

Challenge and Response in the Relationship between Typhoon Disasters and Human Action in Japan*

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I. Some Aspects of Typhoon Disaster during the Period of Rapid Economic Growth in Japan.

A. Damage caused by large typhoons

During World War II and the following period of reconstruction in Japan great loss of human lives and property was caused by natural disasters such as typhoons, torrential rains, earthquakes and tsunami. At times these disasters occurred in rapid succession causing even greater misfortune. In the years between 1947 and 1959, some 1,500 people were killed and/or missing per year (on average) in storms and floods caused by the frequent onslaught of large typhoons. In particular, the typhoon of Ise Bay in September 1959 caused serious damage to the metropolitan area of Nagoya and affected a total of thirty-

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Table 1 A Table Comparing Typhoon Related Damages, Between

Types of Damage: Amount of Damage:	People			Housing		
	Number of deaths	Injuries	Number missing	Complete collapse	Partial collapse	Washed away
Ise Typhoon	4,700	38,917	401	36,138	113,052	4,703
10 year average	928	4,410	663	8,864	20,559	3,594
Ratio	5.06	8.82	0.61	4.08	5.51	1.31

nine prefectures. The number of people killed and/or missing in this typhoon alone amounted to 5,100 people. (Table 1)

In the past twenty years, per-year typhoon disasters have decreased notably. The number of persons killed and/or missing in storms and floods per year has fallen below 500, based on five year statistical averages, and it has been decreasing year by year. This is partly owing to the fact that no violent typhoon has visited Japan along dangerous courses, while at the same time there has been the development of countermeasures for disaster prevention, including an increase of buildings and houses capable of withstanding such disasters.

B. Frequent occurrence of inundation in the newly developed lowlands

Until the beginning of rapid economic growth in Japan, the increase of rice production had been most important and paddy were reserved in the flood plains of the small rivers flowing through urbanized areas. These paddy have been changed in a short time, since around the 1960's, into residential and other urban land uses. The first objective was the conversion of certain well drained paddy into housing lots, located adjacent to the older residential areas. Following the transformation of these fields, marshy paddy in the suburbs have been progressively reclaimed for housing, by means of landfill methods, although in many cases land was not raised high enough to prevent flooding. These works were carried out mainly by smaller entrepreneurs.

Several cases of inundation caused by torrential rainfall in newly developed urban areas have been researched in detail by geographers such as Prof. M. Oya (1980), M. Kikuchi (1960), F. Tsuji (1968). A well known example is the Neyagawa river basin in Osaka prefecture where inundation takes place repeatedly. The reasons have been identified by Prof. Oya (1969).

Almost every year we learn anew that many dwelling houses located in the lowlands of

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1948 and 1959, Using the Typhoon of Ise Bay as its Base.

Flooded Above floorboards	Flooded Below floorboards	Paddy		Ships	Rail ways	Communication facilities
		Eroded or buried	Submerged			
157,858	205,753	9,842	146,802	1,137	786	200,608
94,233	295,007	21,263	220,719	1,924	432	5,077
1.67	0.70	0.46	0.67	0.59	1.82	39.6

(Japan Meteorological Society)

city regions suffer from inundation. In this year (1981) two typhoons caused flooding and inundation in the urban areas, one in Sapporo and Ebetsu-shi in Hokkaido, and the other in Tokyo. In the Tokyo case let me briefly recount the events for you. From the night of the 22nd through the 23rd of October, Typhoon No. 24, with a low pressure of 965 mb and maximum wind velocity of 35 m/s, moved very quickly at about 100 km/h at its peak in the offshore to the south of Honshu. It brought abundant rainfall to the southern Kanto area: the Meteorological Agency at Otemachi in central Tokyo recorded 207 mm within 24 hours from twelve o'clock midnight of the 22nd. (Fig. 1) Due to this torrential rainfall a number of small rivers and rivulets overflowed.

The Megurogawa and Kandagawa flooded at several points in the wards of Tokyo, as is customary. These rivulet like rivers originate from springs and ponds at the heads of smaller valleys dissecting the Musashino diluvial plateau. Although they have been improved as urban drainage-ways in the past few decades, their width and depth are not enough to dispose of large quantities of rainwater, in addition to sewage overflow. The reason is partly a result of the "flood of housing" which has reduced the width of the sewers. Because of the exorbitant price of urban land it is extremely difficult to redeem even a string-like free zone along the sewers. Any architectural regulations are almost ineffective. Nevertheless, national and municipal governments responsible for the management of rivers must compensate dwellers for the damages caused by flood in many cases. In this regard it is a noteworthy countermeasure that the Liaison Council of the Ministry of Construction, Prefectures and Municipalities for Comprehensive Control of Drainage Basins finally took action to identify those places suffering from past typhoon related floods by compiling a map on a large scale, 1:25,000, with remarks. For instance, the following is noted in the map of the Tsurumigawa flowing in the area of Kawasaki and Yokohama city

