Tanshui estuary at risk of the backwash of sea currents (Fig.4-2).

III . Hazardous Slopes, the slopes on the basin rim subject to various kinds of geological hazard: the north-western side covering a volcano belt, the coast on east side and the terrace on west side both striding earthquake belts, and many thrust folds running through the whole basin (Fig. 4-3). All steep slope surrounding the basin are therefore quite fragile and vulnerable to sliding and collapse.

IV . Conservation Districts, including the ecological district in Mount Yangming National Park, the Mangrove Conservation along Tanshui River, and the Taiwan Ketelee-ria (Keteleeria davidiana (Franchet) Beissner var. formosana Hay.) protection zones in the mountains (Fig. 4-4).

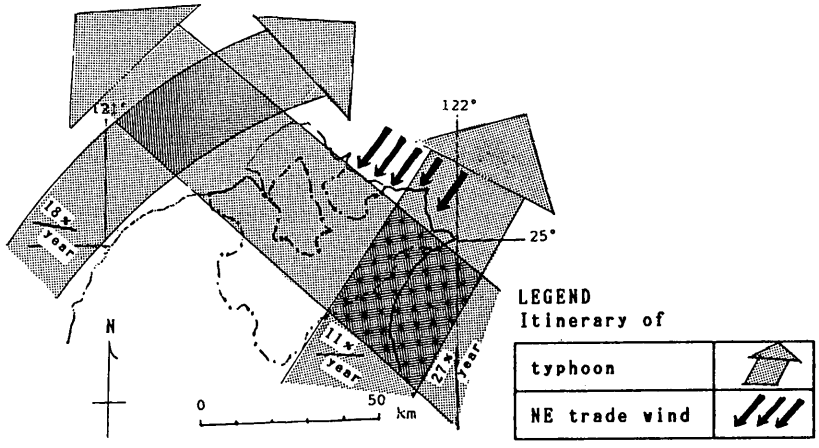


Figure 4-1 The Marginal Area Type I -- typhoon

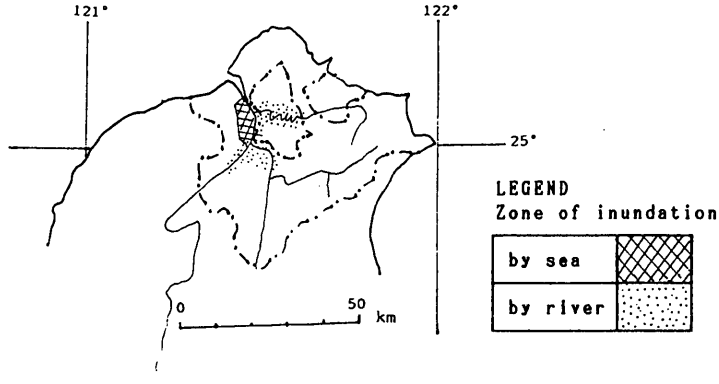


Figure 4-2 The Marginal Area Type II -- inundation

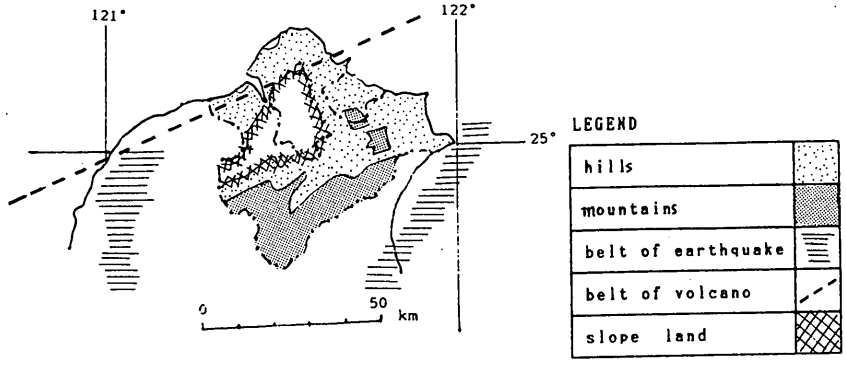


Figure 4-3a The Marginal Area Type III
-- slope land

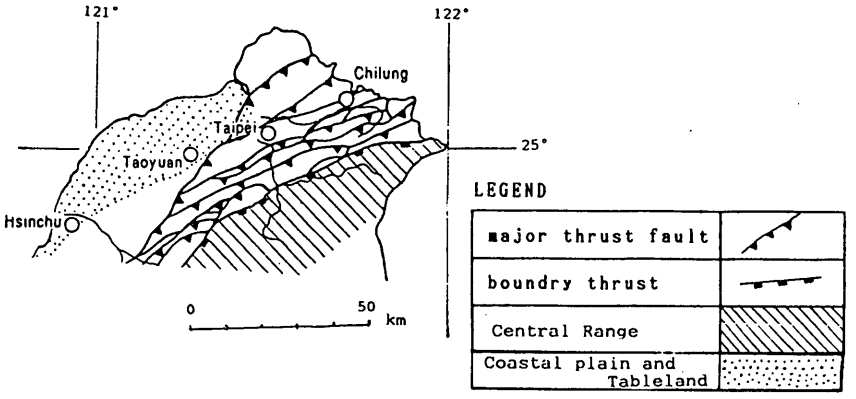


Figure 4-3b Fold-thrust Zones

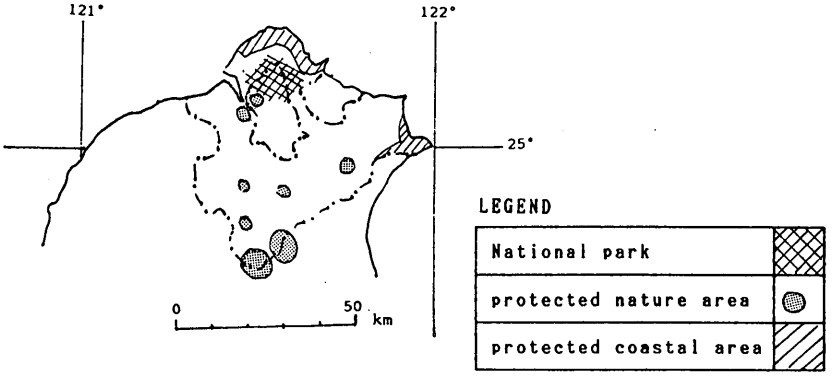


Figure 4-4 The Marginal Area Type IV
-- ecological fragility

4. POPULATION PRESSURE

The aforementioned overall population density of 2,461 person/sq.km. belies the actual population burden of TMA. As much as 65.8% of the metropolitan land are mountain area but has been used to compute the gross density. The actual buildable land takes only 6.11% of TMA that is about 150 sq.km. (Table 1).

To describe the population pressure in a more meaningful way, net population densities are computed on basis of buildable land quoted from urban planning sources for each of the 42 cities, towns, and townships in TMA. See Appendix-1. These net densities together with the percentages of land for hills and woods are mapped as Fig. 5. An analysis of these statistics indicates that the bottom of the basin is also the most

densely populated area. Yungho City of Taipei Prefecture ranks first with a net density of 97,174 persons/sq.km. and her northern neighbor Wanhua District of Taipei City ranks the second with 78,429 persons/sq.km.. The other three civic units on the west side of Yungho and Wanhua all have more than 60,000 persons/sq.km., and towns of the next ring in Taipei Prefecture as well as the older districts in Taipei City have net density over 50,000 persons/sq.km.. All the civic units with net density less than 30,000 persons/sq.km. (ranking lower than 20 in Fig. 5) are outskirts of TMA. They border and are restricted by hills and mountains. For example, Wulai Township, of the southernmost part of TMA, ranking 29 in Fig. 5, has more than 90% of land as mountain area. Shimen Township, with 6,523 persons/sq.km., has the lowest net density.

