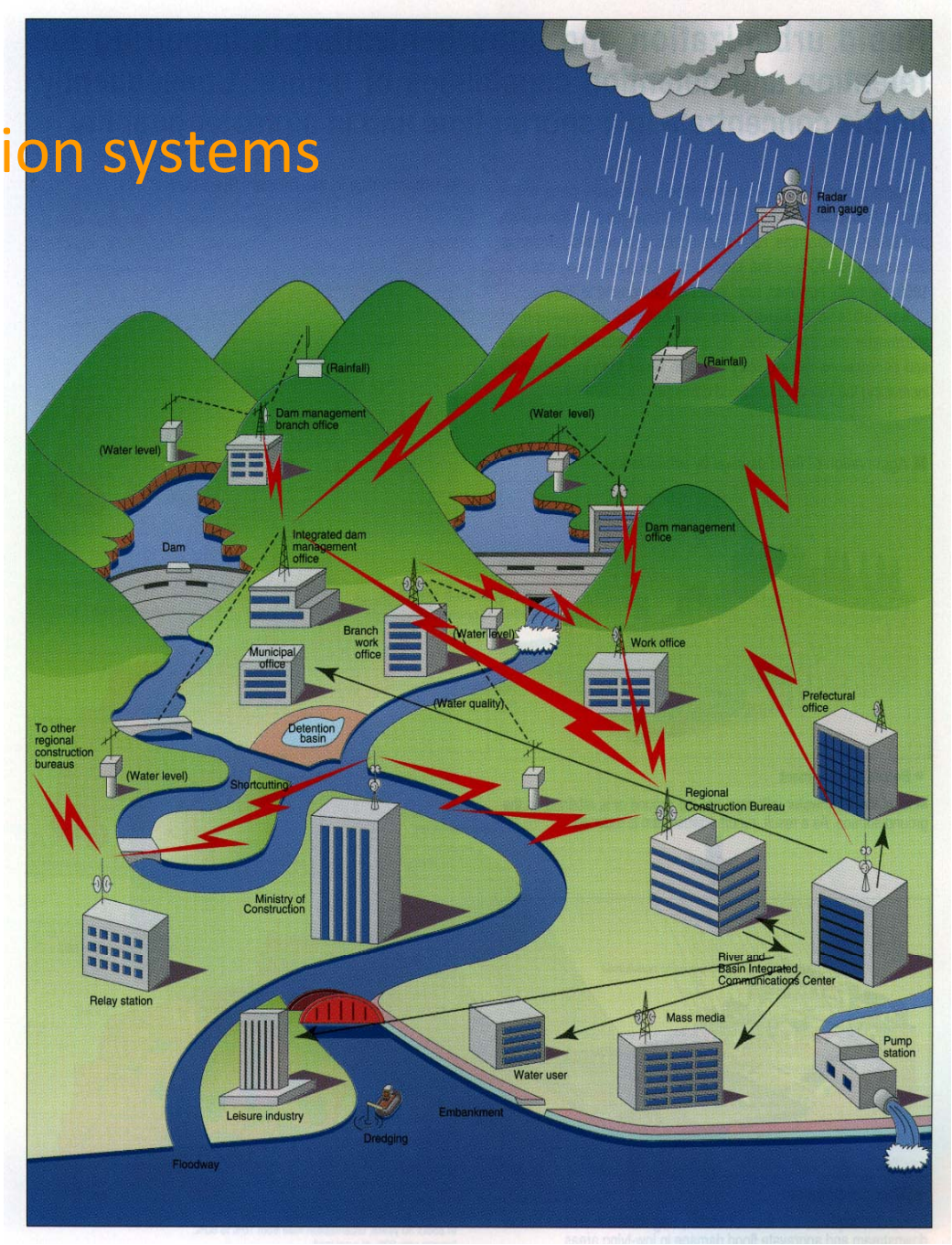
River Information System and Flood Forecasting and Early Warning in Japan 2013

Slides are from:

Foundation of Rver and Basin Integrated Communication (FRICS)

MLIT Kanto Region

River information systems



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Development of Flood Forecasting Facilities

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Year	Item
ca.1948	Manual Reading. Reporting by Telephone and Telegraph. Manual Analysis based on Personal Experience.
1950	Introduction of Short Wave Wireless Telephone (only for Emergency Use)
1951	Introduction of VHF Telephone (Daily Use was permitted)
1952	First Telemeter Data Transmission (Using Telephone Line)
1956	Introduction of Multiplex Data Transmission Network
1970	Introduction of a Digital Computer for Flood Forecasting
1972	Installation of a Digital Computer at the Bureau Headquarter
1976	Branch Offices were connected to the HQ on-line for Flood Forecasting
1976	Installation of on-line Data Exchange Network for Tone River
1977	Installation of the First Radar Rainfall System on Mt. Akagi
1986	FRICS started Information provision to Municipalities .

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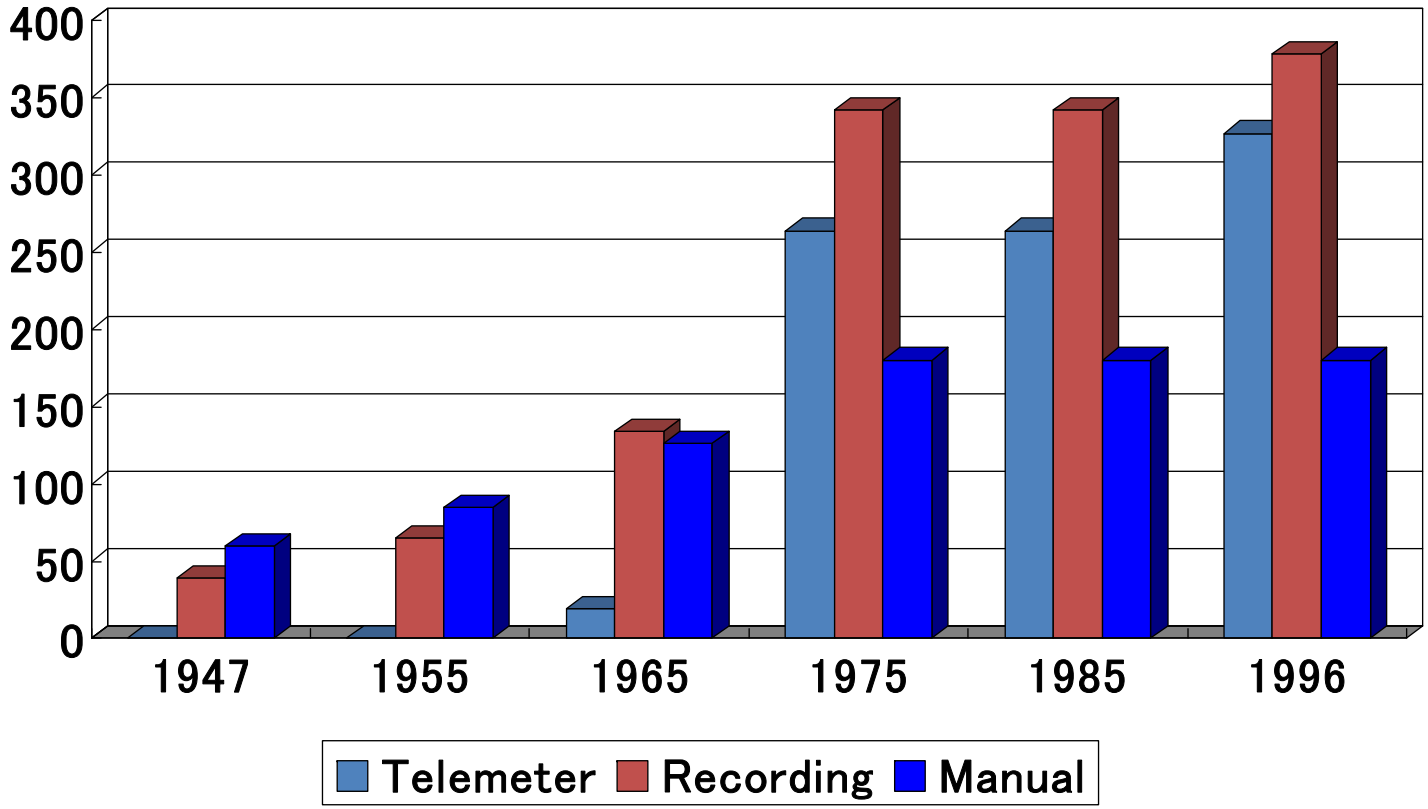
Trend of Measurement Facilities



In Tone River Basin (A=16,840 km^2), including Rainfall and Stage Stations

Sources of Data

As of March 31, 2010

	River Bureau	Highway Bureau	Met. Agency	Local Govern-ment	Water Corporation, etc.	Total
Radars	26		20			46
TM Rain	2,348	1,182	1,275	4,557	243	9,605
Water Stage	2,132			4,042	88	6,262
Others	1,560	188	87	400	337	2,572
Total	6,066	1,370	1,382	8,999	668	18,485

Most data are updated every 5(radar) or 10(telemeter) minutes.

Radar Rain Gage

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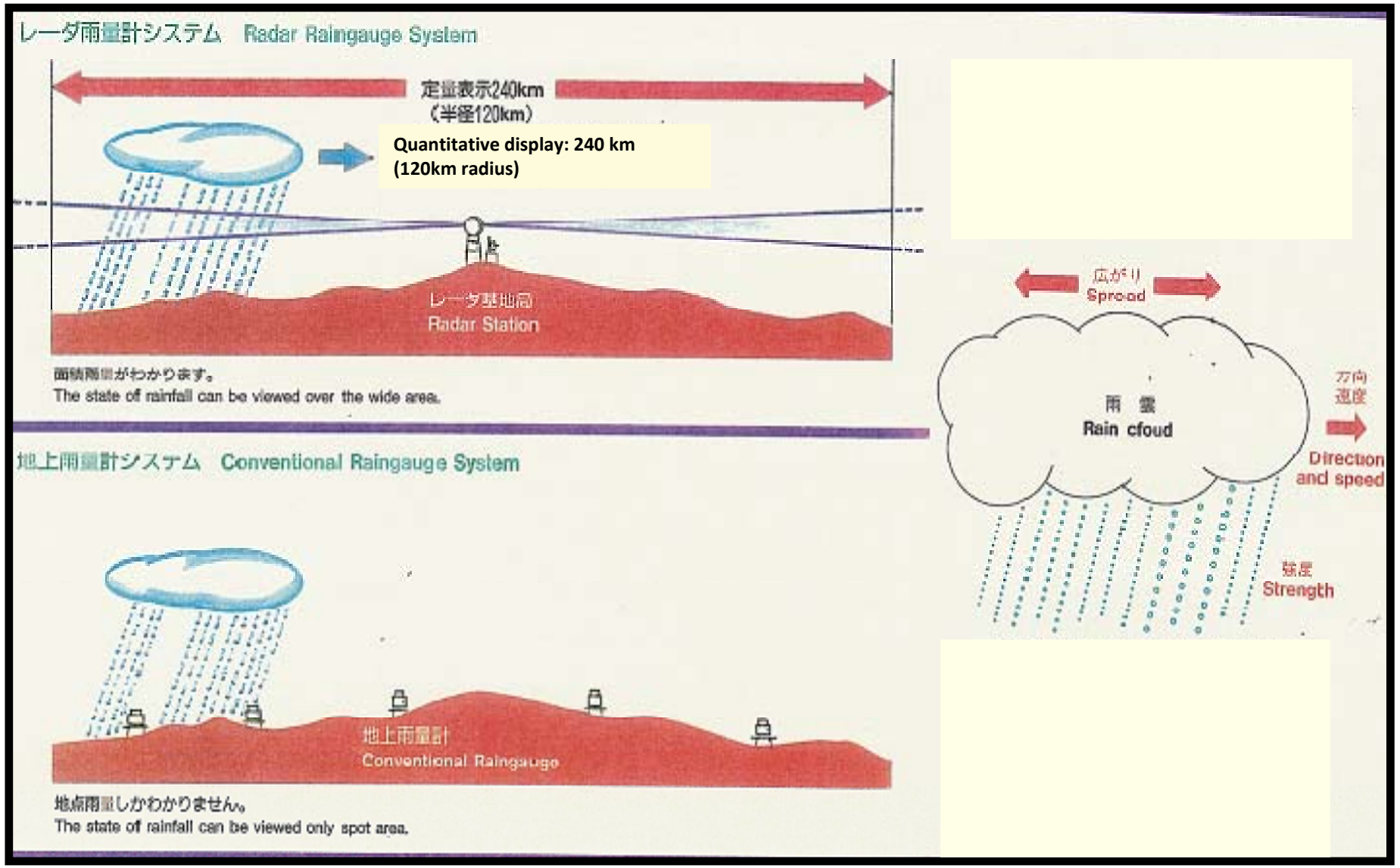
Observation