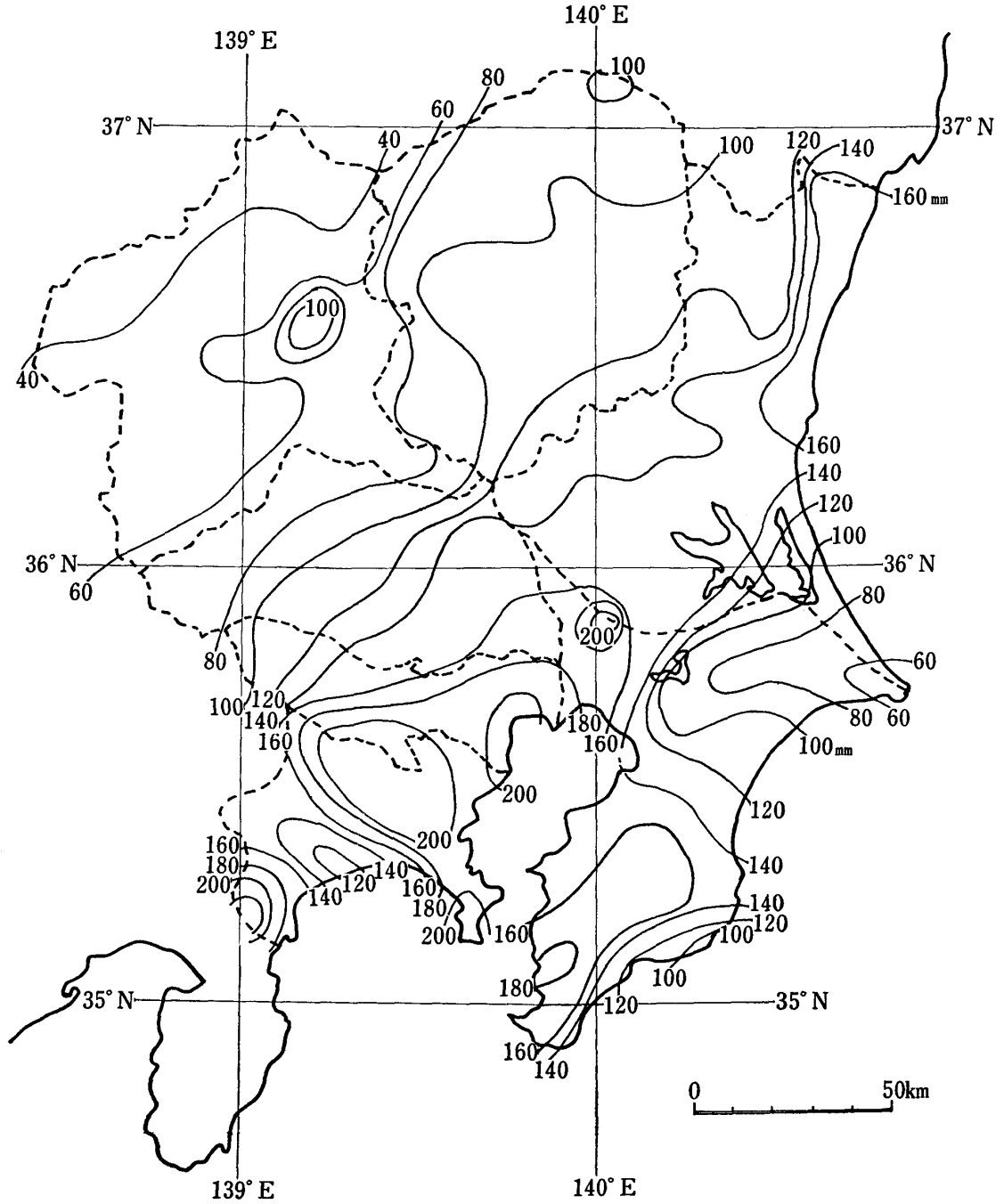


Figure 1 Rainfall to the Kanto Area Brought by Typhoon No. 24 within 24 hours of the 22nd October 1981.

(by O. Nishikawa)

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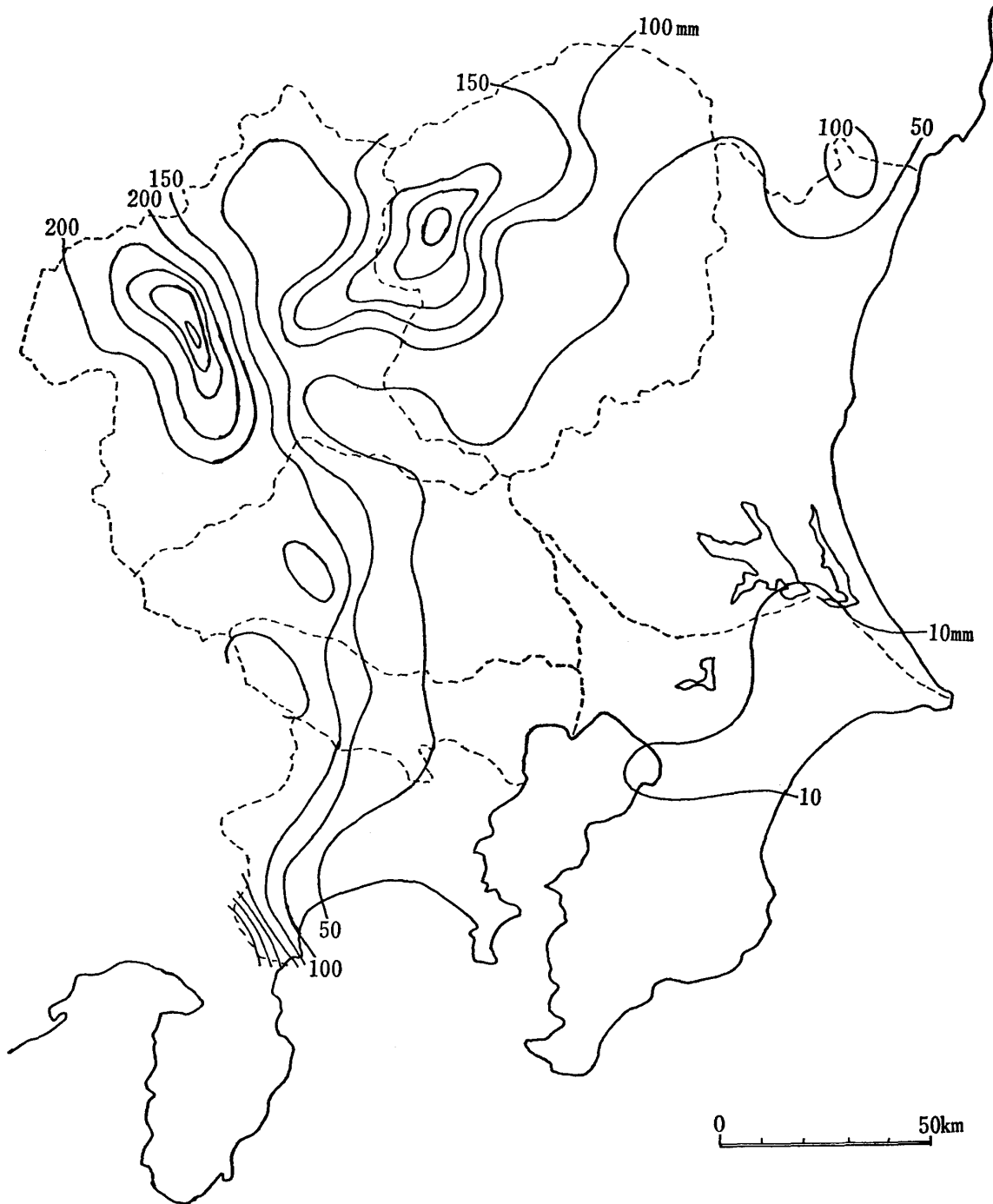


Figure 2 Rainfall to the Kanto Area Brought by Typhoon No. 15 within 24 hours of the 22nd August 1981.

(by T. Mikami)

under conditions of very rapid and vast urbanization:

“After World War II inundations occurred several times in the drainage basin of the Tsurumigawa and this map shows the widely inundated belts due to typhoon No. 4 of 1966 and No. 17 of 1976 with their heavy rainfall. Dwellers in the basin are respectfully urged to recognize the areas inundated in the past and to utilize this information to promote reasonable land use and to seek refuge from flooding. It should be added that the area of inundation can change according to the pattern of rainfall and topography.”