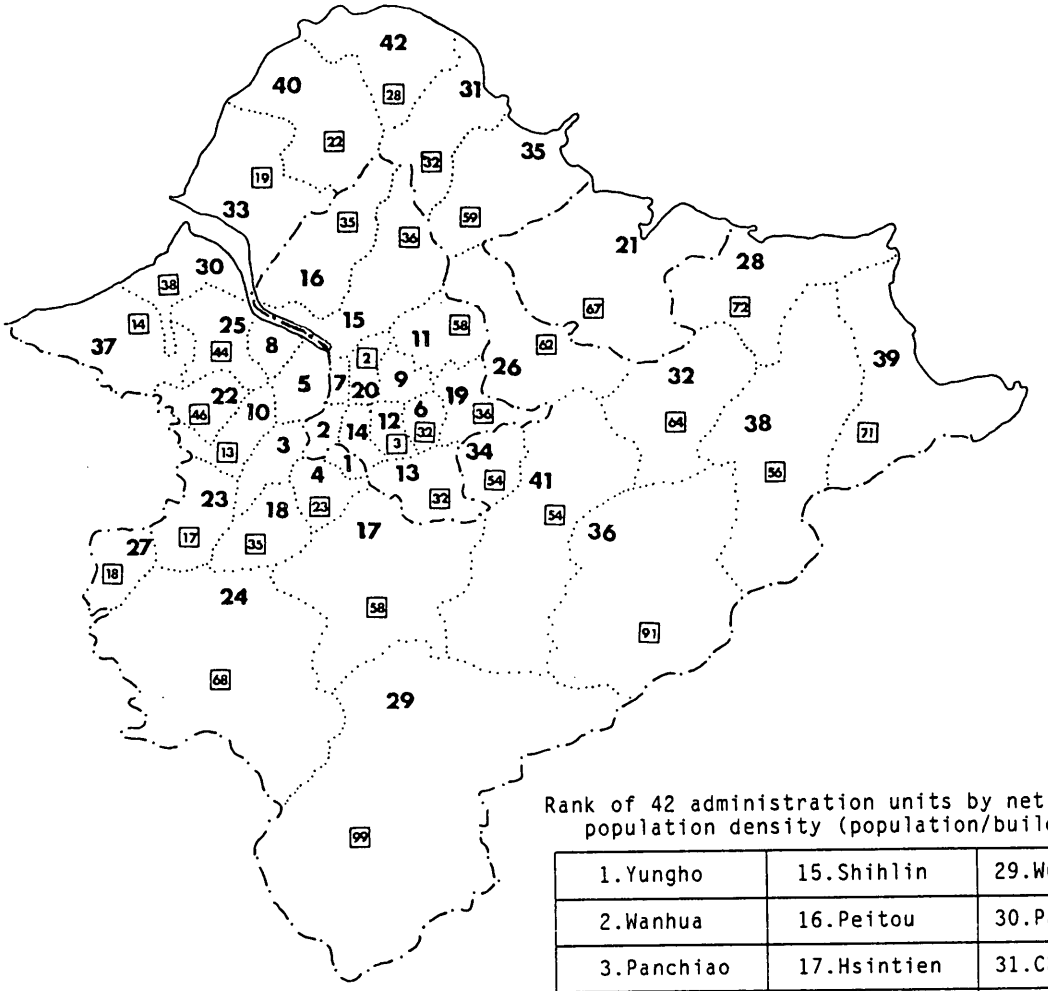
Given such a density distribution, it should be pointed out that even the least dense townships in TMA would be regarded as heavily populated in most Western cities.

Table 1 The buildable land in TMA

Km²

Land / Administration	Buildable land	Mountain area	Others	Total area
Chilung	11.85	88.61	32.30	132.76
Taipei municipality	59.01	82.02	130.74	271.77
Taipei prefecture	79.33	1447.54	525.75	2052.62
Taipei metropolis	150.19	1618.17	688.79	2457.15
percentage(%)	6.11	65.86	28	100

source: 1) The statistical abstract of Taipei Municipality 1990, pp.28-41 , pp.70-71.
2) The statistical abstract of Taipei Prefecture 1990, pp.1-11, pp.22-25.
3) The statistical abstract of Chilung Municipality 1990, pp.2-5, pp.14-15.



Rank of 42 administration units by net population density (population/buildable area)

1.Yungho	15.Shihlin	29.Wulai
2.Wanhua	16.Peitou	30.Pali
3.Panchiao	17.Hsintien	31.Chinshan
4.Chungho	18.Tucheng	32.Pinghsi
5.Sanchung	19.Nankang	33.Tanshui
6.Hsinyi	20.Chungshan	34.Shenkeng
7.Ta-tung	21.Chilung	35.Wanli
8.Luchou	22.Taishan	36.Pinglin
9.Sungshan	23.Shulin	37.Linkou
10.Hsinchuang	24.Sanhsia	38.Shuanghsi
11.Neihu	25.Wuku	39.Kungliao
12.Ta-an	26.Hsichih	40.Sanchih
13.Wenshan	27.Yingko	41.Shihting
14.Chungcheng	28.Juifang	42.Shihmen