Radar Rain Gauge System



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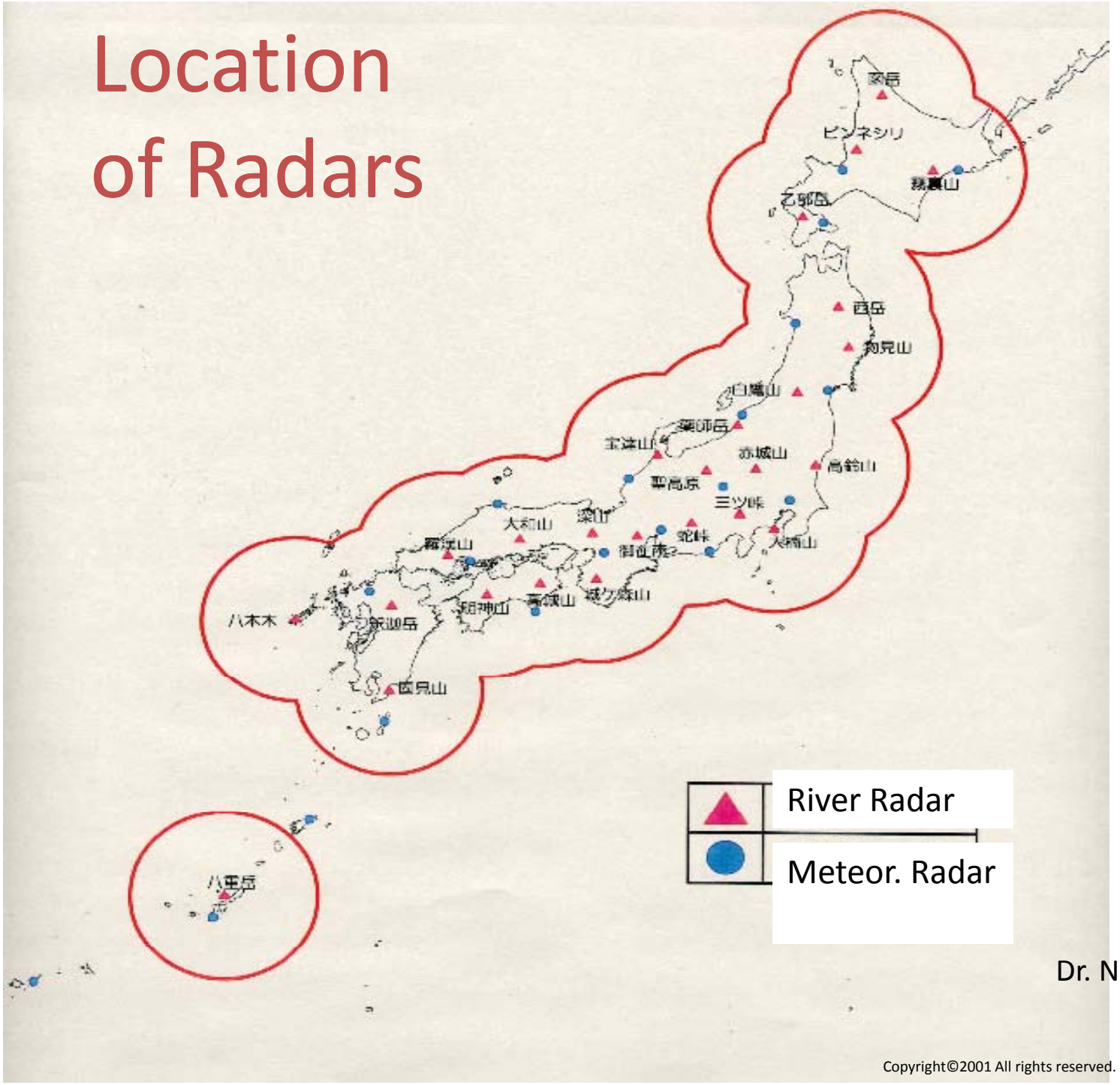
Location of Radars



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Arrangement of results observed

Rainfall Map (July, 2006)

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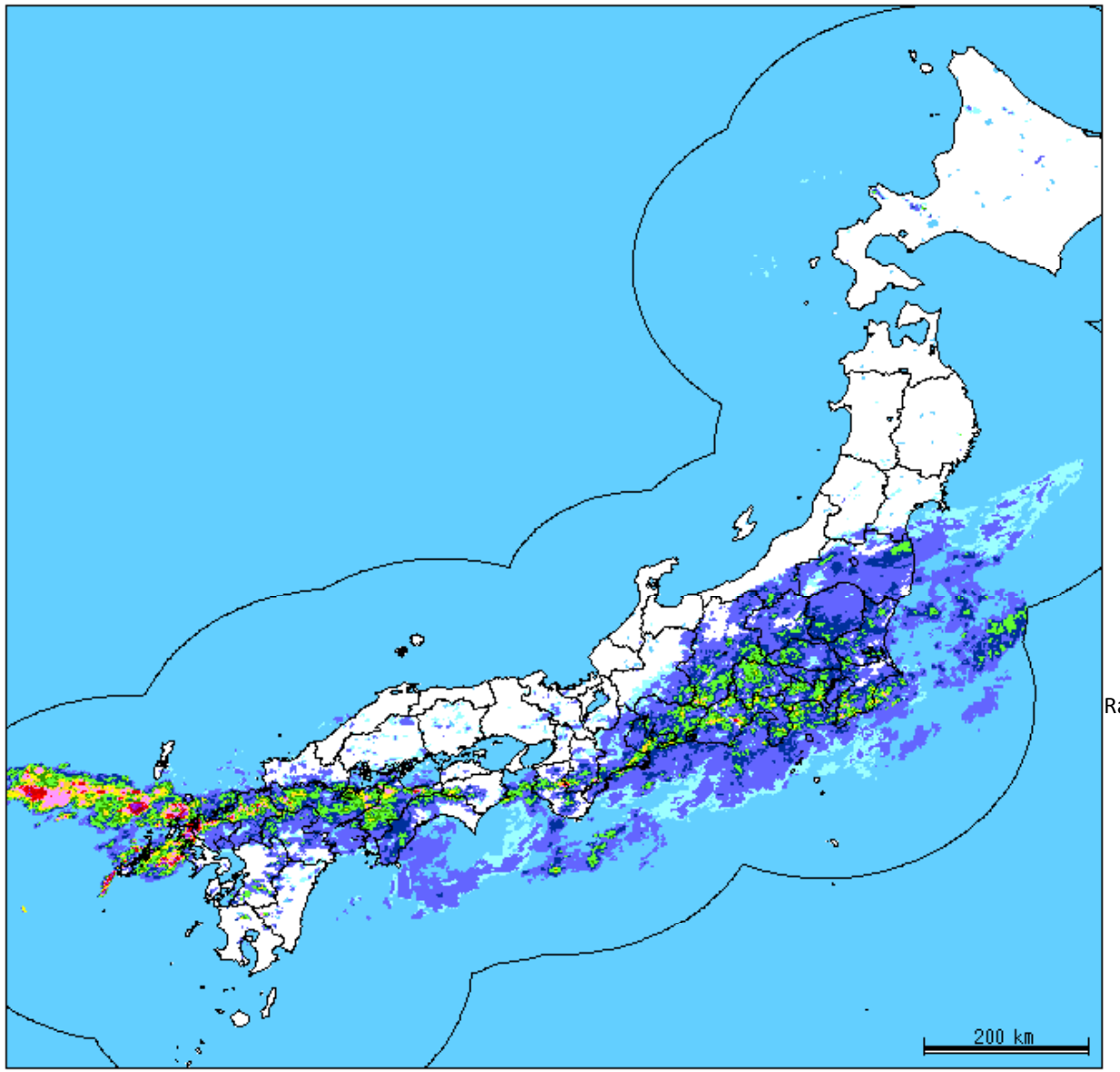
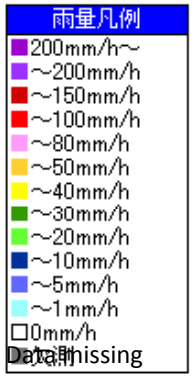
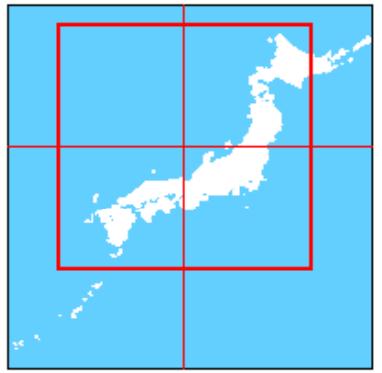


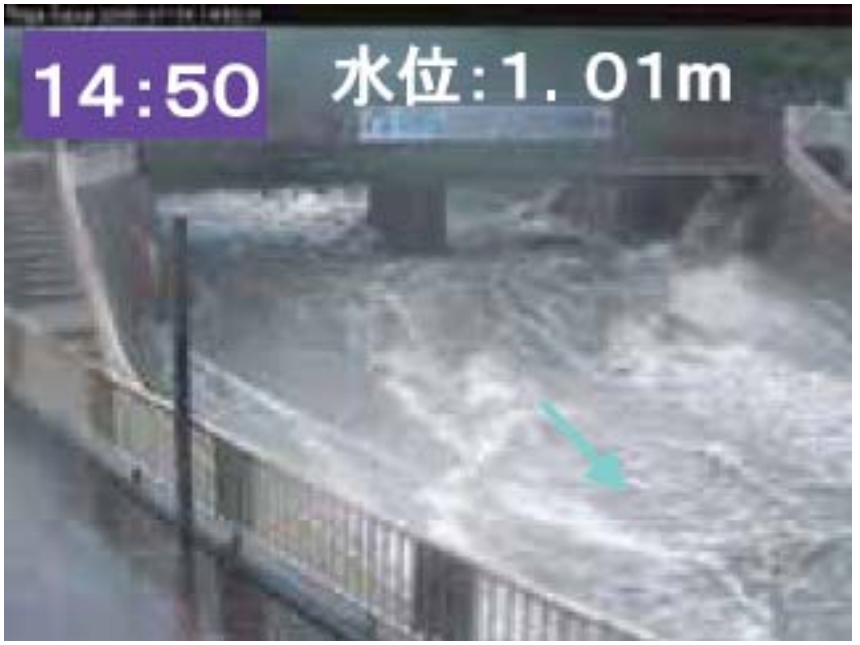
Rainfall Legend





TOGA River in Kobe
Sudden Flood in 28 July 2008　14:32-16:40

KOBE City　http://www17.plala.or.jp/kcamera/movie/demo.html



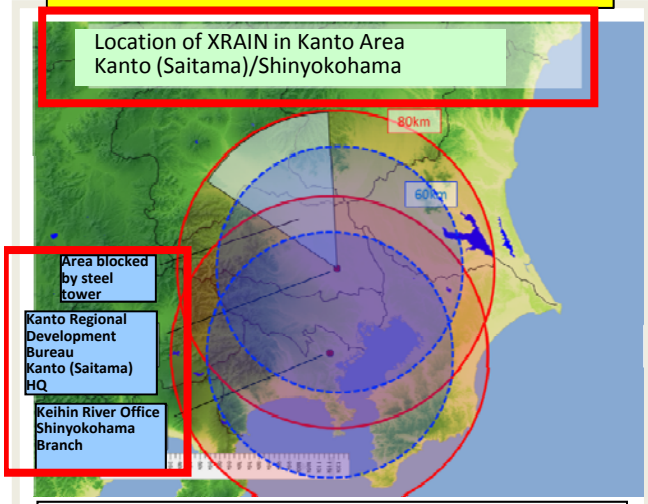
http://www.youtube.com/watch?v=4QWVzKoL-J8&feature=player_detailpage

Installation of XRAIN (X-band MP Radar)

○ Recent years have seen increasing localized heavy rains and torrential rainfall, requiring enhanced rainfall monitoring.
○ High-frequency X-band MP radars that provide high-resolution rainfall measurements were installed in FY2009 (2 in Kanto area).

