

# Integrated use of weather forecasts and other disaster information for effective emergency response and preparedness in Japan

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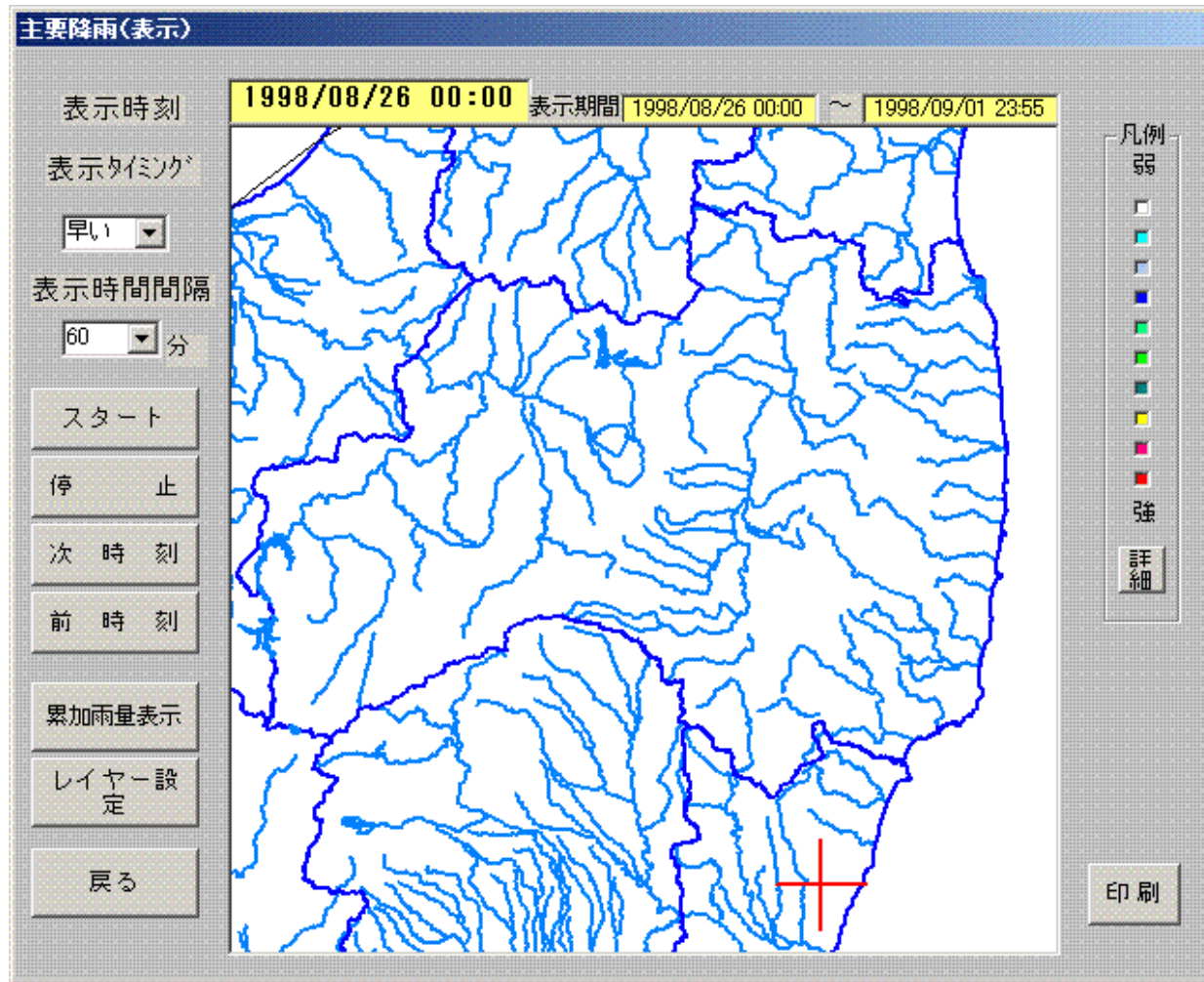
# Case of Abukuma River Disaster





# Heavy Rain in August 1998

- Radar Rainfall Map (Aug 26 – Sept 1, 1998)