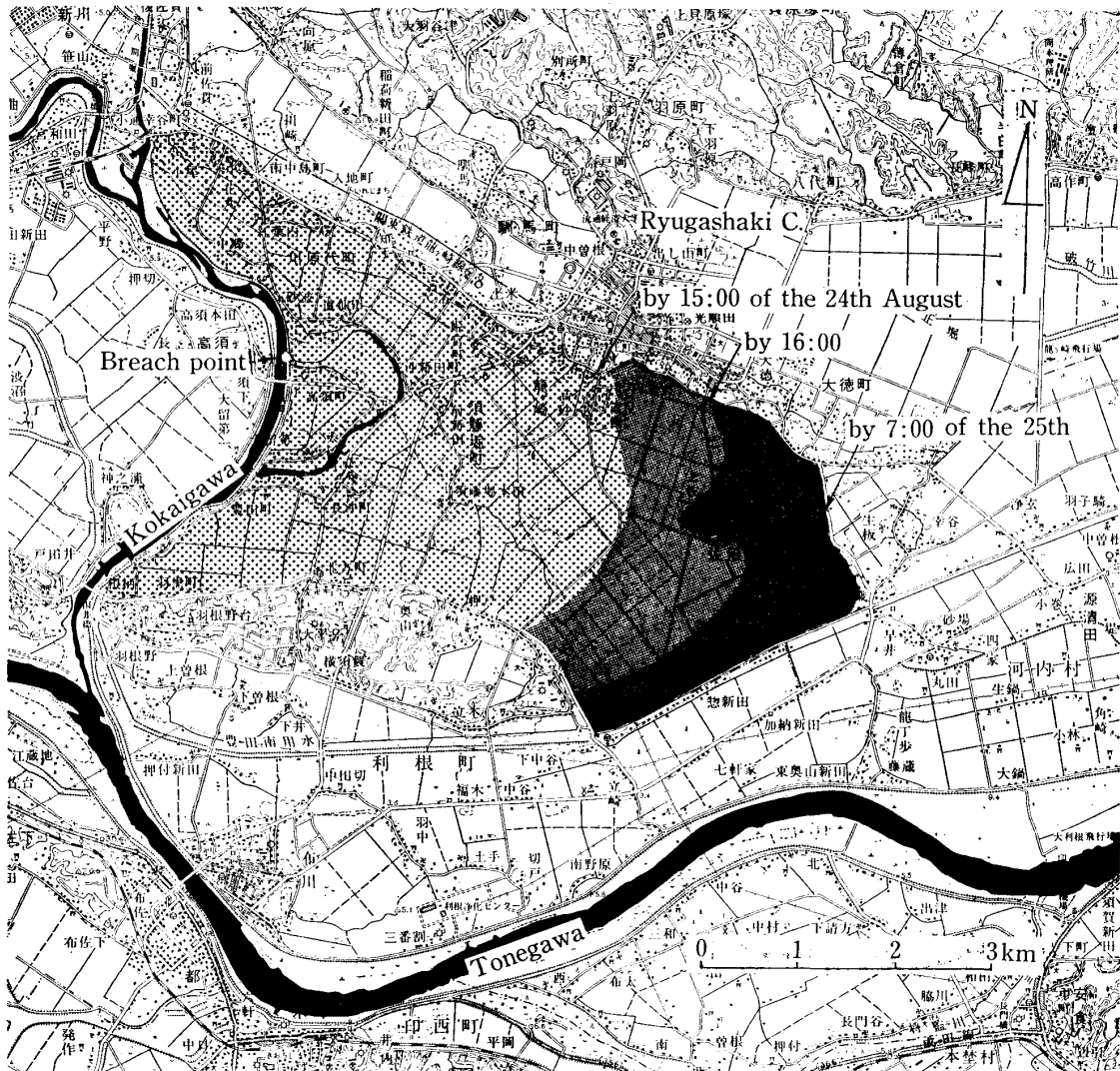


Figure 3 The Area of Inundation Caused by the Typhoon No. 15, 1981 in a Part of the Drainage Basin of the Kokaigawa.

(by Courtesy of the Geographical Survey Institute)



0 300m

Photo 1 Breach at the left bank of the Kokaigawa due to flood caused by typhoon No. 15. at inundation in an area around a former oxbow of the Kokaigawa. This air photo was taken at eight o'clock on the 24th of August, 1981. (by courtesy of Tonegawa Karyu Koji Jimusho of the Ministry of Construction)

C. Breach of river tributary embankments.

In some respects it was lucky for Tokyo, Yokohama, Kawasaki and other cities in the western part of the Kanto plain that in 1981 a second typhoon, No. 15, with its central pressure of 965 mb and maximum wind velocity of 35 m/s landed above the Boso Peninsula at four o'clock on the 23rd August and ran with a velocity of 35 km/h through the eastern part of the Kanto toward the north-northeast. It brought so much rainfall in the upper drainage basin of the Tonegawa that the water level of that river in its middle courses rose and flooded, in a reverse fashion, the Kokaigawa, one of its tributaries. (Fig. 2) Although the water level of the Kokaigawa was about one meter lower than thought to be dangerous, its embankment was breached at a point near to the confluence with the Tonegawa. As a result a large area of paddy was flooded. The flooded area, in the upper part of a relic stream at the entrance to a former oxbow, spread over approximately 1,600 ha. (Fig. 3)

The reason for the breach of the embankment may be explained as follows; a new dike shortening the length of the river (constructed about 1910) was not strong enough to withstand flooding from both the Tonegawa and Kokaigawa. Moreover, for irrigation purposes there was a watergate of concrete adjacent to the broken portion of the dike and it may be presumed that portion must not have been fully hardened and adhered to the watergate after its recent construction in 1966. In addition to the watergate problem, the body of the dike itself is protected by a concrete block lining only in its lower part, but, on the contrary, its upper part contains irregularly constructed sand lenses and silt layers. Furthermore, the embankment is likely to float on soft alluvial ground, so that it is prone to have both cracking problems, landslides and crumbling. This type of construction is in complete disregard of the effect of frequent earthquakes in this area. It is not yet confirmed whether the previously mentioned watergate remained open or not during the period of high water levels. If the gate remained open, the weak backside of the embankment must have been scoured by gushing water from the sluiceway, further undermining the stability of the embankment. (Photo 1)

II. Lessons from the Disaster Caused by the Typhoon of Ise Bay

A. The reasons for the tremendous damage caused by the typhoon of Ise Bay

On September 26th, 1959, the violent typhoon of Ise Bay occurred with a low pressure of 929.5 mb accompanied by a maximum wind velocity of about 60 m/s. It landed above