-> Use radar network to facilitate optimal river and disaster management with an eye to minimizing damage

Installation of X-band MP Radars

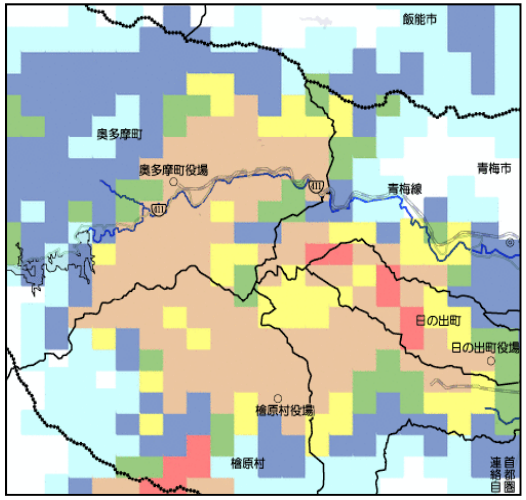


2 units installed in Shinyokohama and Saitama New Urban Center
Radar range with 60 km radius for quantitative observation (blue circles)

C-band and X-band Radar Rainfall Image

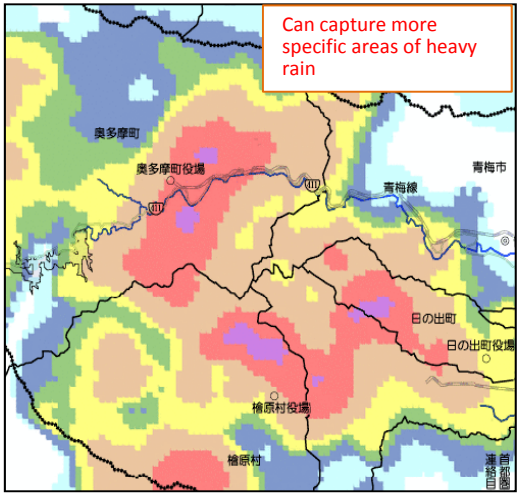
[Existing (C-band) Radar]

Minimum size:	1-km grid cell,
Data update interval:	5 minute,
Time to delivery:	5-10 minutes



[X-band MP Radar]

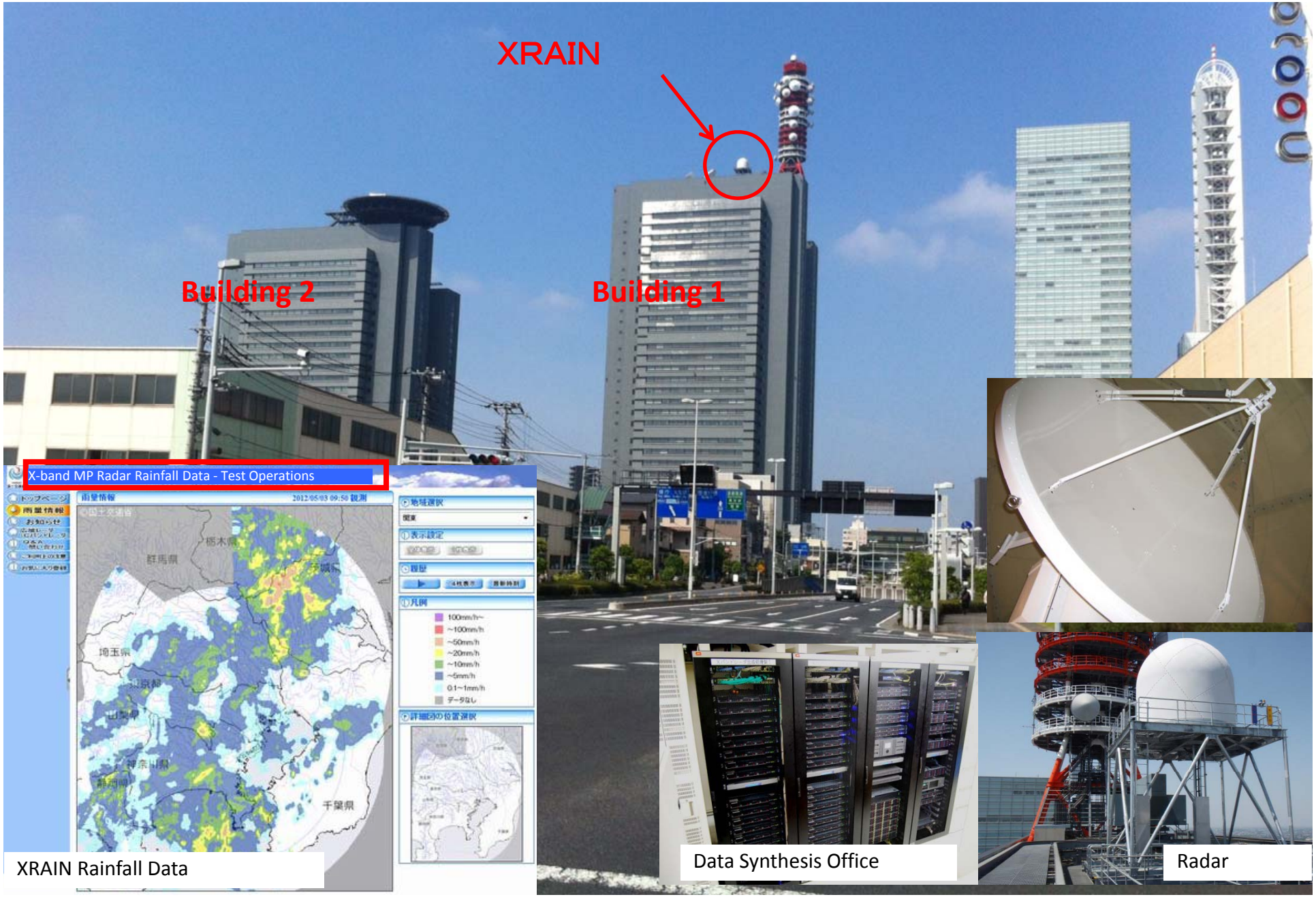
Minimum size:	250-m grid cell,
Data update interval:	1 minute,
Time to delivery:	1-2 minutes



- Higher frequency (5x) and higher resolution (16x) than conventional (C-band) radar.
  Cut delivery time from 5-10 minutes to 1-2 minutes.
- While the C-band radar (quantitative precipitation estimation radius: 120 km) is suitable for wide-area rainfall observation, the X-band MP radar (quantitative precipitation estimation radius: 60 km) is capable of gathering detailed data on localized heavy rain in real time despite its smaller area of coverage.

XRAIN: X-band polarimetric (multi parameter) RAdar Information Network

Photos of XRAIN (X-band MP Radar)
[Kanto (Saitama) HQ]



NHK Digital Terrestrial Broadcasting Service

■ **Background**

○ **Recent increase in torrential rainfall (guerrilla rain) hazards have been a major concern (River water level rises rapidly) -> (Need to get evacuation info., etc. out ASAP)**

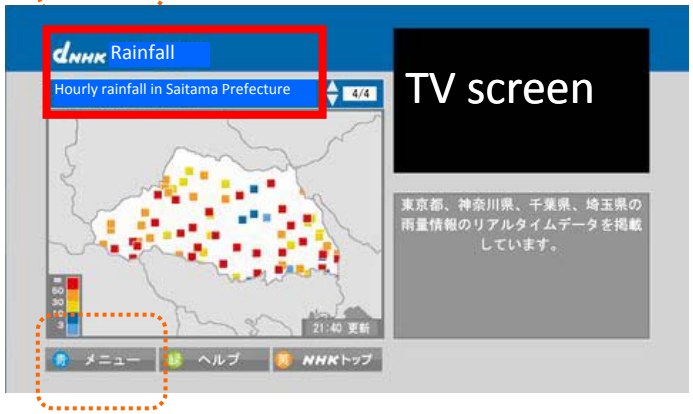
○ **Disaster information for rivers, etc. (water levels, rainfall) is provided via the integrated river information system. (Conventionally via PC, mobile phones, telephone information service, etc.)**

○ **TV, used by people of all ages, is the most appropriate means of conveying disaster information.**

Information on river water levels and rainfall is provided by NHK via its digital terrestrial broadcasting service.

[River Water Levels]

[Rainfall]



July 2011 Digital terrestrial broadcasting launched
April 2012 River water level and rainfall information service launched via NHK's digital terrestrial broadcasting

Press this button to switch between rainfall and water level information

Closed Circuit TV

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Display in an Operation Room

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Information through Internet for the Public

http://www.river.go.jp/

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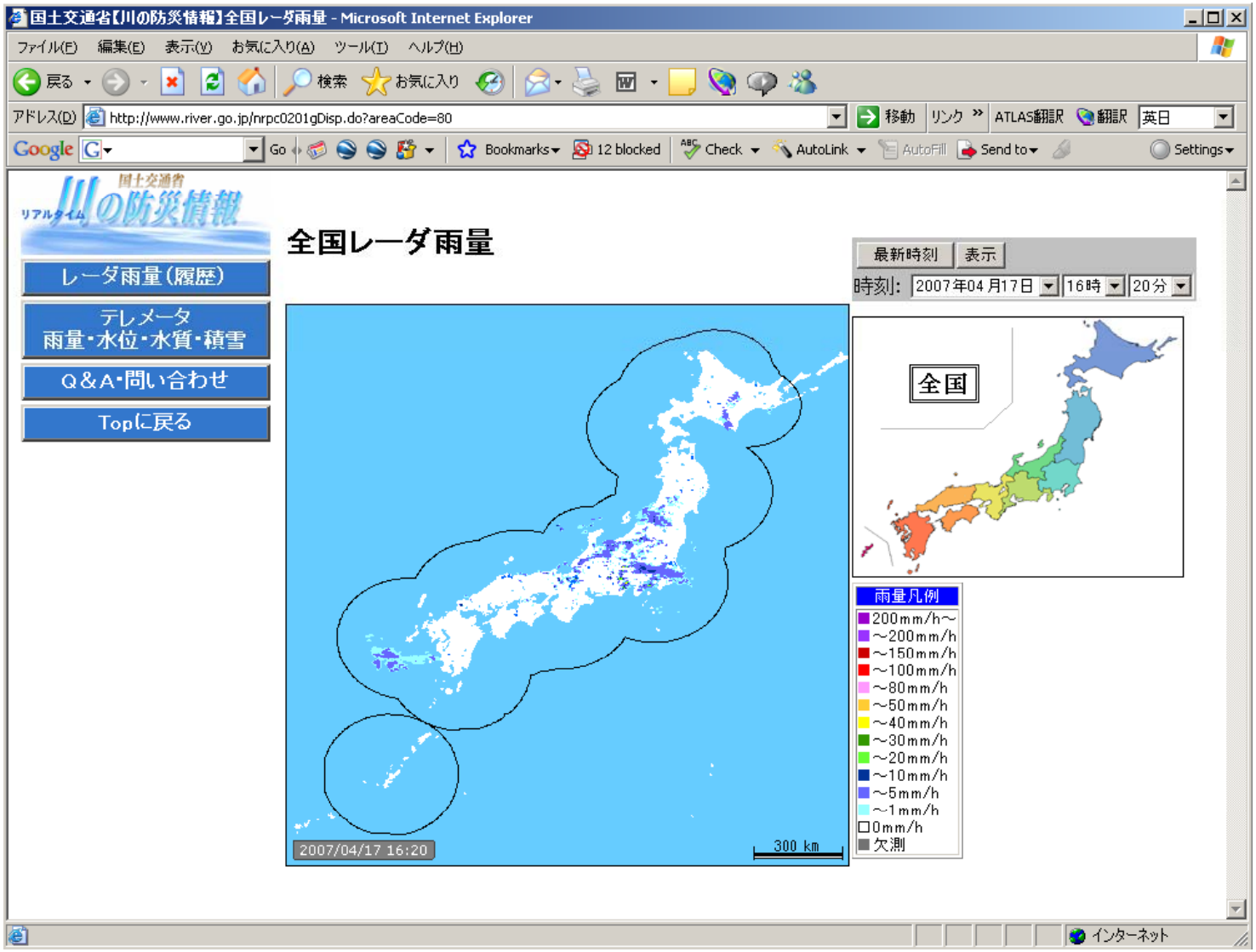

Information through Mobile Phone

http://i.river.go.jp/

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Flood Forecasting and Warning

Flood Forecasting and Warning is …

-Information for disaster prevention that alerts local communities and residents to protect them from disasters such as floods.

-Information utilized for decision makings prior to **local flood fighting activities**, **municipalities' evacuation guidance** (evacuation advisory and evacuation order) for local residents and residents' self-protective measures (evacuation etc.)

-Information mainly includes status of rainfall in a river basin and water level of a river.

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Types of Flood Forecasts and Warnings

(1) Flood Forecast

Article 10 and 11 of Flood Fighting Act

Purpose

A flood forecast is jointly announced by MLIT (or prefecture) and Japan Meteorological Agency (JMA) when there is a risk of river flooding due to heavy rain.

The forecast contains critical information needed for agile and appropriate flood fighting activities to protect areas from damage caused by flooding and for self-protection measures conducted by local residents.

Announced as 'XX River Flood Forecast'

(2) Flood Fighting Alarm

Article 16 of the Flood Fighting Act

Purpose

A flood fighting alarm issued by MLIT or prefectures is sent to related organizations in order to provide flood fighting corps with instructions such as stand-by, preparation and operation.

2 Types of flood forecasts

Flood forecast jointly announced by MLIT (Prefecture) and JMA [For designated rivers]

Among **the large rivers** specified by MLIT (or Prefecture) and JMA for flood forecasting, the designated rivers, a forecast is announced for one(s) that has a risk of severe damage caused by flooding.

Flood forecast announced by JMA

The JMA's local office sends a forecast to the specific area(s).

The announcement is specifically targeting **small/ medium rivers** that are not included in the designated rivers for flood forecasting.