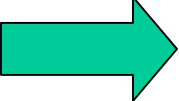




# Overflow of the river in Sukagawa City

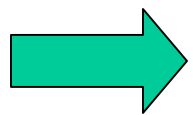


# Disaster Reduction is a fight against Information

- **Less time** for information dissemination (shorter internal processing time required)
  - **Confusion** of information at the time of disaster
  - Trade-off between certainty of information and required time
-  **”Redundant, background information ”** is important

## Items decision makers face at the time of disaster management ...

- Issue specific directives to critical area/sites
- Communication with heads of local government on evacuation of residents
- Informing and consulting ruling bodies
- Provision of disaster information to people through mass media



**Priority changes by disaster phase**



# **Case 1**

## Bank collapsed in the Ara River

(Top priority: communication with the head of municipal government)

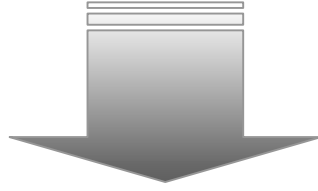
8:30 Bank reported to be in a critical stage

8:40 Advised Mayor for issuance of evacuation order

Hotline with Mayor was set up

9:00 Evacuation order reached to 500 households in the effected area

9:02 **Bank collapsed**



11:20 Requested Defense Force for  
rehabilitation operation

13:00 Water level dropped

Restoration of the bank began

2:00 (next day)

Bank was restored

Started to break up at about 8:29





About 8:30





About 8:35





About 8:37





Collapsed at about 9:02



## **Case 2**

# Bank in danger of collapsing due to water leakage

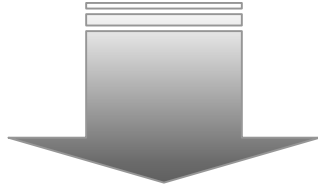
(Top priority: giving orders at the site and communicating with higher-level organizations)

7:00 30 m-long crack found (water leakage)

Requested for dispatch of flood-fighting teams

10:00 Crack became larger, more water leakage

Requested for dispatch of Defense Force



- 11:45 Crack size became 250m long  
Evacuation order for flood-fighting teams
- 13:00 Muddy water started leaking  
Evacuation orders to all people
- 14:00 Water level began to drop  
Collapsing of bank prevented