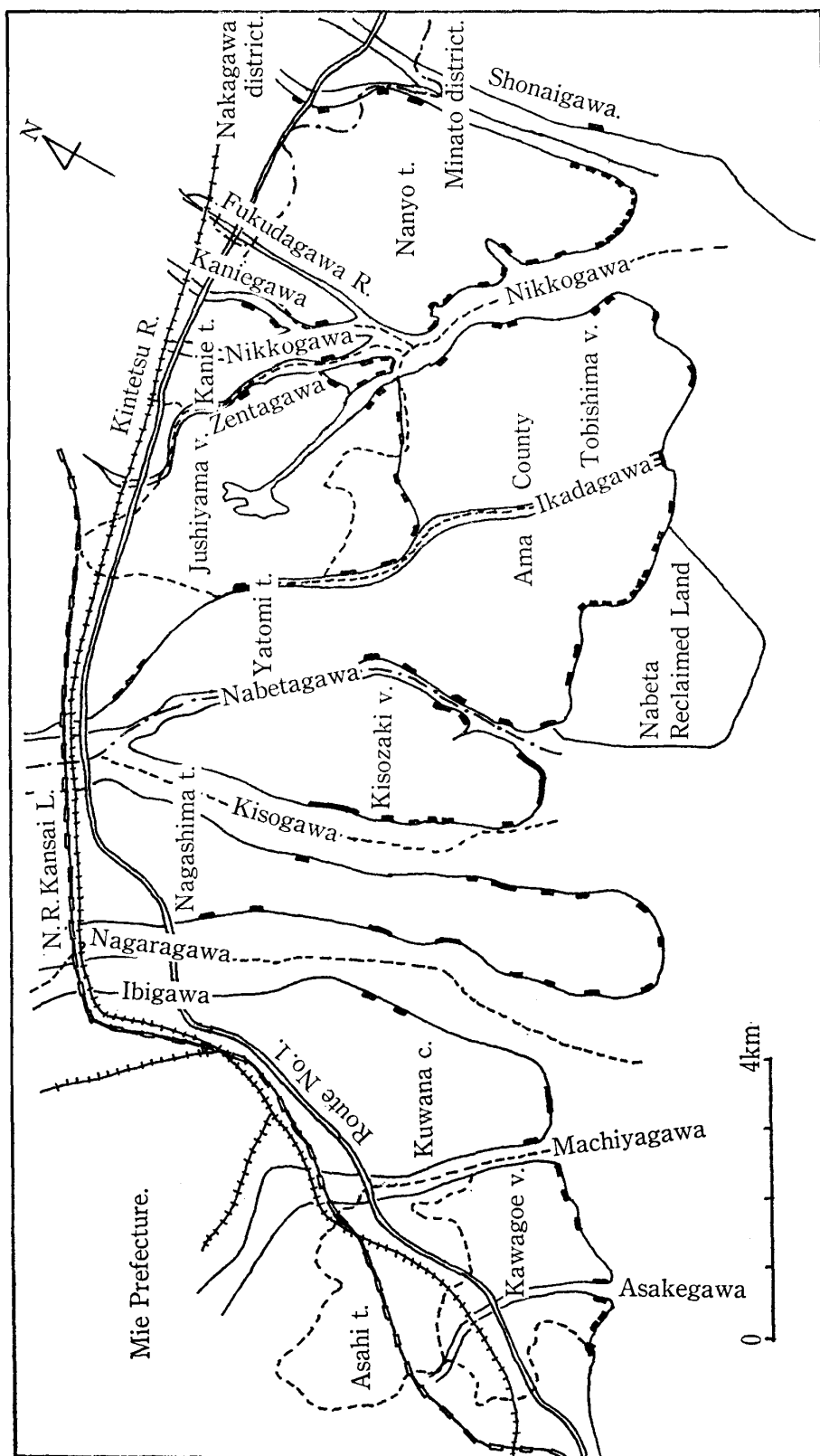


Figure 4 Breaches of Embankments (marked with thick line) caused by the Flood Tide of the Typhoon of Ise Bay.
(Based on the Report of the Ministry of Construction)

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near the point of Shionomisaki in the Peninsula Kii, passed through this area with a velocity of 60 km/h, toward the west of Ise Bay, and caused an abnormally high storm surge in the Bay. At 21:35 of the 26th, the highest sea level above the Nagoya Peil (hereafter referred to as N.P.) of plus 5.3 meters was noted with the wind raging most strongly. This coincided with a condition of nearly high tide. This sea level was far higher than that normally anticipated for Nagoya in the event of storm related disaster.* The subsequent flooding from the sea not only overtopped the sea dikes but also pushed water up the mouth of the area's rivers causing water to flow over the river embankments leading to severe flooding on the reclaimed land of the coastal industrial zone. This disaster was further complicated as the dikes surrounding the reclaimed lands and river embankments were broken in many places. (Fig. 4)

The reasons for, and the pattern of the breaks in the dikes and embankments may be listed as follows :

- (1) The flood tide was higher than the top of the dikes. In addition, the upper parts of the dikes were not fortified and therefore destroyed by the power of gigantic waves.
- (2) Breaks occurred in the upper part of the backslope of the dikes due to overflow and overtopping.
- (3) Landslides occurred due to the leakage of water from the body or base of the embankment and the increase in the percentage of water content in the embankment.

There are two important characteristics to be noted regarding this typhoon's affect on urban districts. First was the accumulation of muds and sands after flooding: picking only Nagoya as an example, 370,000 m³ of mud and sand were deposited. This condition completely paralyzed transportation in the city and required extensive rehabilitation of residential sites. The second is that water from high tide flowed backward into canals, broke embankments and combined with already collected canal water to flood built-up areas. About half of Nagoya City, or 120 km², was inundated for many days. As Table 1 shows, this typhoon damaged mainly the city of Nagoya, as well as many other municipalities in thirty nine prefectures.

The reasons for the tremendous damage may be further explained as follows :

* (In 1959 the anticipated level for storm surges was 4.8 m above the Nagoya Peil: sea dikes were constructed according to this standard.)

(1) Assault of a typhoon of the largest scale under the worst meteorological conditions causing the height of the flood tide to be raised, at its highest, to 3.89 m above normal. (As noted earlier, footnote 1, p. 7, the combination of this high tide and the typhoon induced waves led to overtopping of the sea and river dikes.) In addition, densely inhabited lowlands in the southern part of Nagoya are located along the innermost part of Ise Bay.

(2) Incomplete understanding that abnormally violent typhoons can occur.

(3) Incomplete understanding of low ground areas and land subsidence. The southern part of Nagoya damaged most severely by flooding from the typhoon of Ise Bay remained submerged until the end of the sixteenth century. Since then the area had been reclaimed exclusively for paddy until the middle of the 19 century.

B. Administrative efforts for disaster prevention after the Ise-wan typhoon

In consideration of the extraordinarily terrible calamities caused by the typhoon of Ise Bay, there arose calls for increased administrative efforts for disaster prevention in a comprehensive and systematic manner.

At the national level the Disaster Countermeasure Basic Act was enacted in 1961 as the basis for future administration. This law contains such items as: (1) fundamental guidelines; (2) countermeasures for disaster prevention; (3) urgent countermeasures against disasters; (4) measures for rehabilitation from future disasters and necessary financial support, and so on.

At the municipal level of large cities, especially in Nagoya, a Council for the Countermeasure of Disaster Prevention was organized on January 18th, 1960. As early as May of the same year it elaborated a general plan for comprehensive countermeasures for disaster prevention. (B4: 85 pages).

This plan consists of three chapters. The first deals with the plan for disaster prevention including 8 items; the second with the plan for rescue from disaster, including 37 items; the third with the plan for urban construction to prevent disaster, comprising the basic plan, and the main countermeasures both for national and municipal levels of government and implementation. In this respect, some of the following measures should be noted and emphasized:

(1) The National Government is responsible for the promotion of civil engineering works for protection against unusually high sea levels and for the replacement of timber ponds.

(2) The Municipality of Nagoya is responsible for the following:

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(a) in future land adjustment for industrialization or otherwise, the city shall raise the ground level of the lowlands to the west of the Arakogawa to a point 1.3 m higher than the mean low-water level of Nagoya harbor (N.P.);

(b) building regulations designating districts thought to be dangerous in the case of natural disasters;

(c) raising the ground level of parks located in the southern part of the city 3 m higher than N.P., in order to use them as a relief base in an emergency;

(d) countermeasures for preventing ground subsidence by means of regulations controlling the pumping of ground water in the immediate area and increases in the volume of water channels, as well as greater utilization of water from distant points to meet industrial needs;

(e) improvement of drainage facilities, especially by means of as many as 38 drain pumps in the southern district to be capable of functioning in an emergency by means of on-site diesel engines.

C. Outline of storm surge countermeasures in Tokyo.

Making the most of the various instructive lessons evident after the Typhoon of Ise Bay, not only Nagoya but also Tokyo, Osaka and other cities reconsidered their counterplans for natural disasters: Densely inhabited and intensively used areas of Tokyo and Osaka are also situated along bays, so that they may suffer tremendous damages caused by large typhoons, should they someday take a dangerous course toward the western outskirts of these large urban centers. In anticipation of future disasters, the Liason Council for Storm Surge Countermeasures was established in Tokyo in December, 1959. The members of this council include representatives of both the port and harbor bureaus of the Tokyo Municipality and the Ministry of Transport. This council has formulated the following guidelines:

(1) The urban districts should be protected from atmospheric and marine disasters in the Bay of Tokyo, which may be caused by a violent storm comparable to the Typhoon of Ise Bay;

(2) Physical planning should be made on-site regarding the following three items, to be implemented in parallel with countermeasures against storm surge including, (a) countermeasures for ground subsidence, (b) the establishment of an organization for warning and flood control, (c) the promotion of urban planning with consideration for possible evacua-

tion from the danger caused by storm surge;

(3) Disaster prevention facilities should be located at sites which do not disturb urban and harbor functions;

(4) Pump operated drainage systems are to be used for water inside the canals in the district surrounded by sea dikes;