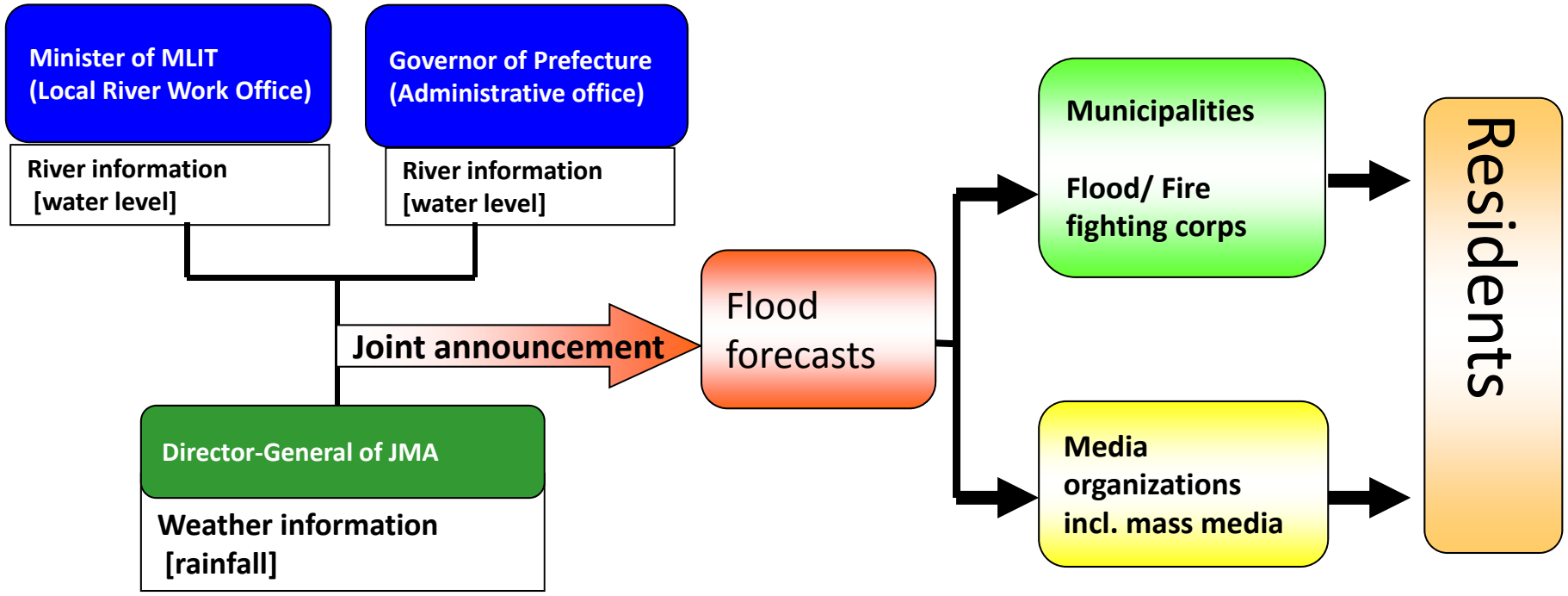
Legal system for Flood Forecasts

●Article 10 Clause 2 of the Flood Fighting Act

★A flood forecast issued by Prefectural Governor is based on Article 11 Clause 1 of Flood Fighting Act.

When there is flood or danger of flood concerning a river which runs through areas of two or more prefectures or a river with a wide basin area designated as rivers which may cause serious damage to the national economy in case of a flood, the Minister of Land, Infrastructure and Transport shall, in cooperation with the Director-General of the JMA, inform the status of the river to the governors of the relevant prefectures, specifying the water level or flow amount in case of danger of flood, and water level or water amount or the estimated flooded area and the water depth after a flood, and shall disseminate such information to the public, asking for cooperation of mass media, if necessary.

Flood forecasts announced by MLIT/ Prefecture -Process



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Number of River Systems and Rivers, River Length

(As of April 30, 2011)

River System	Number of River Systems	Number of Rivers	River length (km)	Catchment Area (km2)
Class A River Systems	109	14,052	Total : 87,958.4km (61%) Ministerial management sections : 10,587.5km (7%) Designated management sections : 77,370.9km (54%)	240,727
Class B River Systems	2,715	7,081	35,834.1km (25%)	107,020
Independent River Systems	2,582	14,473	20,245.1km (14%)	

Number of Rivers Specified for Flood Forecasting and Warning

■The number of rivers specified for flood forecasting and flood warning

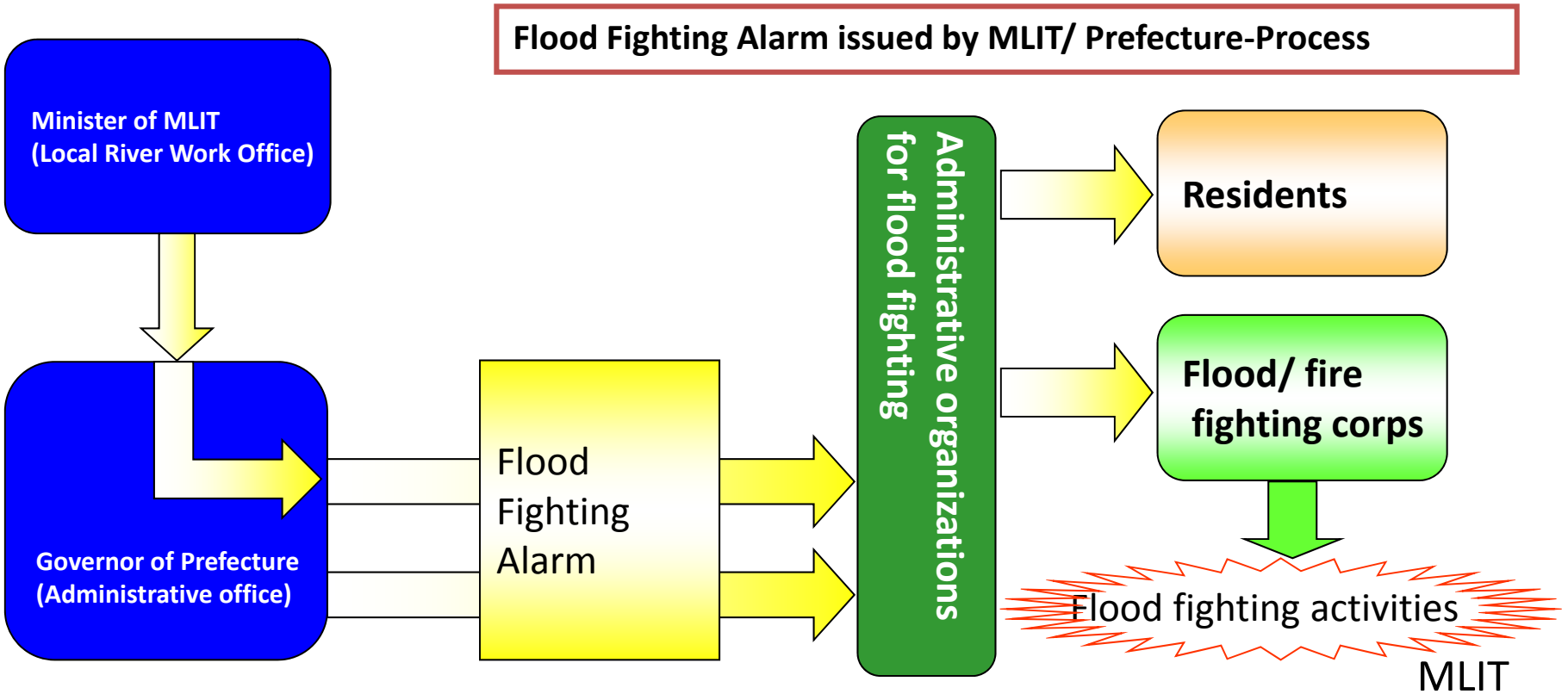
(As of December 31, 2010)

1	**Rivers specified by Minister for flood forecasting and flood fighting alarm**			
	Specified River for Flood Forecast *(Article 10 Clause 2 of the Flood Fighting Act)*		**Specified River for Flood Fighting Alarm** *(Article 16 Clause 1 of the Flood Fighting Act)*	
	River system	**Number of Rivers**	**River system**	**Number of Rivers**
	109	**287**	**109**	**409 (and 7coasts)**
2	**Rivers specified by Prefectural Governor for flood forecasting and flood fighting alarm**			
	Specified River for Flood Forecast *(Article 11 Clause 1 of the Flood Fighting Act)*		**Specified River for Flood Fighting Alarm** *(Article 16 Clause 1 of the Flood Fighting Act)*	
	River system	**Number of Rivers**	**Number of Rivers**	
	61	**118(incl. 2 lake)**	**1339 (incl. 3 lakes), 128 coasts**	

Legal system for Flood Fighting Alarm

●Article 16 Clause 1, 2 and 3 of Flood Fighting Act

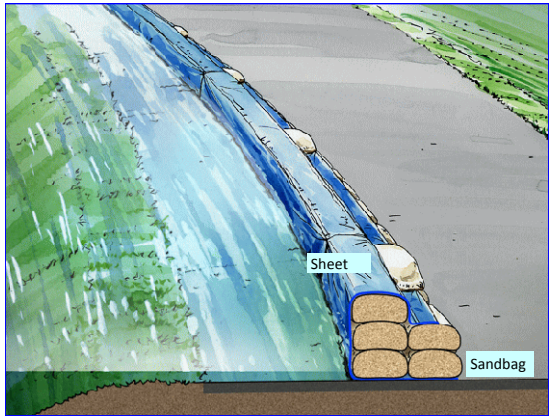
1. Minister of Land, Infrastructure and Transport shall issue a flood fighting alarm for rivers, lakes or coasts that were specified and recognized as risks which may cause serious damage to the national economy due to a flood or high tides, and Prefectural Governor shall issue a flood fighting alarm for rivers, lakes or coasts that are not included in the above rivers, lakes or coasts but were specified and recognized as risks, which may cause significant damage due to a flood or high tides.
2. When issuing a flood fighting alarm in accordance with the previous clause, Minister of Land, Infrastructure and Transport shall immediately inform related Prefectural Governor(s) of the contents of the alarm.
3. When issuing a flood fighting alarm in accordance with Clause 1 or receiving a alarm in accordance with the previous clause, Prefectural Governor shall immediately inform related administrative organizations for flood fighting or other flood related organizations of the alarm received/ issued in accordance with the prefecture's flood fighting plan.



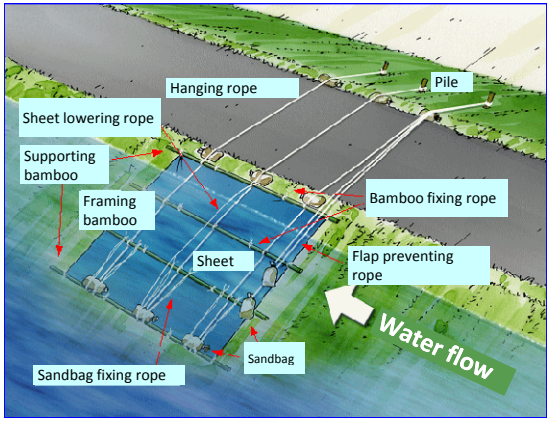
Flood-fighting activities

ting Activities in Flooded Area

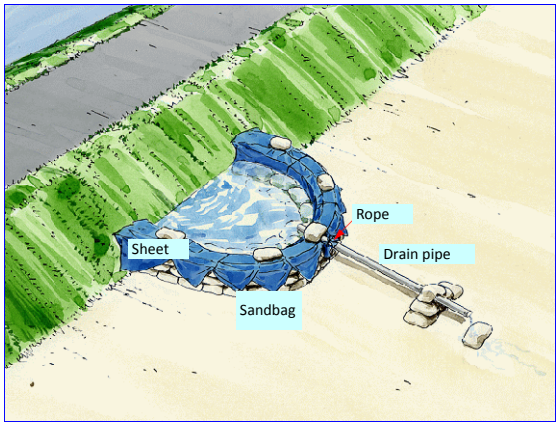
In order to protect human life and assets and to minimize damage when a flood occurs, flood-fighting groups and firefighters use a variety of technologies and conduct flood-fighting activities mainly near to the river in question.



Completion drawing of the improved sandbag piling method (2)



Completion drawing of the sheet covering method



Completion drawing of the hooping method

What are the flood-fighting activities?

- Who conduct the activities? The answer is a flood-fighting group that is formed when the fire department does not have enough power.
- **Flood prevention means disaster reducing activities for self-defense conducted by local residents, and they form flood- and fire-fighting groups.**.
- The total number of fighters participated in the activities from June to October in 2010 was about 71,000.