LEGEND

Population / Buildable area	Administration Unit
90000^{+}	1
70000 ~ 89999	2
50000 ~ 69999	3 ~ 12
30000 ~ 49999	13 ~ 20
0 ~ 29999	21 ~ 42
Percentage of mountin area in each unit, e.g. 35%	35

Figure 5 Rank of Net Population Density and Percentage of Mountain Area in Each Unit

5. UTILIZATION OF MARGINAL LANDS

Case I, Flood Control. The most densely settled areas in TMA are also most frequently inundated areas, at least in the recent past. To protect life and property against water, heavy public investment has been made during the last decades for construction of flood control facilities. It indicates the challenge of utilizing marginal lands, although its effectiveness is hard to evaluate. Efforts of the control can be seen in Table 2 which is compiled for 23 years since the statistics became available. During this period, flood retaining walls have been increased from 5.2 km. to 24.6 km; earth dike from 25.8 km. to 72.1 km.; emergency pump station from 5 to 39; and flood control gates from 20 to 92.

Table 2 Project of flood prevention in Taipei (1968-1990)

Item	D i k e (Km)		Pumping station	Lockgate
year	Water-Proof Wall	Earth Dike	(Lot)	(Set)
1968	5.19	25.77	5	20
1971	14.44	25.30	14	26
1976	14.59	65.06	23	57
1981	17.81	74.06	29	111
1986	19.88	76.00	37	104
1990	24.58	72.07	39	92

source: The statistical abstract of Taipei Minucipality 1990, pp.446-447.

Case II , Conflict and Competition Between the Living and the Dead. Traditionally, Chinese follows the practice of geomancy to build graves on dry slope land with good view. Under population pressure in TMA, the same sites are now considered to be suitable for houses or condominiums. As a result, either the old cemeteries are redeveloped if tombs can be relocated, or they are mingled with new bulidings if not. And new slope lands are developed into cemeteries to meet the ever increasing demand for burial

grounds. One can see at a glance of this type of necropolis surrounding TMA. Cremation has become increasingly acceptable in recent years as land price for grave yard goes beyond reach of most people. Pagodas for preserving ashes are springing up in many places as a new architectural style.

Case Ⅲ , Multiple Use of Open Space. Shortage of land has forced land owners, both public and private, to make as many uses of land as possible, particularly for recreation which is highly demanded in Taiwan as national income continues to grow fast. Many ecological conservation areas attract so many visitors that the original purpose can hardly be met. Mount Yangming National Park looks like a market during the bloom season. Parks in TMA means people and Botanic Garden has become a popular park. Many private tea terraces and fruit farms on the hills earn their major income from tourists.

6. CONCLUSION REMARKS

Although marginal land is a term yet to be precisely defined, it is nevertheless used in this short paper if just to test the utility of the concept behind the term. Three points can be made after having reported the experience of TMA above. (1), referring to so many aspects on both physical and human geographic sides, the concept of marginality remains to be an ambiguous one, but fruitfully ambiguous. (2), central to the various meanings of marginality seems to be the notion about resource and its collateral population issues. (3) TMA is a very useful laboratory place, rich of cases for further investigation of the concept of marginality.

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Appendix 1 Rank of 42 administration units by net population density (population / buildable area)

(Km²)

Items / administration	Population Density (Population / area)	Net Population Density (Population / buildable area)	Percentage of mountain area in each unit (%)
1.Yungho	43,737 249,736 / 5.71	97,174 249,736 / 2.57	0.02(area) 0(%)
2.Wanhua	29,711 232,934 / 7.84	78,429 232,934 / 2.97	0 0
3.Panchiao	23,271 538,954 / 23.16	67,369 538,954 / 8.0	0.03 0
4.Chungho	18,587 374,339 / 20.14	66,966 374,339 / 5.59	4.73 23
5.Sanchung	23,039 375,996 / 16.32	65,164 375,996 / 5.77	0.002 0
6.Shinn-1	22,396 245,235 / 10.95	59,093 245,235 / 4.15	3.46 32
7.Ta-tung	30.918 151,188 / 4.89	58,828 151,188 / 2.57	0 0
8.Luchou	13,996 104,972 / 7.50	54,939 104,972 / 1.91	0 0
9.Sungshan	20,540 218,133 / 10.62	54,533 218,133 / 4.00	0 0
10.Hsinchuang	15,156 299,174 / 19.74	53,139 299,174 / 5.63	2.56 13

Source: The Statistical Abstract of Taipei Municipality、Taipei Prefecture and Chilung Municipality, 1990.