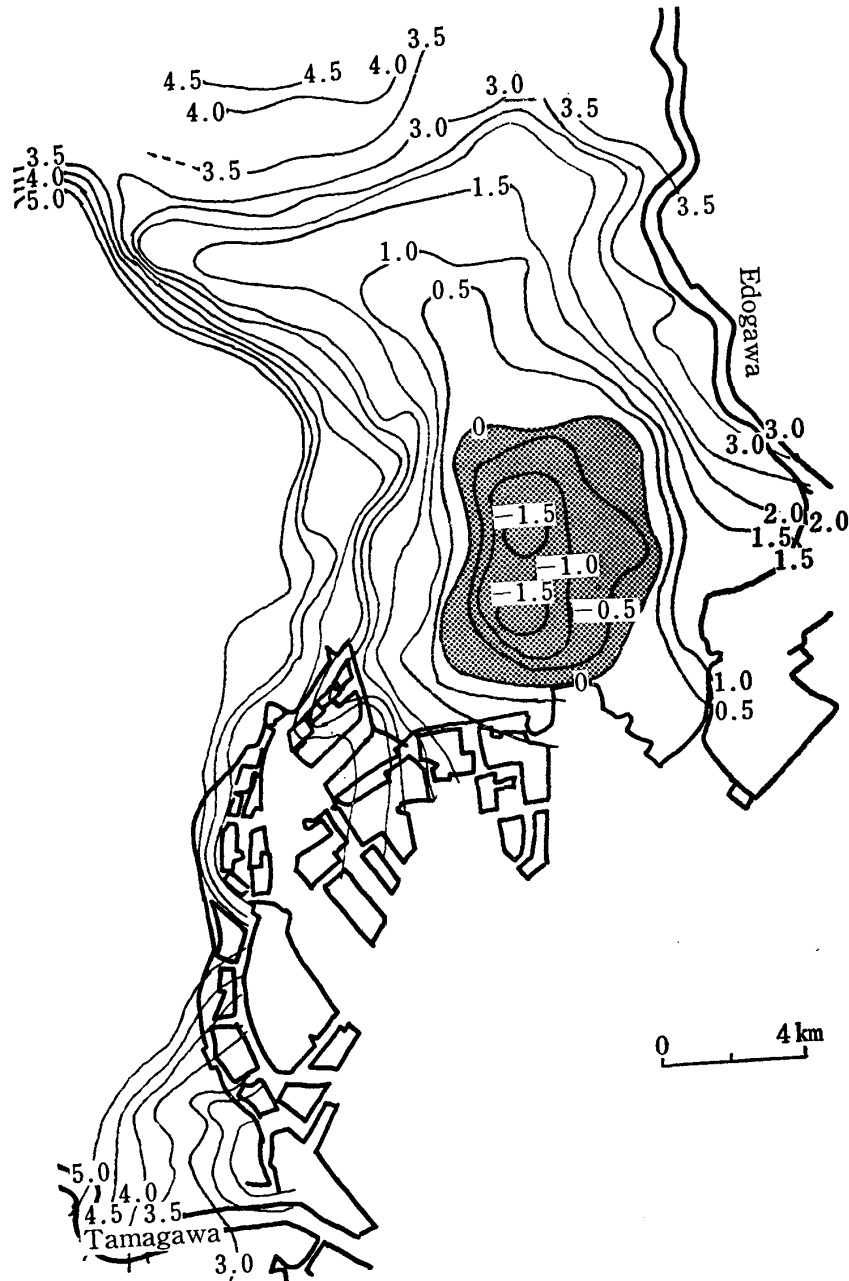


Figure 5 General Ground Conditions, at Half-Meter Contour Intervals (Tokyo, 1974)
(The Tokyo Metropolitan Government)

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(5) As a rule, cut timber should be kept in ponds isolated from other land uses. As a temporal measure, it is necessary to improve the existing timber ponds to prevent outflow of logs and to bind temporarily moored logs tightly to each other.

(6) Coverage, method, location, schedule, etc. of disaster prevention planning should be determined in full consideration of future planning of the urban area, streets, rivers, sewers and harbors.

D. Implementation of countermeasures for typhoon related floods in the Koto district of Tokyo

The lowlands of Tokyo have suffered from typhoon related floods quite often, including twenty times in the Edo era (1600–1867) and thirteen times since the Meiji Period. The most dangerous area is the Koto-district, the delta region made by the ancient Tonegawa, stretching between the Sumidagawa and the Arakawa canal, completed in 1929. This district has an area of 45 km² with a north-south length of about 12 km and an east-west width of about 5.5 km. About 60% of the district lies below zero meter sea level measured by the Arakawa-Peil (A.P.). The lowest portion is –1.5 meter A.P., and even the highest point rises to only 4.8 m above A.P. (Fig. 5) This is a densely inhabited area of about 650 thousand people in 1981 and used intensively for industrial and commercial activities. The ground subsidence of this district began at the end of the last century. On the first of January 1980, the total value of ground subsidence at the point of highest incidence amounted to 4.5 meter. Owing to multiple regulations to prevent ground subsidence, adopted since 1961, there are no areas which have sunk more than five centimeter per year on average since 1976.

To protect this district and areas of Tokyo harbor as effectively as possible, suitable sea dikes have been constructed or strengthened according to a series of operational plans since 1960. (Fig. 6) The crown height of sea dikes is now based on the simulation that a typhoon similar in scale to the Typhoon of Ise Bay would take either the course of the Typhoon of October, 1917 (near Tokyo Bay)*, or the Typhoon of Ise Bay. (Fig. 7) In total, ten model typhoons were examined. (Fig. 8) For instance, in the case of model seven, the largest deviation from the A.P. would reach 302 cm in the area adjacent to Funabashi city.

* The 1917 Typhoon caused in Tokyo Bay the highest sea level (A.P.+4.21 m) in history. This typhoon measured 950 mb with a wind speed of 40 m/s.