(As of April 1, 2011)
Number of firefighters: 871,279
Number of flood-fighters: 14,921

Terminology Related to Flood Forecasts/ Warnings

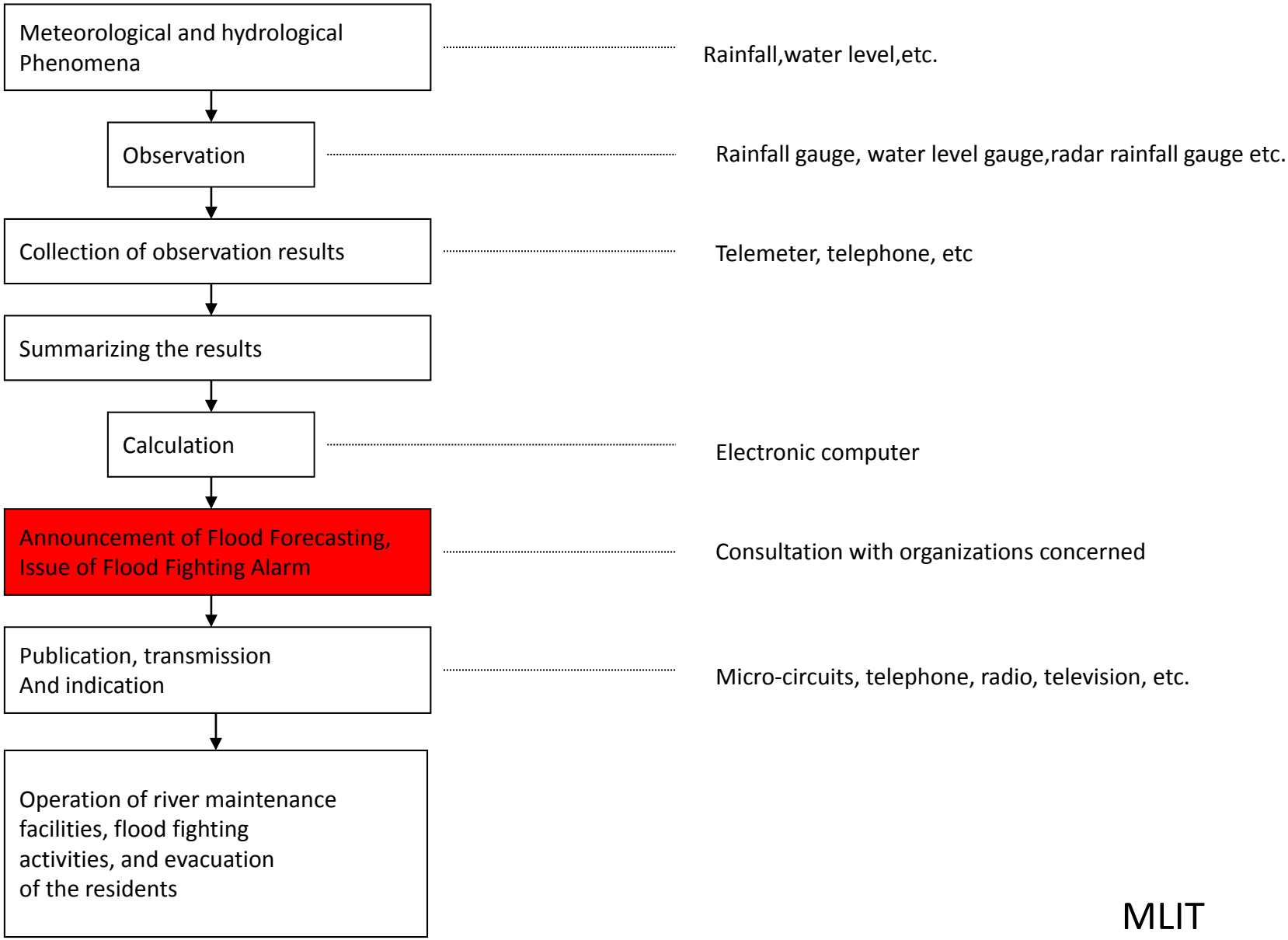
Terms used in flood forecasts/ warnings	Descriptions
5. Design High Water Level （計画高水位）	Standard water level for river embankment design and the highest water level that the embankment can bear.
4.Flood Danger Water Level （氾濫危険水位）	Water level with risks of serious disasters due to flooding etc.
3.Evacuation Alert Water Level （避難判断水位）	Referential water level for resident evacuation. It gives an indication for an evacuation decision made by a municipal governor.
2.Flood Watch Water Level （氾濫注意水位）	Exceeding this level may result in disasters such as embankment collapse, scouring and leakage. Related flood fighting corps are mobilized to guard their river.
1.Stand-by Water Level for flood Fighting Corps （水防団待機水位）	Water level suggesting flood response teams for preparation. Related flood fighting corps are on stand-by and start to prepare for flood fighting activities.

River Information and Behavior Necessary to Municipal Governments and Residents

Note: **A standardized color sign is put on bridges and gauges over the country for everyone to know dangerous water levels.**

Degree	Water level	FF river	WLN river	FPW river	Behavior necessary to municipal governments and residents
5					
4 (Danger)	5. Flood	<4>. Information on flooded XX River			Rescuing residents who fail to escape
3 (Warning)	4. Flood warning level	<3>. Information on flood risk of XX River			Completing resident's evacuation
2 (Caution)	3. Evacuation judgment level (Special warning level)	<2>. Information on flood warning in XX River When it reaches evacuation judgment level or is expected to reach flood warning level after given hours	Information on flood warning in YY River		Issuing evacuation recommendation
	2. Flood caution level (Warning level)	<1>. Information on flood caution in XX River		Flood prevention warning (mobilization)	Issuing evacuation preparation information Mobilizing flood-fighting group
1	1. Flood-fighting group standby level (Notifying level)			Flood prevention warning (standby)	Making flood-fighting group standby

2.8 Flow Chart of Flood of Forecasting and Warning Service



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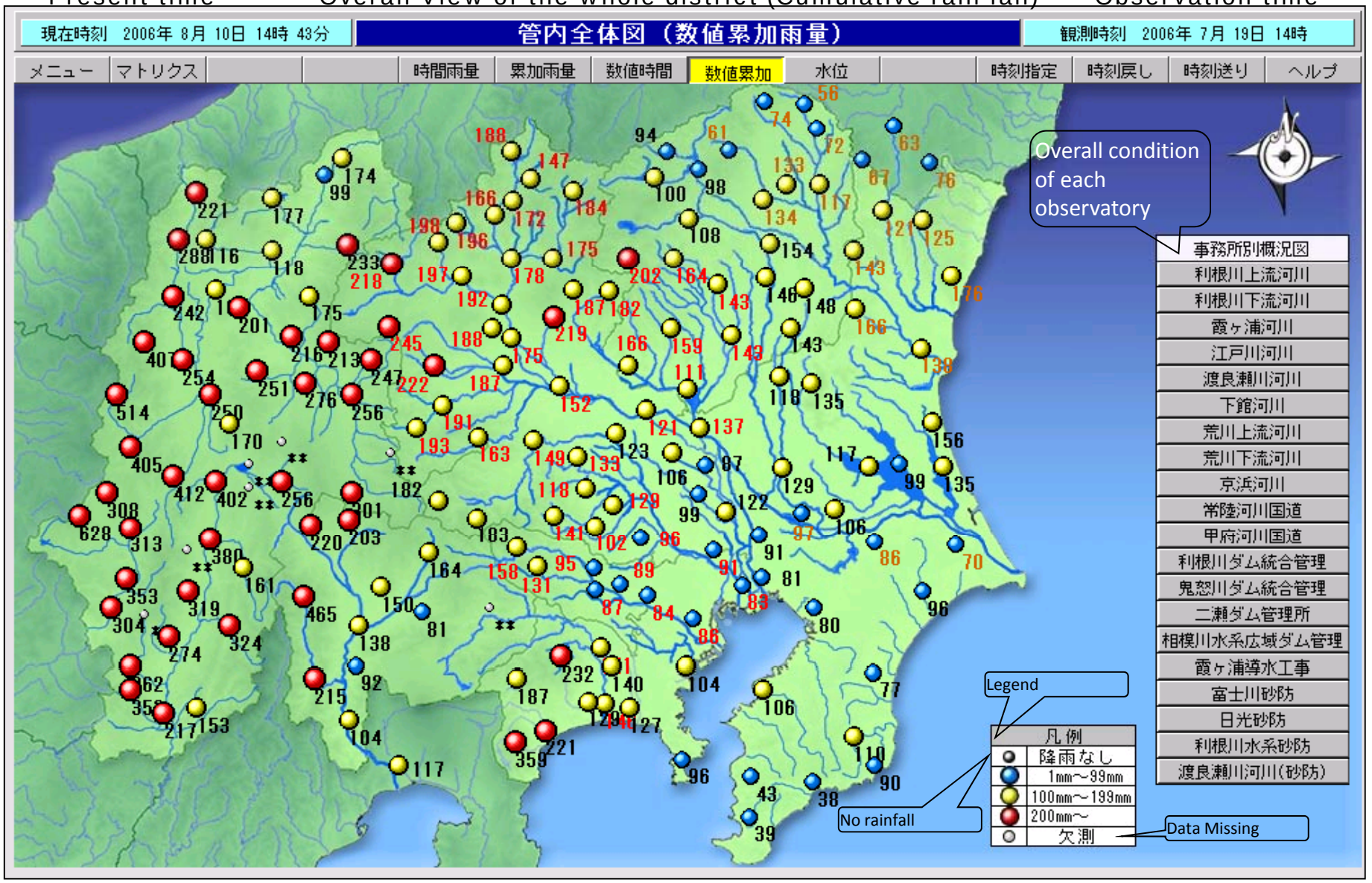
Arrangement of results observed

Rainfall Distribution Map

Present time　　Overall View of the whole district (Cumulative rain fall)　　Observation time



MLIT

Arrangement of results observed

Rainfall Chart

関東地整管内 | < Page 7 /8 > | ○時間 ○30分 ○10分 | ☑主要諸元 ☑基準値 ☑管理諸元 | ☑国河川 ☐国道路 ☐気象庁 ☐自治体 ☐他所管 | ☑テレ地点 ☑テレ流域 ☑レーダ流域 | 最新時刻 表示 移動刻み 1時間 | < 2006年7月 19日 24時 00分 >

観測所名	川俣 テレ地点	川治 テレ地点	五十里 テレ地点	檜原 テレ地点	鶴川 テレ地点	札掛 テレ地点	硯島 テレ地点	増富 テレ地点
読み	かわまた	かわじ	いかり	ひのはら	つるかわ	ふだかけ	すずりじま	ますとみ
水系名	利根川	利根川	利根川	多摩川	鶴見川	相模川	富士川	富士川
河川名	鬼怒川	鬼怒川	男鹿川	秋川	鶴見川	中津川	雨畑川	塩川
標高	998.00m	634.00m	600.00m	363.00m	82.00m	720.00m	447.00m	1065.00m
所在地	栃木県日光市大字川俣	栃木県日光市大字川治	栃木県日光市大字川治	東京都西多摩郡檜原村	東京都町田市大蔵町18	神奈川県愛甲郡清川村	山梨県南巨摩郡早川町	山梨県北杜市須玉町小
管理区分	国河川	国河川	国河川	国河川	国河川	国河川	国河川	国河川
所管	鬼怒ダム統管	鬼怒ダム統管	鬼怒ダム統管	京浜河川	京浜河川	相模水系ダム	甲府河川国道	甲府河川国道
種別	1	1	1	3	1	1	4	2

	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量	雨量	累加雨量
警戒値	60.0	200.0	60.0	200.0	60.0	200.0	20.0	50.0	20.0	50.0	–	–	40.0	150.0	40.0	150.0
注意値	30.0	70.0	30.0	70.0	30.0	70.0	–	–	–	–	–	100.0	20.0	70.0	20.0	70.0
7/19 1:00	7.0	40.0	7.0	43.0	7.0	41.0	–	–	–	–	–	–	4.0	161.0	2.0	131.0
2:00	9.0	49.0	9.0	52.0	9.0	50.0	2.0	82.0	1.0	51.0	5.0	102.0	3.0	164.0	2.0	133.0
3:00	15.0	64.0	11.0	63.0	11.0	61.0	0.0	82.0	0.0	51.0	2.0	104.0	3.0	167.0	4.0	137.0
4:00	8.0	72.0	9.0	72.0	9.0	70.0	0.0	82.0	0.0	51.0	1.0	105.0	4.0	171.0	6.0	143.0
5:00	6.0	78.0	4.0	76.0	4.0	74.0	1.0	83.0	1.0	52.0	5.0	110.0	6.0	177.0	14.0	157.0
6:00	4.0	82.0	5.0	81.0	4.0	78.0	5.0	88.0	2.0	54.0	8.0	118.0	7.0	184.0	3.0	160.0
7:00	3.0	85.0	1.0	82.0	2.0	80.0	3.0	91.0	2.0	56.0	12.0	130.0	5.0	189.0	6.0	166.0
8:00	4.0	89.0	5.0	87.0	4.0	84.0	4.0	95.0	6.0	62.0	13.0	143.0	5.0	194.0	5.0	171.0
9:00	2.0	91.0	2.0	89.0	2.0	86.0	9.0	104.0	3.0	65.0	15.0	158.0	4.0	198.0	6.0	177.0
10:00	3.0	94.0	3.0	92.0	3.0	89.0	9.0	113.0	6.0	71.0	26.0	184.0	5.0	203.0	5.0	182.0
11:00	3.0	97.0	3.0	95.0	3.0	92.0	5.0	118.0	7.0	78.0	36.0	220.0	11.0	214.0	9.0	191.0
12:00	2.0	99.0	3.0	98.0	4.0	96.0	11.0	129.0	10.0	88.0	45.0	265.0	1.0	215.0	1.0	192.0
13:00	1.0	100.0	0.0	98.0	0.0	96.0	2.0	131.0	7.0	95.0	5.0	270.0	0.0	215.0	0.0	192.0
14:00	0.0	100.0	0.0	98.0	0.0	96.0	0.0	131.0	1.0	96.0	2.0	272.0	0.0	215.0	0.0	192.0
15:00	0.0	100.0	0.0	98.0	0.0	96.0	0.0	131.0	1.0	97.0	2.0	274.0	0.0	215.0	0.0	192.0
16:00	0.0	100.0	0.0	98.0	0.0	96.0	1.0	132.0	0.0	97.0	0.0	274.0	0.0	215.0	0.0	192.0
17:00	0.0	100.0	0.0	98.0	0.0	96.0	1.0	133.0	0.0	97.0	1.0	275.0	0.0	215.0	0.0	192.0
18:00	1.0	101.0	0.0	98.0	0.0	96.0	0.0	133.0	1.0	98.0	1.0	276.0	0.0	0.0	0.0	0.0
19:00	0.0	101.0	0.0	98.0	0.0	96.0	0.0	133.0	0.0	98.0	0.0	276.0	0.0	0.0	0.0	0.0
20:00	0.0	101.0	0.0	98.0	0.0	96.0	0.0	133.0	0.0	98.0	0.0	276.0	0.0	0.0	0.0	0.0
21:00	0.0	101.0	0.0	98.0	0.0	96.0	0.0	133.0	0.0	98.0	0.0	276.0	0.0	0.0	0.0	0.0
22:00	0.0	101.0	0.0	98.0	0.0	96.0	0.0	133.0	0.0	98.0	0.0	276.0	0.0	0.0	1.0	1.0
23:00	0.0	101.0	0.0	0.0	0.0	96.0	0.0	133.0	0.0	98.0	0.0	0.0	0.0	0.0	0.0	1.0
24:00	0.0	101.0	0.0	0.0	0.0	96.0	1.0	134.0	0.0	98.0	1.0	1.0	1.0	1.0	0.0	1.0
降雨検出時刻		7/18 5:20		7/18 7:00		7/18 7:00		7/17 6:30		7/17 7:40		7/19 23:00		7/20 0:00		7/19 21:10

