

Risk of areal flooding in the downstream area
of the Kakogawa River
- Toward Making a Practical Hazard Map -



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1. Incentive and Purpose

Areal flooding

1. Incentive and Purpose

Areal flooding

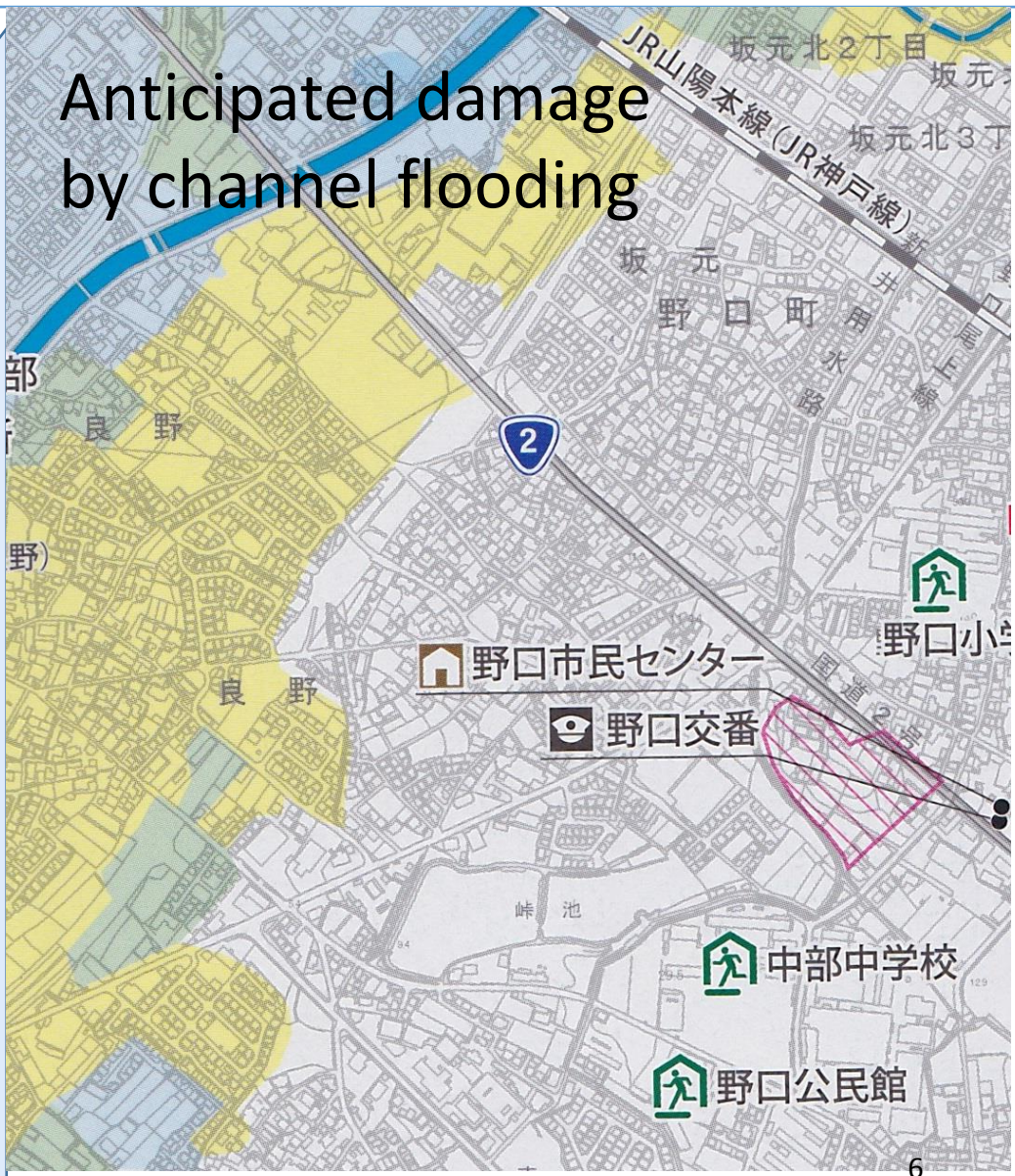


1. Incentive and Purpose



1. Incentive and Purpose