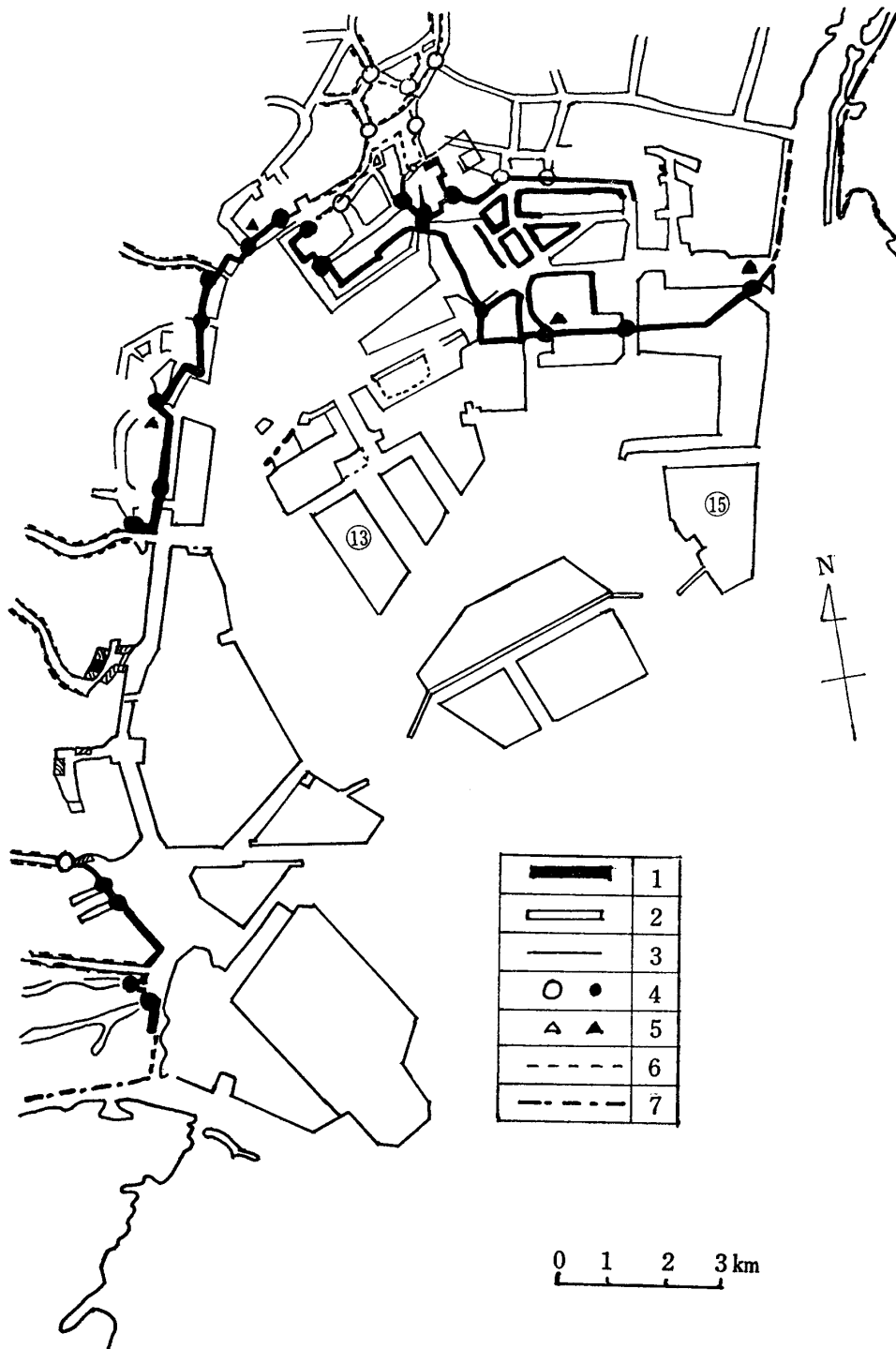


Figure 6 Ground Plan for Tokyo Harbor Coastal Defense Projects.

(The Tokyo Metropolitan Government)

- ① Dike constructed before 1979. ② Dike under construction in 1980. ③ Dike in planning after 1981. ④ water gate. ⑤ Drain pumping station. ⑥ Dike under the control of the TMG. ⑦ Dike under the control of the Ministry of Construction. ⑬ Reclaimed land No. 13. ⑮ Reclaimed land No. 15.

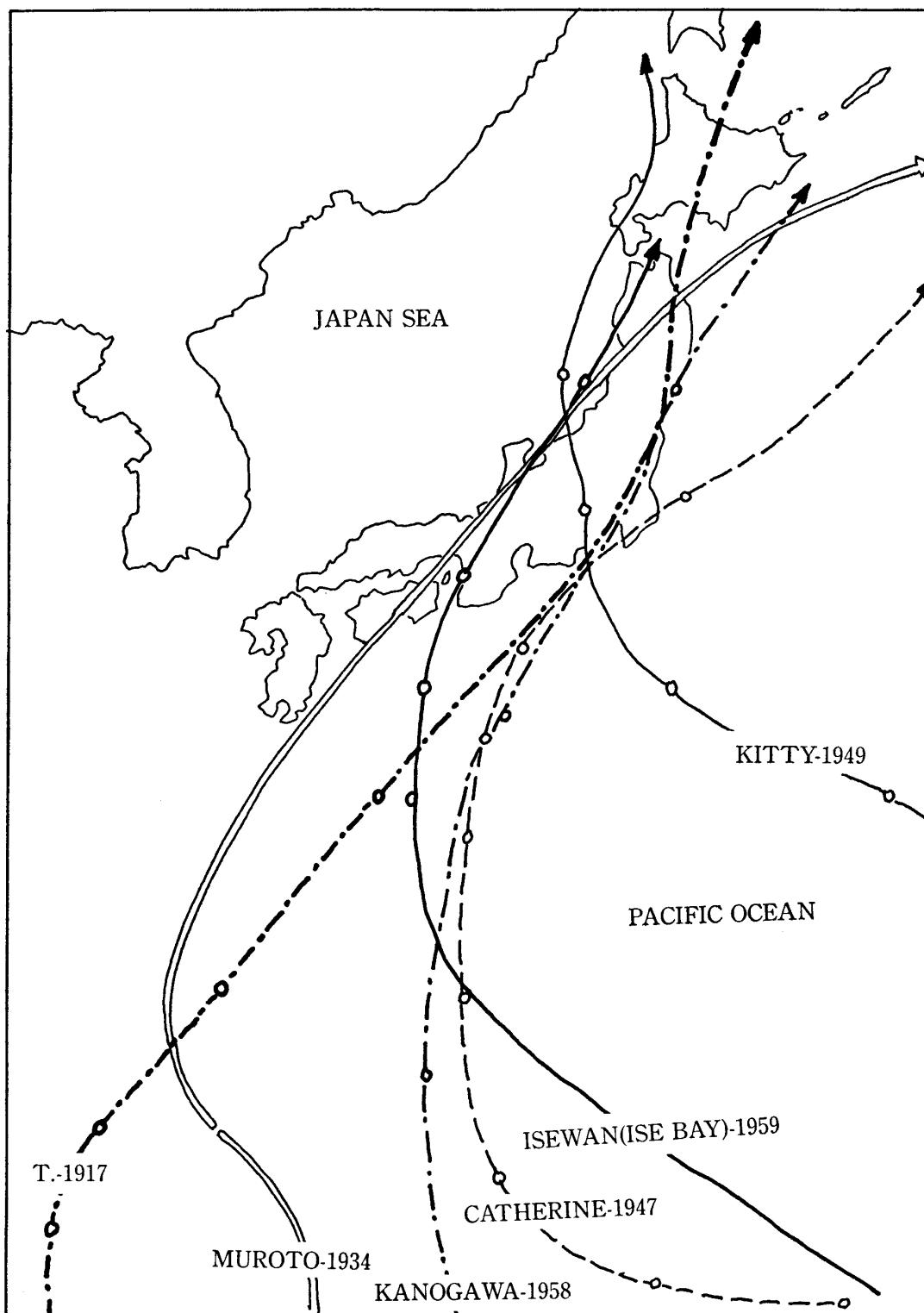


Figure 7 The Main Typhoon Routes Intersecting Japan (1917-1966).
(Japan Meteorological Agency)