単位:mm

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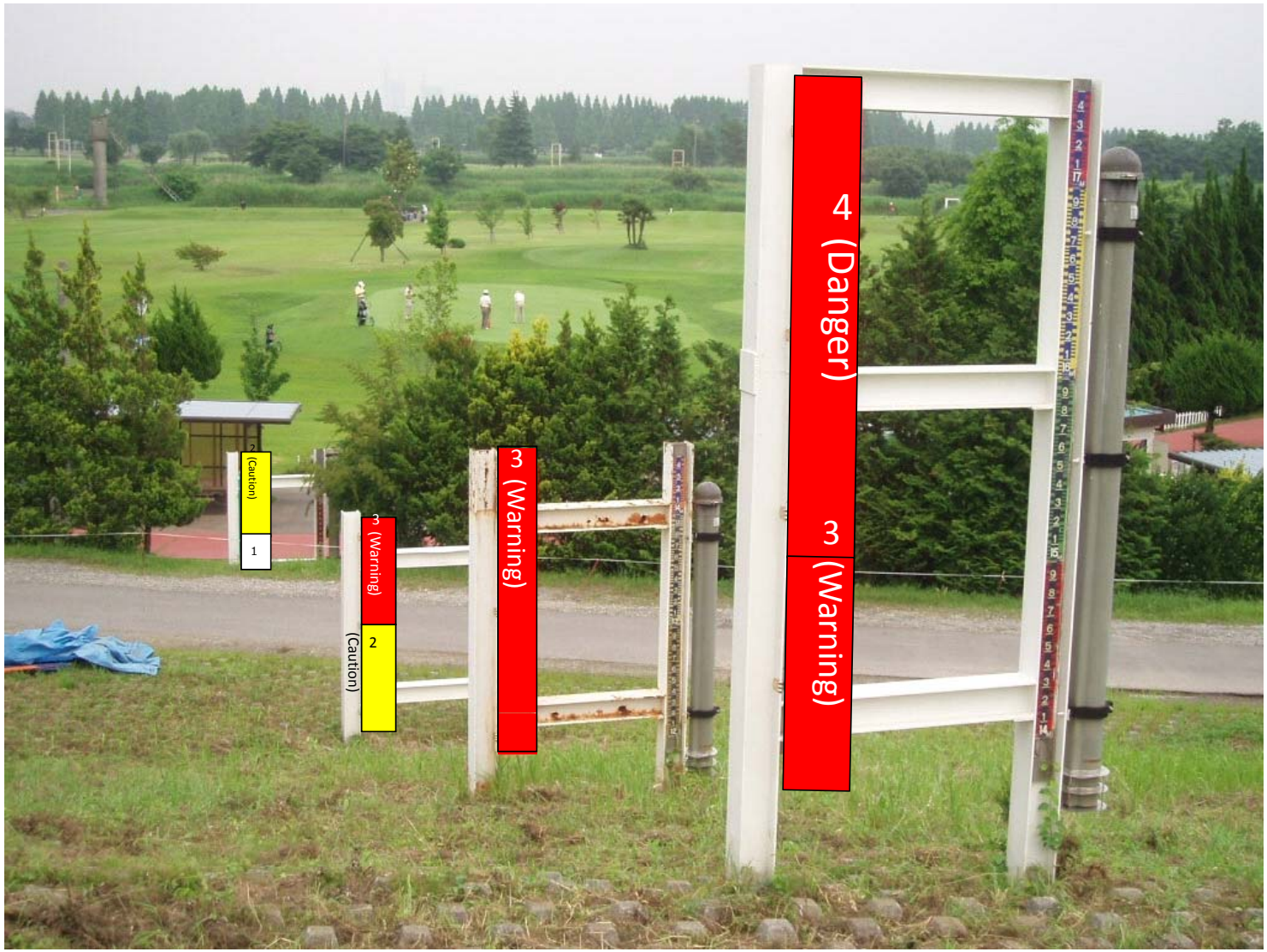
Observation

Water Level Observation (Usual Water Meter)

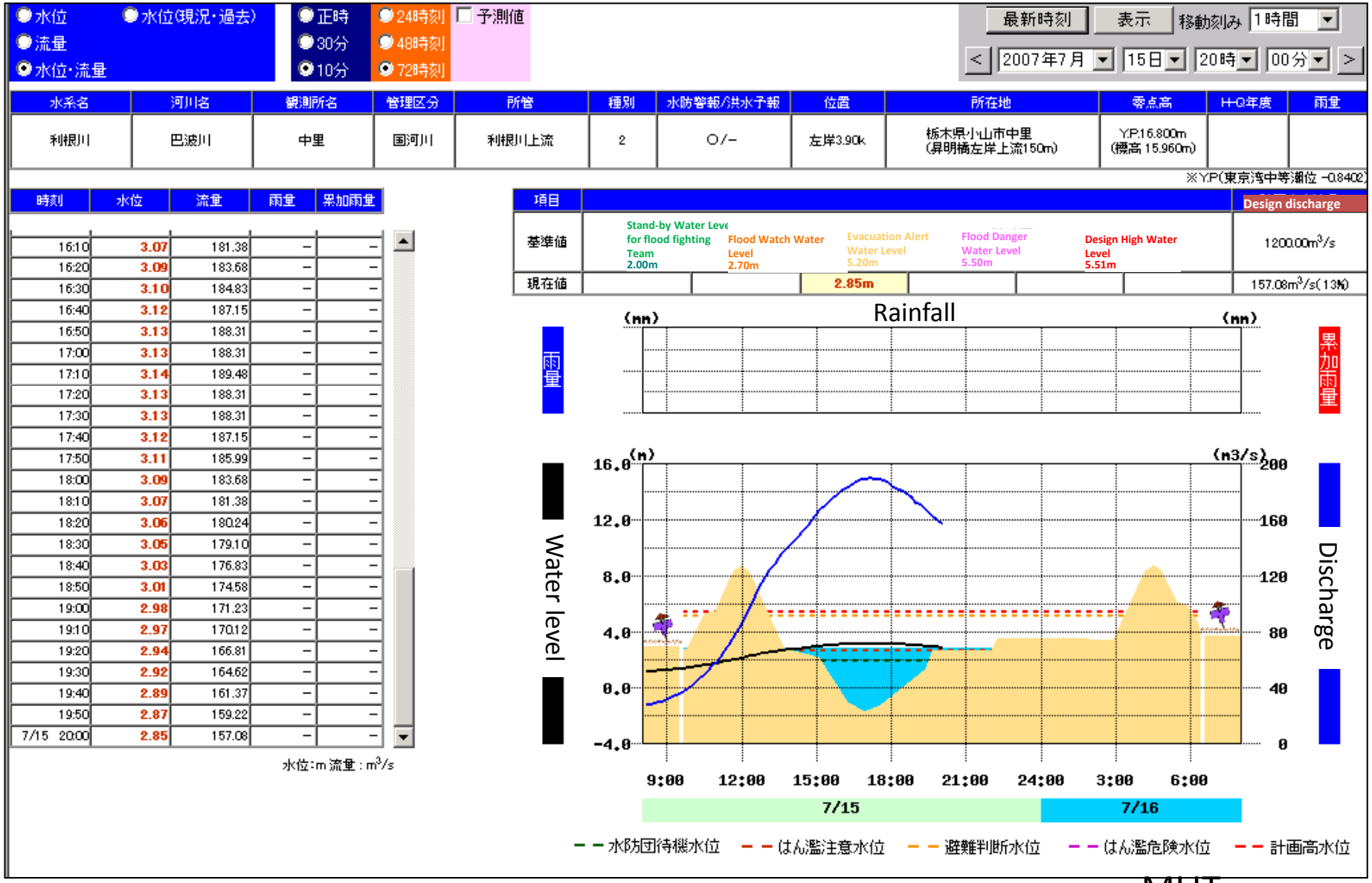


Arakawa River

MLIT

Arrangement of results observed

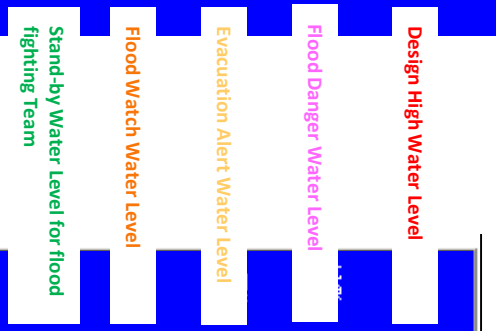
Stage-discharge Curve (Hydrograph)



MLIT

Arrangement of results observed

Water Level Chart



関東地整管内 ▼

< Page 1 /3 >

☑ 国河川 ☑ 自治体 ☐ 他所管

☑ 水防警報対象 ☑ 洪水予報基準 ☑ その他

観測所名	管理区分	所管	Water Level	Deference before 10 minutes (m)	Deference before 1 hour (m)	Discharge (m^3/s)	Criteria of Water Level				
							Standby WL	Flood Watch	Evacuation Alert	Flood Danger	Design High WL
乙女	国河川	利根川上流	5.17	–	-0.13	902.79	3.00	5.50	8.00	8.70	8.74
古河	国河川	利根川上流	2.96	–	0.08	781.53	2.70	4.70	8.20	8.70	9.72
中里	国河川	利根川上流	1.98	–	-0.09	78.09	2.00	2.70	5.20	5.50	5.51
芽吹橋	国河川	利根川上流	1.22	–	0.11	1117.18	2.00	5.00	6.40	6.80	7.94
利根川堰	国河川	利根川上流	-0.86	–	-0.01	937.90	1.60	3.20	–	–	7.46
八斗島	国河川	利根川上流	-1.37	–	-0.07	686.56	0.80	1.90	4.80	5.20	5.28
栗橋	国河川	利根川上流	2.92	–	0.05	1644.23	2.70	5.00	8.40	8.90	9.90
広見橋	国河川	渡良瀬川河川	0.38	–	0.00	13.98	1.70	2.00	2.30	2.80	4.00
高津戸	国河川	渡良瀬川河川	0.71	–	-0.01	146.97	2.20	3.30	4.30	4.90	8.54
足利	国河川	渡良瀬川河川	1.06	–	0.00	187.75	3.00	3.30	4.70	5.20	6.54
鬼怒川水海道	国河川	下館河川	-0.13↑	0.03	0.10	589.53	1.50	3.50	5.40	6.20	7.33
石井(右)	国河川	下館河川	0.01↓	-0.02	-0.07	–	1.00	1.50	2.10	3.10	3.93
川島	国河川	下館河川	-0.34↑	0.01	0.09	–	0.00	1.10	2.20	3.30	5.91
佐貫(下)	国河川	下館河川	-0.42↓	-0.02	-0.13	271.64	1.50	2.30	2.40	3.40	–
黒子	国河川	下館河川	3.42↓	-0.02	-0.10	368.75	2.50	3.80	5.00	5.50	6.08
三谷	国河川	下館河川	1.21↓	-0.01	-0.04	86.68	1.40	1.80	2.50	3.10	3.38
上郷	国河川	下館河川	3.15→	0.00	0.04	–	3.00	3.60	4.60	5.10	5.54
小貝川水海道	国河川	下館河川	3.77↑	0.01	0.06	–	3.80	4.60	5.70	6.20	6.60
押付	国河川	利根川下流	1.57↑	0.01	0.09	–	3.10	5.75	7.60	7.90	8.03
須賀	国河川	利根川下流	1.95↑	0.01	0.06	–	2.75	4.95	–	–	7.40
取手	国河川	利根川下流	1.17↑	0.02	0.12	1287.19	2.50	5.40	7.50	7.80	7.93
横利根	国河川	利根川下流	1.93↑	0.02	0.09	–	2.10	2.85	4.50	4.70	5.02
新横利根	国河川	霞ケ浦河川	1.07	–	0.01	–	1.30	1.40	1.50	–	1.50
出島	国河川	霞ケ浦河川	1.48	–	0.01	–	1.50	2.10	2.40	2.50	2.85
白浜	国河川	霞ケ浦河川	1.50	–	0.01	–	1.50	2.10	2.40	2.50	2.85
山方	国河川	常陸河川国道	0.31↑	0.01	-0.10	166.89	–	–	–	–	–
宮岡	国河川	常陸河川国道	0.16↓	-0.02	-0.13	373.59	1.50	2.50	2.80	3.40	5.87
徳橋	国河川	常陸河川国道	3.67↓	-0.05	-0.24	967.54	2.70	3.70	6.60	7.10	7.26
常井橋	国河川	常陸河川国道	1.21↓	-0.01	-0.09	41.05	2.00	3.00	3.00	–	4.21
機切	国河川	常陸河川国道	1.51↓	-0.03	-0.14	87.43	2.00	3.00	3.00	–	4.30