Hazard map



Anticipated damage by channel flooding

1. Incentive and Purpose



Considers channel flooding

Doesn't consider areal flooding

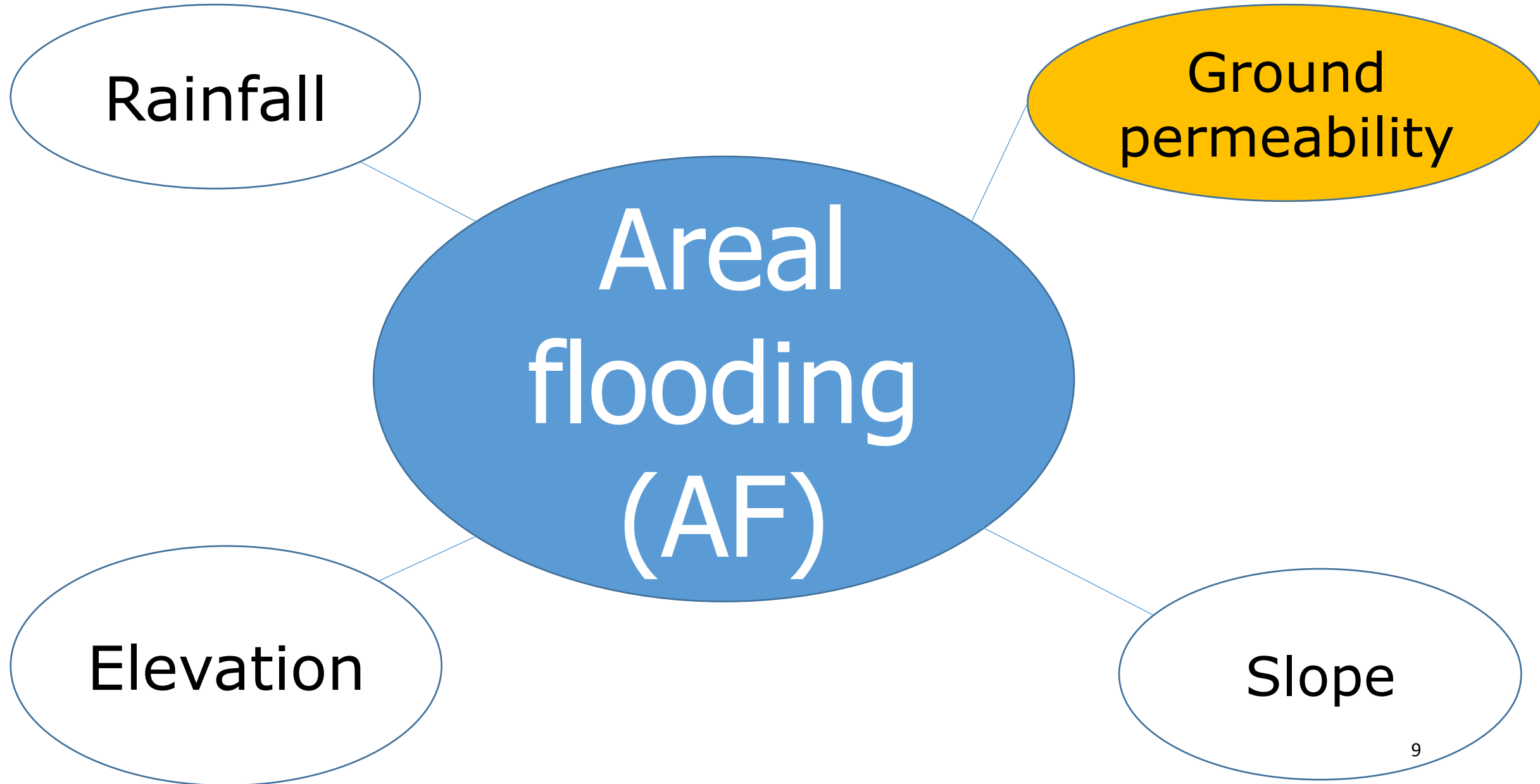
1. Incentive and Purpose

The purpose of our research

To investigate the risks of areal flooding in the downstream area of the Kakogawa River