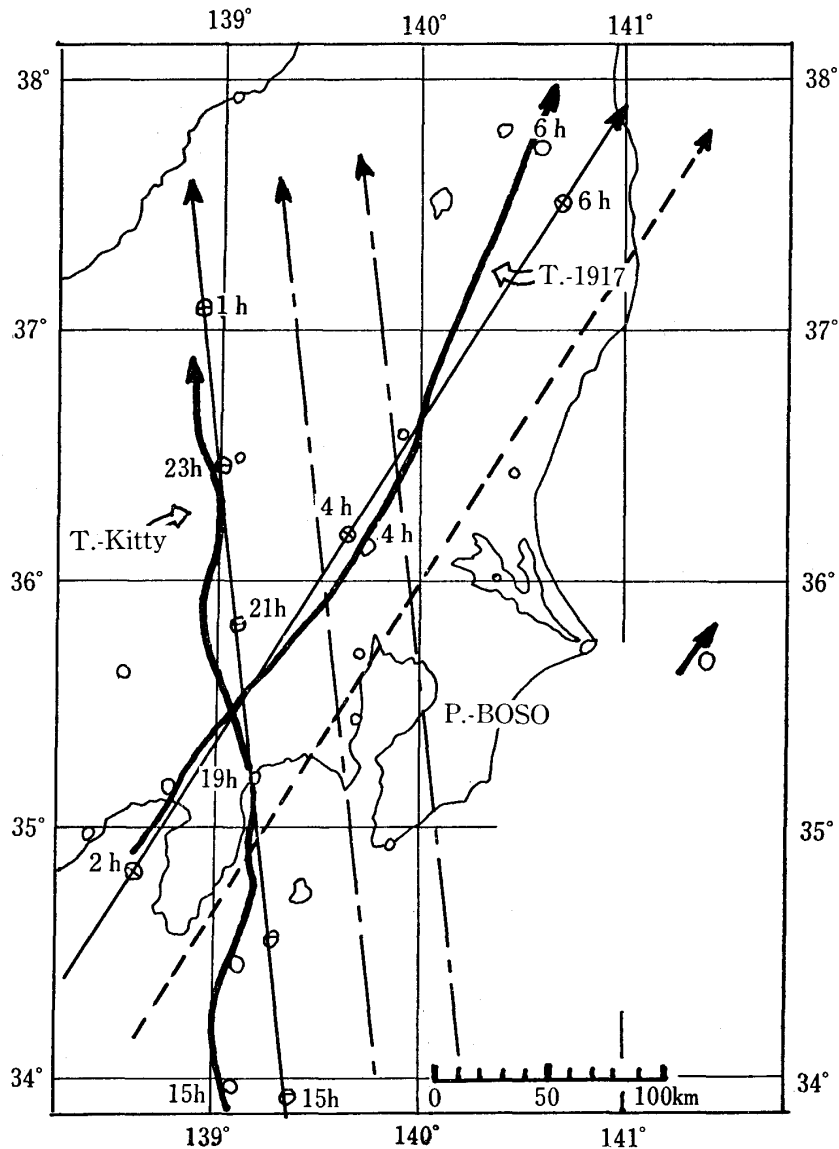


Figure 8 Real (with thick lines) and Possible Course of Typhoons Based on Historical Data (Kanto Plain, Greater Tokyo Region)
(The Tokyo Metropolitan Government)

Concerning astronomical tide, A.P. +2.10 m was adopted as mean high water level during the typhoon season, July through October. Adding projected wave height, 0.5–2.9 meters, to these values the sea dike crowns have been determined. In the Koto district, for example, the crown height of the sea dike shall be maintained at A.P. +6.3 meters at the gate of Toyosu, and as high as A.P. +8 meters in certain land fill areas (such as that called No. 14–2). With regard to internal drainage in the Koto district, the following standards for

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facility planning have been adopted.

- (1) Pumping drains are to commence operation when the anticipated water level exceeds A.P. +2.5 in this district's rivers and canals;
- (2) The planned crown height of the embankments of the inner rivers and canals is to be maintained at A.P.+3 meters. Ground subsidence must be considered in the construction of embankments;
- (3) Closure of the gates is to coincide with the time when the sea level reaches A.P. +2.00 meters, with due regard to navigation;
- (4) Storm surge and precipitation are to be anticipated and planned for according to the worst conditions;
- (5) Anticipated rainfall is calculated for 254 mm per 24 hours, according to 50 year probability statistics, and 337 mm per day, according to 100 year probability statistics, with regard to typhoons;
- (6) All rainfall after gate closure is to be drained into the inner rivers and canals by means of electric pumps capable of diesel operation in an emergency;
- (7) Anticipated sea level in the Koto district is to be A.P.+5.10 meters based on the model case of the Typhoon of Ise Bay. At this time the volume of drained water will probably amount to 190 m³/s. This goal is now nearly realized through inplacement of four large stations for drainage purposes. One of these stations (Kinegawa Station) is equipped with five gigantic pumps (three pumps are equal to 2,500 mm and the two others are 2,200 mm) capable of draining 50 m³/s of water. By 1979 all the planned sea dikes were completed so that they were capable of protecting the Koto district against a sea water level of A.P.+3.14 meters, the second highest level following that of 1917, brought about by the storm surge from Typhoon No. 20 in October, 1979 (976 mb, 147 mm of rainfall, wind-speed of 38.2 m/s, from a southerly direction).

Besides the sea dikes, river embankments, and the provision of adequate facilities for drainage, the other big project for disaster prevention is anticipation of a great earthquake in the Koto district. Since 1969, the construction of eight bases for the prevention of disasters have been or are in the state of being gradually implemented. (Fig. 9) The first project, in a section called Shirahige Higashi, is in large part realized. (Fig. 9) This 37.9 ha section is situated in the northern fringe of the Koto district. In 1967, the Municipality of Tokyo began to purchase the grounds of two big factories which had previously moved

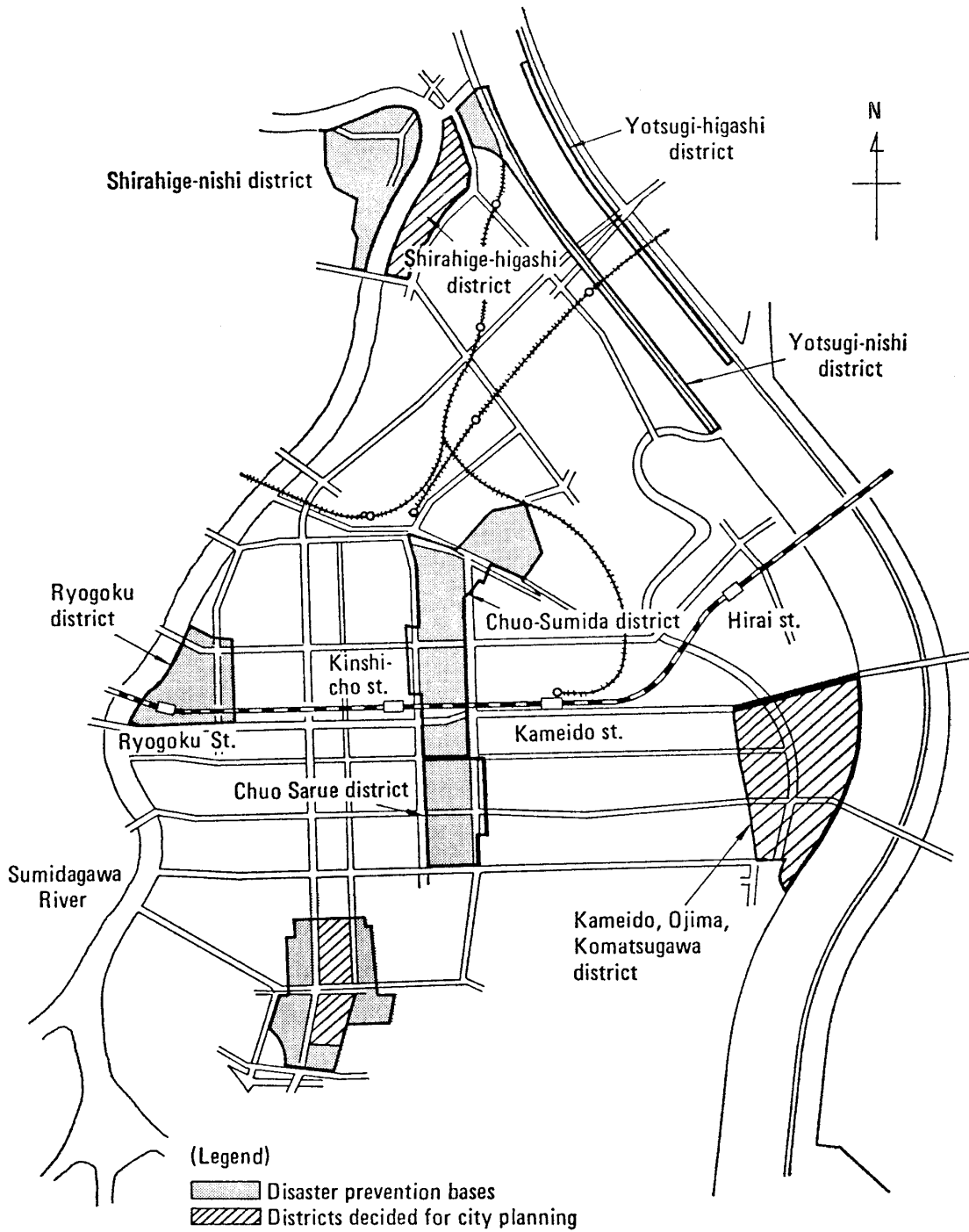


Figure 9 Location of Disaster Prevention Bases in Koto District.
(after "Tokyo at a Glance", TMG Municipal Library No. 16, 1981.)