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Flood estimation

Forecasting of water level

出水様式－1

Stage-discharge Forecast

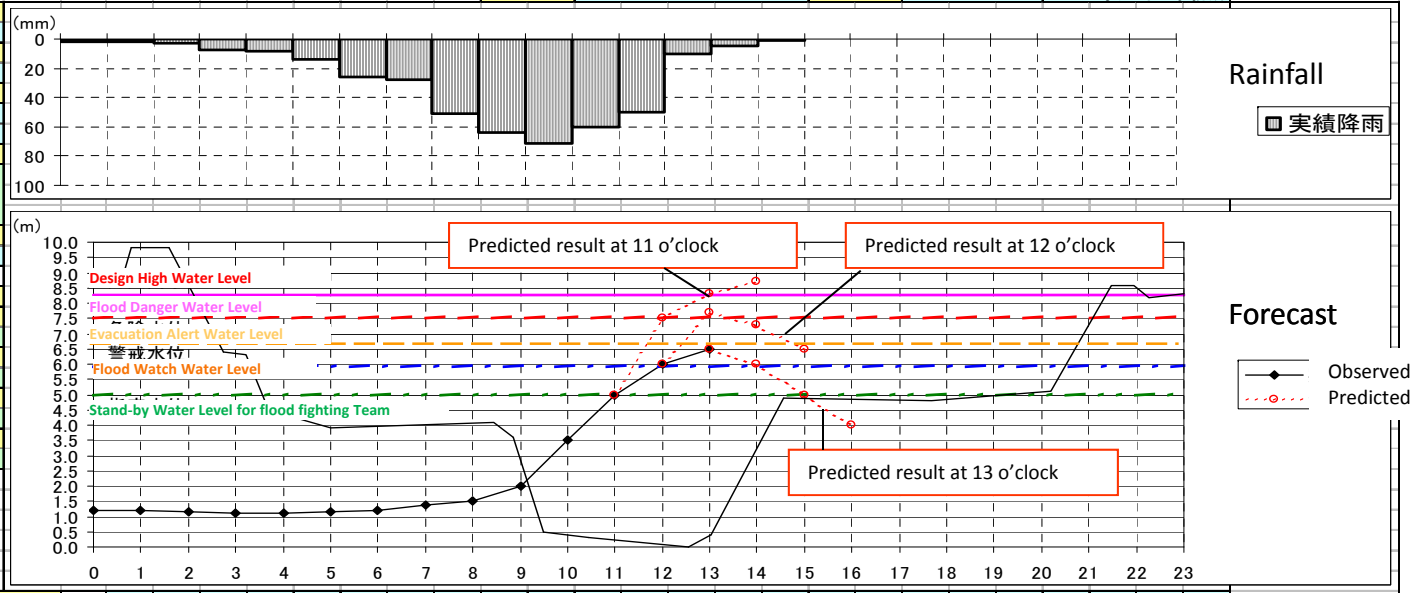
出水名	17演5	降雨成因	台風第10号	関東地方整備局 京浜河川事務所

水系名: 鶴見川水系
河川名: 鶴見川
予測地点名: 亀の子橋
洪水予報基準地点
予測手法

雨量
流域平均雨量

グラフの開始時刻
年: 2005
月: 5
日: 12
時刻: 0

次のシートを作成
グラフ作成



日		12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日	12日
時刻		00時	01時	02時	03時	04時	05時	06時	07時	08時	09時	10時	11時	12時	13時	14時	15時	16時	17時	18時	19時	20時	21時	22時	23時	
実績	降雨	2.0	2.0	3.0	7.0	8.0	14.0	26.0	28.0	51.0	64.0	71.0	60.0	50.0	10.0	5.0	1.0	0.0	0.0	0.0						
	水位	1.19	1.18	1.15	1.09	1.10	1.17	1.22	1.37	1.50	2.00	3.50	5.00	6.00	6.50											
1時間先の予測	予測降雨																									
	水位 予測													7.50	7.70	6.00										
	水位 再現																									
2時間先の予測	予測降雨																									
	水位 予測														8.30	7.30	5.00									
	水位 再現																									
3時間先の予測	予測降雨																									
	水位 予測															8.70	6.50	4.00								
	水位 再現																									
4時間先の予測	予測降雨																									
	水位 予測																									
	水位 再現																									
5時間先の予測	予測降雨																									
	水位 予測																									
	水位 再現																									
6時間先の予測	予測降雨																									
	水位 予測																									
	水位 再現																									

※記入要領
1.Rave(流域平均雨量)がない場合は、代表雨量観測所とする
2.既往最大洪水水位曲線と、今回出水の水位上昇時の警戒水位を合致させて記入のこと
3.観測所の河川横断図、H.W.L、危険水位、警戒水位、指定水位を記入のこと

【備考】
予測・・・「予測降雨」を用いた場合の水位予測結果(出水中)
再現・・・「実績降雨」を用いた場合の水位予測結果(出水後、チェックのため)

↓	事務所	送信	平成 年 月 日 時 分	発信者	
	本局	受信	平成 年 月 日 時 分	受信者	

↓	本局	送信	平成 年 月 日 時 分	発信者	
	本省	受信	平成 年 月 日 時 分	受信者	

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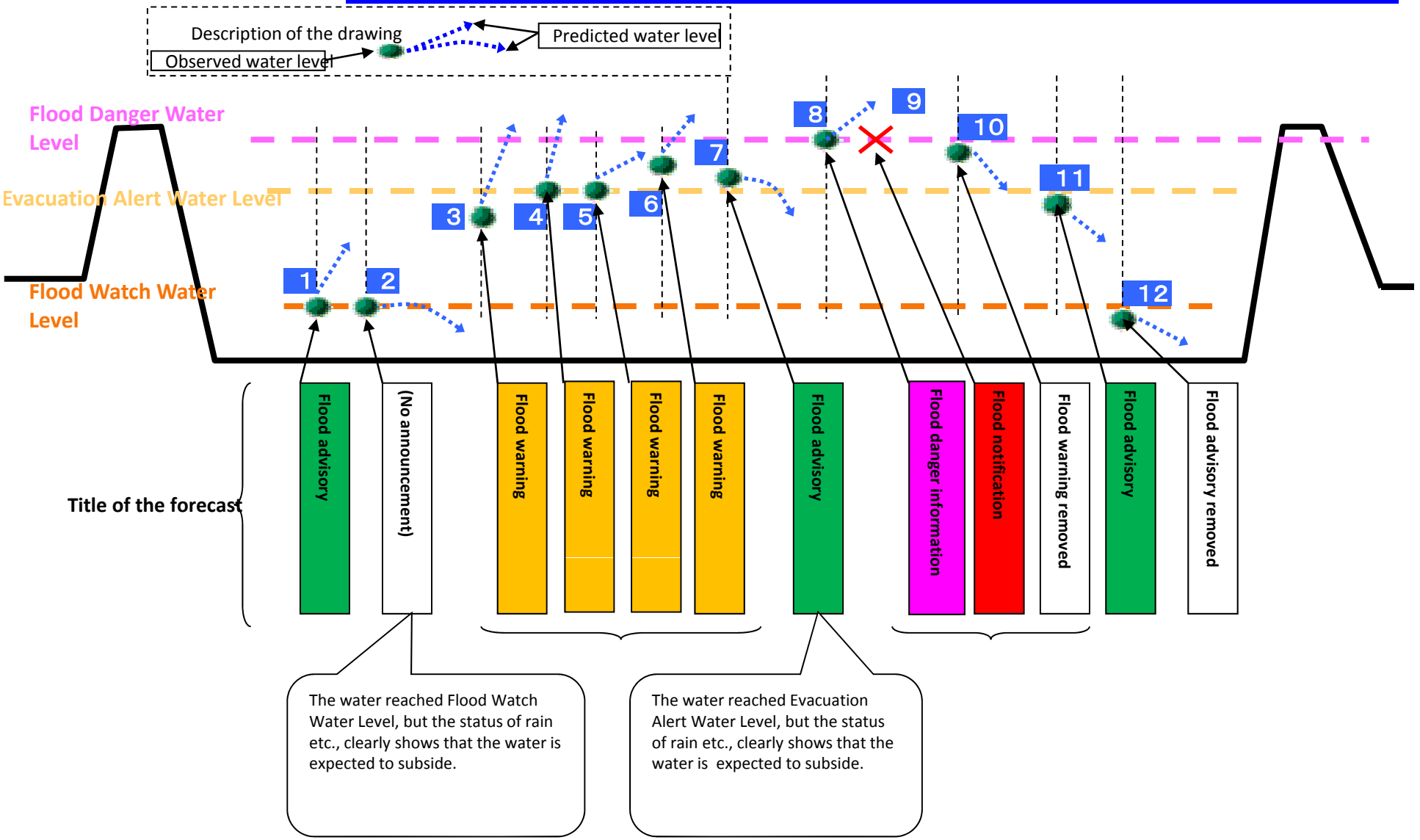
Announcement of flood forecasts/ warnings

Types of Flood Forecasts/ Warnings

(1) Flood Forecasts		**Joint announcement by MLIT and JMA**
XX River Flood Forecast	**<1> Flood caution/advisory**	Issued for urging caution when the water reaches Flood Watch Water Level and is expected to increase above the level.
	<2> Flood warning	Issued for urging more vigilance when the water reaches Evacuation Alert Water Level and is expected to reach Flood Danger Water level.
	<3> Flood danger information	Issued when the water reaches Flood Danger Water Level.
	<4> Flood notification	Issued when a flood occurs.
(2) Flood Fighting Alarm		**Announcement by MLIT/ Prefecture**
	1 “Stand-by“	When a flood or increase of the water level is expected, a warning is issued to request flood fighting corps to be on stand-by for action.
	2 “Preparation”	Sharing of flood fighting-related information, gathering flood defense equipment and securing transmission/ transportation as well as issuing a warning that requests flood fighting corps to prepare for operation.
	3 “Operation”	When the water level is expected to increase beyond Flood Watch Water Level, a warning is issued to request flood fighting corps to act.