(CONTINUE)

(Km²)

Items / administration	Population Density (Population / area)	Net Population Density (Population / buildable area)	Percentage of mountain area in each unit (%)
11.Neihu	6,499 207,525 / 31.93	51,881 207,525 / 4.00	16.69(area) 52(%)
12.Ta-an	31,473 354,704 / 11.27	51,556 354,704 / 6.88	0.37 3
13.Wenshan	7,255 226,505 / 31.22	428,176 226,505 / 5.20	10.13 32
14.Chungcheng	25,240 185,263 / 7,34	39,418 185,263 / 4.70	0 0
15.Shihlin	4,702 300,478 / 63.91	38,424 300,478 / 7.82	22.95 36
16.Peitou	4,250 243,280 / 57.24	38,372 243,280 / 6.34	20.08 35
17.Hsintien	1,875 225,517 / 120.23	35,571 225,517 / 6,34	70.11 58
18.Tucheng	4,637 136,928 / 29.53	34,491 136,928 / 3.97	10.27 35
19.Nankang	52,668 117,134 / 22.24	32,995 117,134 / 3.55	8.09 36
20.Chungshan	19,275 237,280 / 12.31	31,595 237,280 / 7.51	0.25 2

Source: The Statistical Abstract of Taipei Municipality、Taipei Prefecture and Chilung Municipality, 1990.

(CONTINUE)

(Km²)

Items / administration	Population Density (Population / area)	Net Population Density (Population / buildable area)	Percentage of mountain area in each unit (%)
21.Chilung	2,658 352,910 / 132.76	29,782 352,919 / 11.85	88.77(area) 67(%)
22.Taishan	2,711 51,998 / 19.16	28,492 51,998 / 1.825	8.82 46
23.Shulin	3,380 111,993 / 33.13	26,289 111,993 / 4.26	5.61 17
24.Sanhsia	3,131 59,939 / 191.45	22,878 59,939 / 2.62	129.91 68
25.Wuku	1,351 47,015 / 34.80	21,178 47,015 / 2.22	15.28 44
26.Hsichih	1,309 93,305 / 71.26	21,062 93,305 / 4.43	44.21 62
27.Yingko	3,122 65,934 / 21.12	20,734 65,934 / 3.18	3.73 18
28.Juifang	757 53,505 / 70.73	18,840 53,505 / 2.84	50.92 72
29.Wulai	6[illegible]5 3,193 / 321.13	18,782 3,193 / 0.17	34.30 11
30.Pali	439.5 17,357 / 39.49	17,711 17,537 / 0.98	15.05 38
31.Chinshan	381 18,728 / 49.21	17,668 18,728 / 1.06	15.72 32

Source: The Statistical Abstract of Taipei Municipality、Taipei Prefecture and Chilung Municipality, 1990.

(CONTINUE)

(Km²)

Items / administration	Population Density Population / area	Net Population Density Population / buildable area	Percentage of mountain area in each unit (%)
32.Pinghsi	100 7,103 / 71.34	17,324 7,103 / 0.41	45.86(area) 64(%)
33.Tanshui	1,174 82,986 / 70.66	16,630 82,986 / 4.99	13.18 19
34.Shenkeng	628 12,919 / 20.58	15,746 12,919 / 0.82	11.19 54
35.Wanli	293 18,553 / 63.38	15,461 18,533 / 1.20	37.66 59
36.Pinglin	34 5,795 / 170.84	14,859 5,795 / 0.39	52.05 30
37.Linkou	592 32,037 / 54.15	14,302 32,037 / 2.24	22.24 41
38.Shuanghsi	85 12,399 / 146.25	14,252 12,399 / 0.87	82.23 56
39.Kungliao	142.5 14,209 / 99.97	13,930 14,209 / 1.02	70.89 71
40.Sanchi	257 16,933 / 65.99	10,262 16,933 / 1.65	14.78 22
41.Shihting	49 7,059 / 144.35	7,843 7,059 / 0.90	77.34 54
42.Shihmen	185 9,458 / 51.26	6,523 9,458 / 1.45	14.22 28

Source: The Statistical Abstract of Taipei Municipality、Taipei Prefecture and Chilung Municipality, 1990.