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to the suburbs, as well as smaller sites. By 1972, the renovation guidelines for the site were adopted. The physical planning is characterized by the construction of very long (about 1,100 meters) and high (14 meters) dwelling houses which function as a protective wall against fire. In addition, a large park of 10.3 ha is to be used as a place of refuge in an emergency, and will include centers for disaster prevention and medical services. A community center will also be established. This section of the Koto district provides dwelling houses for 2000 families and has a capacity to accept evacuees amounting to 80,000 people, for whom a large amount of water, food, and other necessities will be provided. The ground of the refugee park is to be raised high enough to offer protection from floods.

Conclusion

Until the end of the 16th century the Japanese response to flood disaster took place mainly in a passive way: it was either an attempt to evade disaster or a striving for its minimization. Since then positive countermeasures for flood control have been executed in order to protect developing urban and industrial areas as they expand into alluvial plains. This countermeasure technique may be explained as the construction of higher and stronger dikes and embankments. These were also necessary to protect securely Japan's rural settlements and rice fields because retarding basins, which were reserved previously to a large extent along rivers, had been reduced inexorably in order to increase paddy. Needless to say, newly reclaimed land along the coastal area must also be defended from destructive storm surge.

Against these human actions natural violence such as typhoons and torrential rainfall have occurred with more tremendous damage than ever through the breach of dikes and embankments, at times causing different types of calamities such as repeated and extensive inundation in urbanized areas.

Nowadays, owing to the increase in public investment based on rapid economic growth in Japan, some countermeasures for disaster prevention have become considerably more effective and reliable, so that natural forces are likely to submit themselves to human technology. It is, however, indispensable to provide continually for new challenges from unforeseeable natural disasters, especially those which are complex and which might even happen simultaneously. In reality, then, on the human side there are as of yet several problems capable of producing great anxiety, including the following:

(1) Expenditures for maintaining and repairing protective structures is apt to be insufficient. Thus, these protective structures may become ineffective earlier than we think due to unforeseeable environmental changes;

(2) Overly heavy reliance on mechanical operations and automatic control systems which may grant a false sense of security that keeps us from paying proper attention to everchanging circumstances;

(3) Increases in the number of new urban dwellers, who have no experience with disaster and whose consciousness regarding the prevention or avoidance of dangerous situations may exacerbate emergency situations.

There seems to be a potentially fatal contradiction in the Japanese mentality regarding natural disasters. On the one hand, rice culture and urban activities including the secondary and tertiary industries require intensive use of the alluvial areas. On the other hand, history and science tell us these areas are the most dangerous places in which to live since they are frequently visited by all manner of natural disasters, including typhoons, floods, earthquakes, etc. Of great interest is the conscious acceptance of this contradiction by modern Japan, one that is linked both to past historical experience and future outlook.

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日本における台風災害と人間活動との間の挑戦と応答

あとがき

この論文は、1981年11月24日から27日にかけて、メキシコのラ・パスで開催された国際シンポジウム“ハリケーンと洪水、その人間集落に及ぼす影響”に招待されたさいに作成したものである。シンポジウムではその約3分の1を報告した。メキシコの集落・公共事業省は、1979年に都市災害に関する1回目の国際シンポジウムをTijuanaで開催、そのテーマは“サン・アンドレアス断層”であった。第2回目は、“集落と地震”(1980・, Ooxaca)そして第3回目のハリケーンシンポジウムは、国立大学地理学研究所とバハ・カリフォルニア・スール州政府との共催で、15カ国からの参加者があり、研究発表者は外国から21名、国内からは20名に及んだ。

このシンポジウムは1981年の2月に決っていたが、私あての招待状が届いたのは7月末であった。折しも国連大学と東京地学協会との共催シンポジウムの事務局を当人文地理学研究室内に設置し、その準備に多忙をきわめていたし、専門外のテーマについて果して報告を提出できるかどうか自信はなかったが、メキシコへ行く念願がかなう好機会と思い、参加の返事を出したのであった。たまたま関東地方には、8月23日に台風15号が来襲し、小貝川が欠壊、10月22日には台風24号が目黒川や神田川の氾濫を惹起した。小貝川の生々しい現場は、国土地理院地理第一課の嶋田昌貞氏と須長博明氏の案内で視察することができた。小貝川の氾濫を示す空中写真は、建設省関東地方建設局根川下流工事事務所の好意により、掲載することができた。深く感謝の意を表す。9月16日には、建設省中部地方建設局河川計画課の高垣美良氏から伊勢湾台風後の河川堤防管理についてヒアリング、同じく10月26日には東京都防災企画課の森欣貳課長と都東京港高潮対策事務所の山中研介施設管理課長方からヒアリングと港東

地区と湾岸の視察を行い、11月16日には名古屋市災害対策課の額額力課長や名古屋港管理組合の職員方からヒアリング、伊勢湾台風後の防災施設等を視察させていただいた。

なお、国土庁の三村清志氏からは、“日本における災害防止システム”ほか同庁作成の英文資料を頂戴したが、これらのコピーはメキシコ集落・公共事業省への良い贈物になった。上記の方々に対してここに厚く感謝の意を表する次第である。

ところで、メキシコで開催されたハリケーンと洪水シンポジウムは次の三つのテーマに即して行われた。(1)ハリケーンと洪水現象と原因、(2)ハリケーンと洪水が集落に与える危険と作用、(3)その危険を緩和するための対策。この3日間にわたる研究発表に基づく勧告文をまとめたのは、ストラスブール大学の地理学教授、ジャン・トリカル氏であった。その要旨はおよそ下記の通りである。(1)自然災害をもたらす不幸や危険は、イデオロギーの違いをこえた国際協力と、南北格差に対する配慮が必要である。(2)国家間の協力は、災害発生時のみならず、普段における知識や経験や技術等の交換が大切である。(3)自然災害に対する最良の防御法は、適切な都市計画、効果的な災害緩和策の開発、緊急事態における計画的実施であり、それと同時に災害に備えて住民教育を継続的に行うことである。(4)政府と市民は、被害と復興費や補償額をへらすために、もっと予防措置に力を注ぐべきである。(5)1982年までに実施される国連の人間定住(集落)国際会議においては、その二つの基本的課題の一つとして都市災害問題が初めて採択されることを確認する。(6)国連が生態系の保護のために多額の金を費いやすのであれば、都市災害の危険にさらされている多数の人々の保安にも当然もっと多くの金を使うべきである。(7)各国政府機関も、自然災害防止対策に絶大なる関心を払うべきである。以上であるが、1984年は伊勢湾台風の30周年にあたる。名古屋市あたりで台風災害の国際シンポジウムを開催する好機ではなからうか。

(西川 治)