Announcement of flood forecasts/ warnings

Announcement of Flood Forecasts 'Concept' (1) –Pattern-



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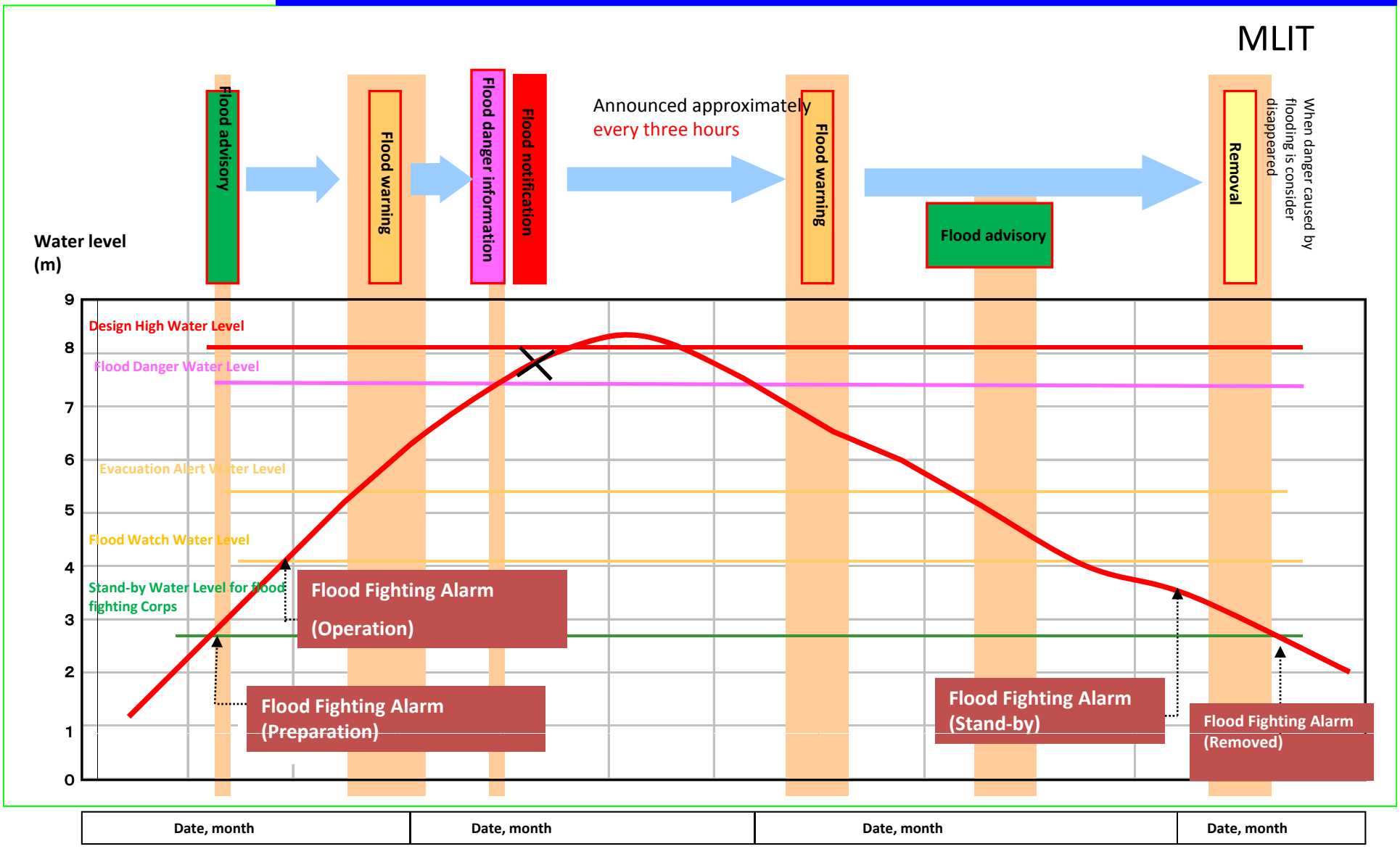
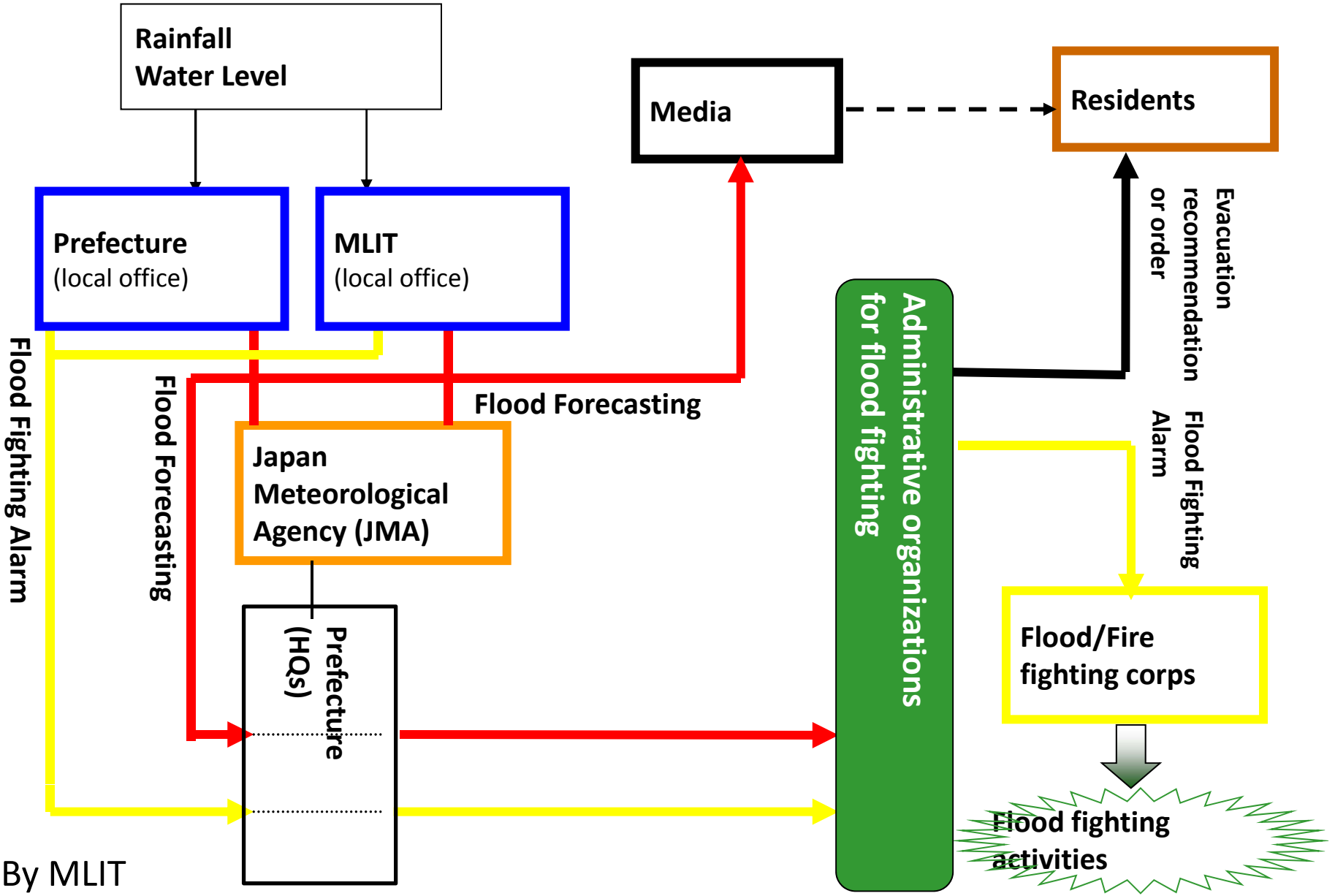
Announcement of flood forecasts/ warnings

Announcement of Flood Forecasts/ Warnings 'Concept' (2) – Relationship between Flood Forecast and Flood Fighting Alarm-



Announcement of flood forecasts/ warnings

Flow of Announcement of Flood Forecasting/ Warning



By MLIT

Announcement of flood forecasts/ warnings

Example ; Flood Forecasting

MLIT

Example: Flood forecasting

Title consistent with water level

Flood Warning Information for Upper Tone River Basin

利根川上流部洪水予報第○号
洪水警報（発表）
平成○○年○月26日10時30分
国土交通省関東地方整備局
気象庁予報部 共同発表

発表内容

Title

上流部では　今後はん濫危険水位に達する見込み　予報文を短く、わかりやすく掲載

（主文）
利根川の八斗島水位観測所（群馬県伊勢崎市八斗島町）では、
はん濫危険水位（レベル4）に達する見込みです。市町村からの避難情報に留意してください。
の栗橋水位観測所（埼玉県栗橋町栗橋）では、当分の間はん濫注意水位を超える水位
ル2）が続く見込みです。引き続き、洪水に関する情報に留意してください。

Text

（降雨と水位の現況）
号の通過による大雨により、
川の危険度、防災上の留意点を記載

Current status

25日15時から26日10時までの利根川上流域の流域平均雨量は200ミリ
に達しました。
また、ところにより1時間に20ミリの雨が降っています。　降雨量と河川水位の最新情報を記載
利根川の水位は26日10時現在、次のとおりです。
八斗島水位観測所（群馬県伊勢崎市八斗島町）で4.50m
（水位危険度レベル2）（上昇中）
栗橋水位観測所（埼玉県栗橋町栗橋）で5.20m
（水位危険度レベル2）（上昇中）

今後の降雨量と水位予測を記載

Forecast

（降雨と水位の予想）
雨は、今後一層強まるでしょう。
0時から26日13時頃までの利根川上流域の流域平均雨量は25ミリ
の見込みです。
利根川の水位は、26日13時頃には、次のとおりと見込まれます。
八斗島水位観測所（群馬県伊勢崎市八斗島町）で5.50m程度
（水位危険度レベル4）
栗橋水位観測所（埼玉県栗橋町栗橋）で7.50m程度
（水位危険度レベル2）

（注意事項）
戒情報は、避難勧告等の目安のひとつとなる情報です。市町村長が発する避難情報や、
況を確認するなど厳重な注意をお願いします。

Considerations

Reference

参考資料
八斗島水位観測所（利根川受け持ち区間　左岸 群馬県伊勢崎市から群馬県板倉町、右岸 群馬県玉村町から埼玉県羽生市）
はん濫危険水位5.2m　避難判断水位4.8m　はん濫注意水位（警戒水位）1.90m　水防団待機水位0.80m　平常水位-2.51m
栗橋水位観測所（利根川受け持ち区間　左岸 群馬県板倉町から茨城県境町、右岸 埼玉県羽生市から江戸川分派点）
はん濫危険水位8.9m　避難判断水位8.4m　はん濫注意水位（警戒水位）5.00m　水防団待機水位2.70m　平常水位-1.37m

水位危険度レベル
■レベル5　はん濫の発生
～
■レベル1　水防団待機水位超過

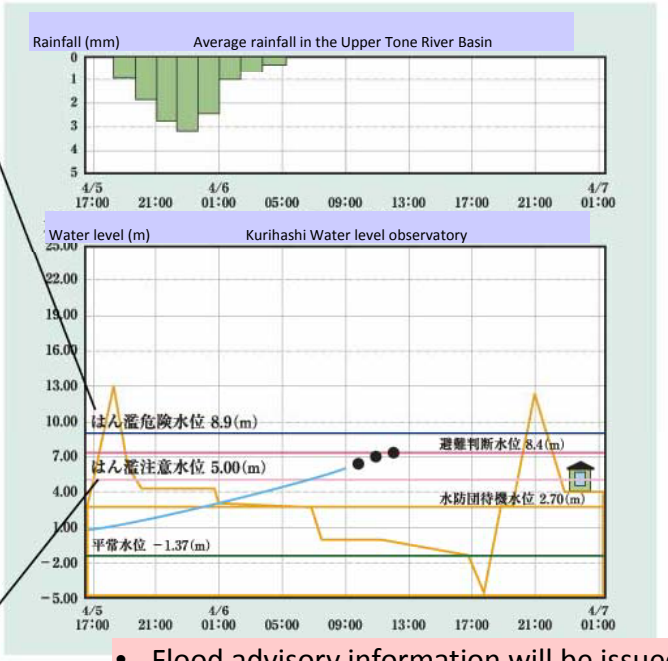
水位の危険度レベルを表示

参考として、水位観測所の
受け持ち区間、基準水位を記載

〔問い合わせ先〕
水位関係：国土交通省　関東地方整備局　河川部　河川管理課　048-600-1413（内線3753）
気象関係：気象庁　予報部　03-3212-8341

Flood Danger Water Level
or
Evacuation Alert Water Level

- Flood warning information will be issued.
- Flood fighting corps will conduct preventative activities in accordance with disaster situation.
- Local residents must pay attention to river information and evacuation information issued by respective top local officers.



Flood Watch
Water Level

- Flood advisory information will be issued.
- Flood fighting alarm will be declared, and flood fighting corps will be mobilized.
- Local residents must pay attention to river information provided by TV, radio and MLIT's "River disaster prevention information" available in its website and mobile site.

Example: Flood Fighting Alarm

Flood fighting alarm Instruction 'Operation'

Current status

Forecast

Instruction

Status of flood fighting alarm by district

Flood Fighting Alarm

Issued by Upper Tone River Office, Kanto Regional Development Bureau,
Ministry of Land, Infastructure and Transportation

1:30 September, 7th, 2007

River	Observatory	Instruction	No.issued
Tone river	XX	Operation	X

[Current status]

1 Rainfall of xx Basin is 200.2mm as of 1am on 7th.

2 Water level of xx Observatory is 1.89m as of 1A.M. on 7th.

3-1 Water level of xx reached Flood Watch Water Level at 1:10 on 7th.

4-1 Water level of xx increases by 60cm per hour.

[Forecast]

6 Water level of xx is expected to reach around 2.72m at 4am on 7th.

[Instruction]

9 Flood fighting corps are now requested to operate.

[Refence material] XX Observatory [xx town, xx city, xx prefecture]

Embankment height(*.*m)

Design High Water Level (5.28m)

Flood Danger Water Level (5.20m)

Flood Watch Water Level (1.90m)

Stand-by Water Level for flood fighting corps (0.80m)

Status of flood fighting alarm issued by Upper Tone River Office

District/ Info. type	Stand-by	Preparation	Operation	Removed
○○			○	
●●			○	
◎◎		○		
△△		○		
▲▲		○		
□□	○			
■■	○			

MLIT

Thank you for your attention