# Abukuma River on the verge of overflow





# Flood-fighting effort

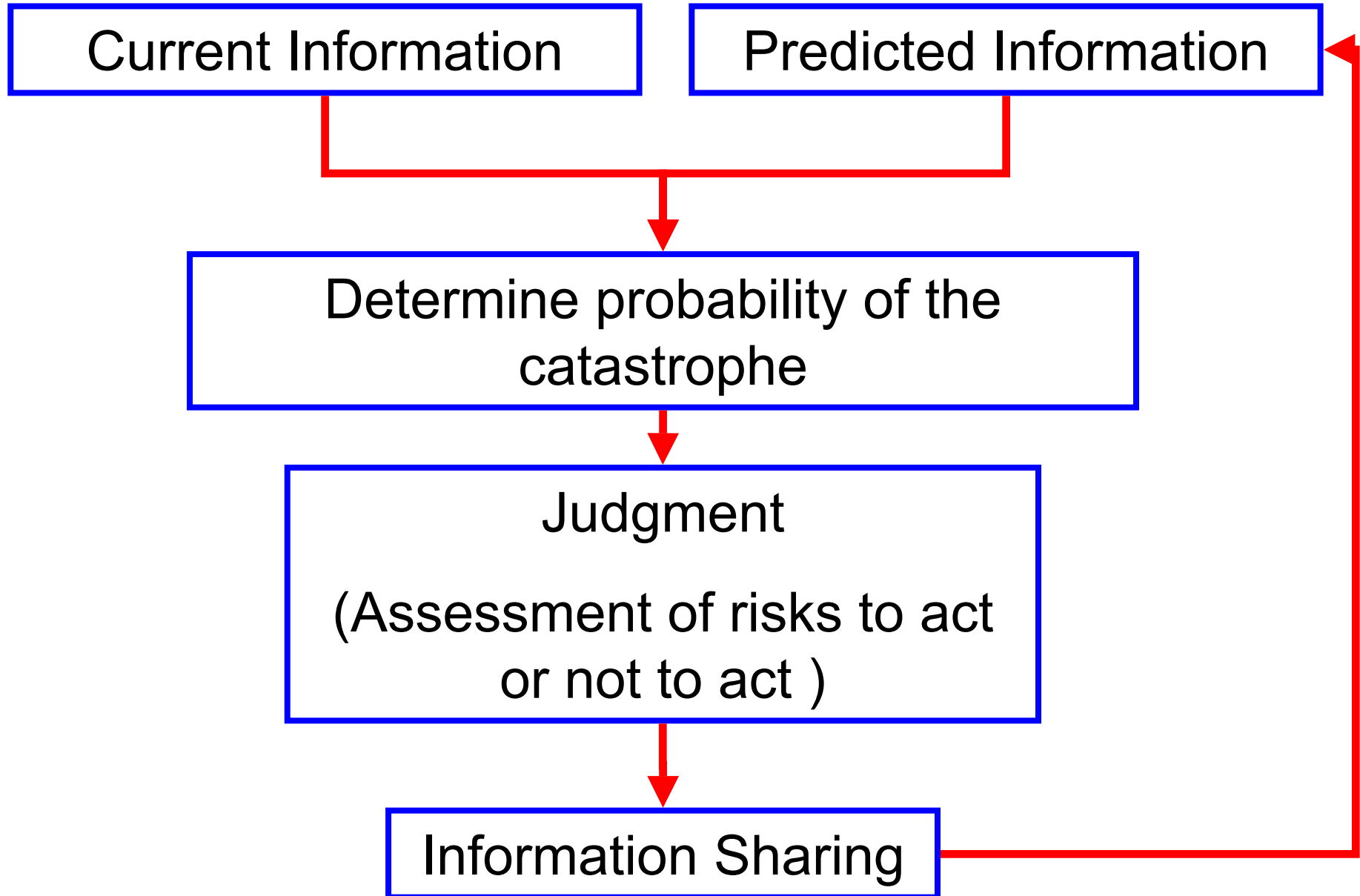




# Crack in the bank



# Cycle of Information Collection & Utilization for Disaster Management



# Information Collection & Utilization

## Points to note for each phase

### (1) (2) Type of Information, Information Collection and Judgment of Accuracy

#### **【Type of Information】**

##### Core information

- rainfall, water level, pressure pattern, facility condition, disaster management structure, etc
- Information directly related to important phenomena (levee failure, inundation, etc)

##### Background information

- topography, residents locations, management structure of other organizations, evacuation
- Information relevant to the event

#### **【Points】**

- Redundant information and error information for core information is important
  - improvement of visual information is a challenge
- Expand the amount of related information (quality &

### (3) Judgment (Decision Making for Action)

#### 【Judgment Flow】

Understanding the Current Situation



Options for Action



Prediction

water level, inundation, facility condition, etc



Decision Making

#### 【Points】

- Make understanding the current situation easier (GIS, etc)
- Improve prediction precision
- Provide decision support information
- Weather forecasting manager to join in decision making



## (4) Information Sharing and Follow-up

- ❑ Organize information (data, etc)
- ❑ Process information (data, etc)

### **【Points】**

- Information sharing between weather and disaster management personnel
- Developing common format that can be understood by both weather and disaster management personnel
- Develop/improve information sharing mechanism

❑ Feedback information (execution status of actions decided)

❑ Monitor changes in situation

### **【Points】**

- Establish feedback flow from disaster manager to weather personnel

# Lead Time has to be taken into account

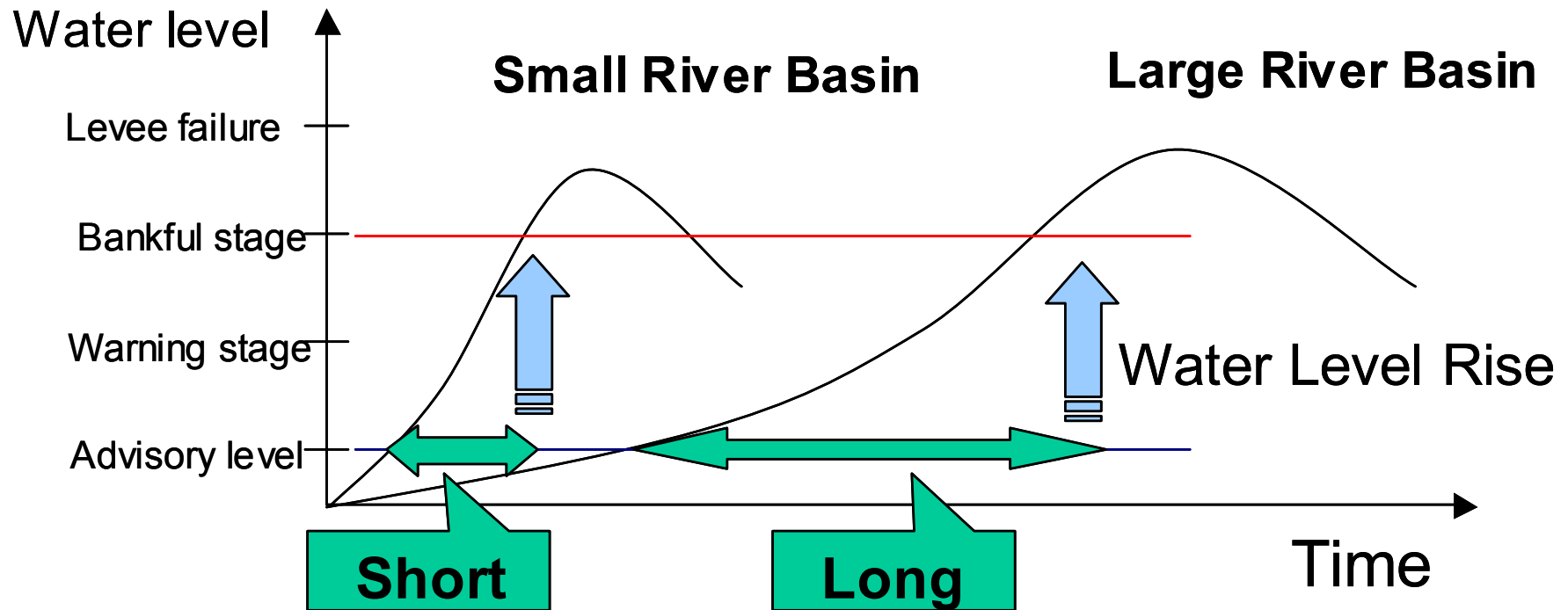
1. Information collection → judgment of information accuracy → decision making
2. Decision making → information sharing → preparation → action

Such processes require time

For an example

<b>Target</b>	<b>Measures</b>	<b>Required time</b>
<b>Residents</b>	<b>evacuation warning → information collection → decision making</b>	<b>approx 1 hr</b>
	<b>Decision making → evacuation preparation → evacuation → arrival at site</b>	<b>approx 2 hrs</b>

# Required prediction time depends on river scale / characteristics

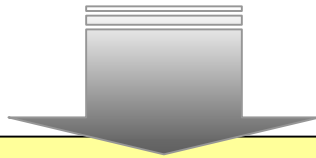


# Required prediction accuracy depends on river scale / characteristics

River Basin	Small	Large
Arrival Time	Short	Long
Prediction from upstream W.L.	Difficult	Easy
Required rainfall prediction	current rainfall	global area rainfall prediction (ex.typhoon movement)
	+ local rainfall prediction (ex.local rainpour)	

# Requirement for weather forecasting

1. Consideration to accuracy setting
  - Information regarding prediction accuracy
  - Forecast accuracy depends on availability of other relevant information
2. Lead time for disaster management has to be taken into account when determining target forecast time
  - Natural condition
  - Society condition
  - Target persons/organizations

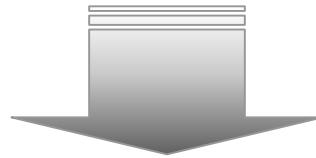


**Collaboration with disaster manager required for provision of useful weather forecasting**



# Requirement for Disaster Management in response to Weather Forecasting

1. Action scenario with consideration to accuracy
  - Understanding of prediction accuracy
  - Consider action risk based on the accuracy
2. Action scenario with consideration to lead time
  - Accelerating decision making
  - Shorter action time & more accurate action
  - Understanding critical information
  - Raising awareness among residents



**Collaboration with weather forecasting manager  
required for proper disaster management**