To make suggestions to improve the current hazard map

2. Survey of ground permeability



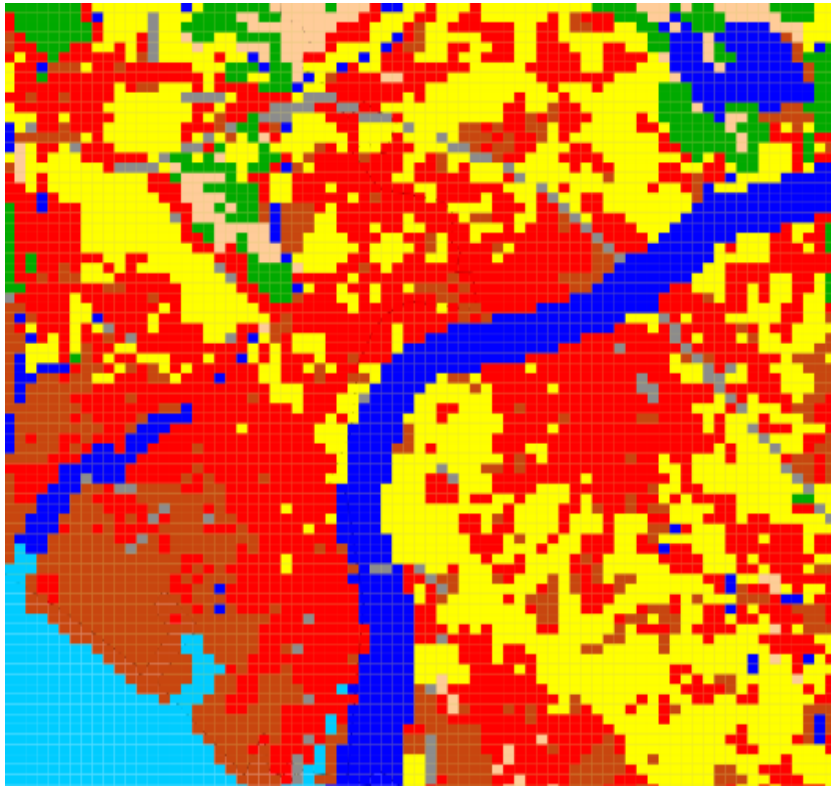
2. Survey of ground permeability

QGIS

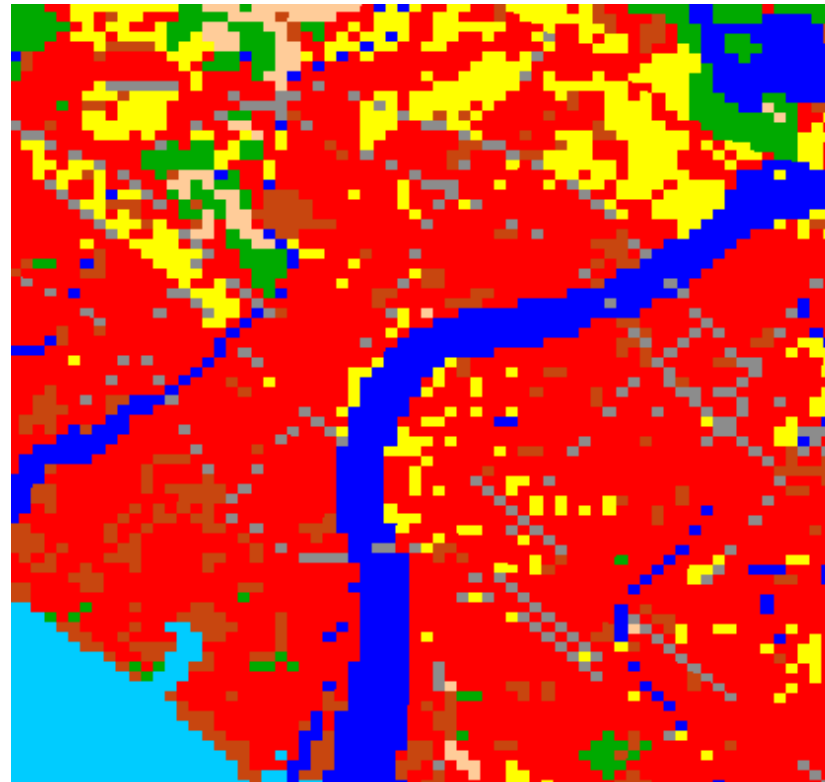
Quantum Geographic Information System

Software that can analyze maps


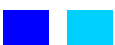
2. Survey of ground permeability



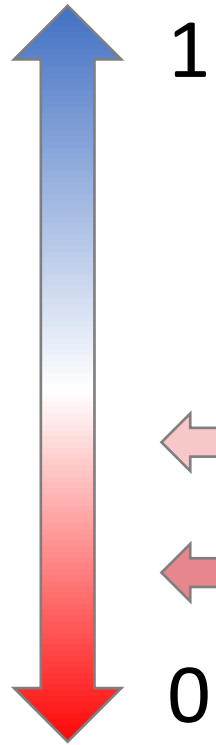
Land use map (1977)



Land use map (2014)

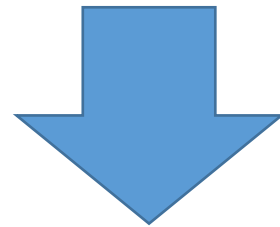
Classification	Colors
Forest	
Farm field (not rice)	
Paddy field	
Houses	
Factories	
Road	
River/Sea	

2. Survey of ground permeability



← Year : 1977 Permeability : 0.471
← Year : 2014 Permeability : 0.279

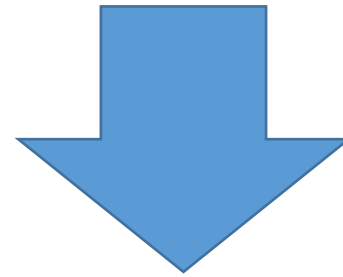
Permeability
declined



The risk of areal flooding is **increasing**

3 . Measurement of elevation | Study areas

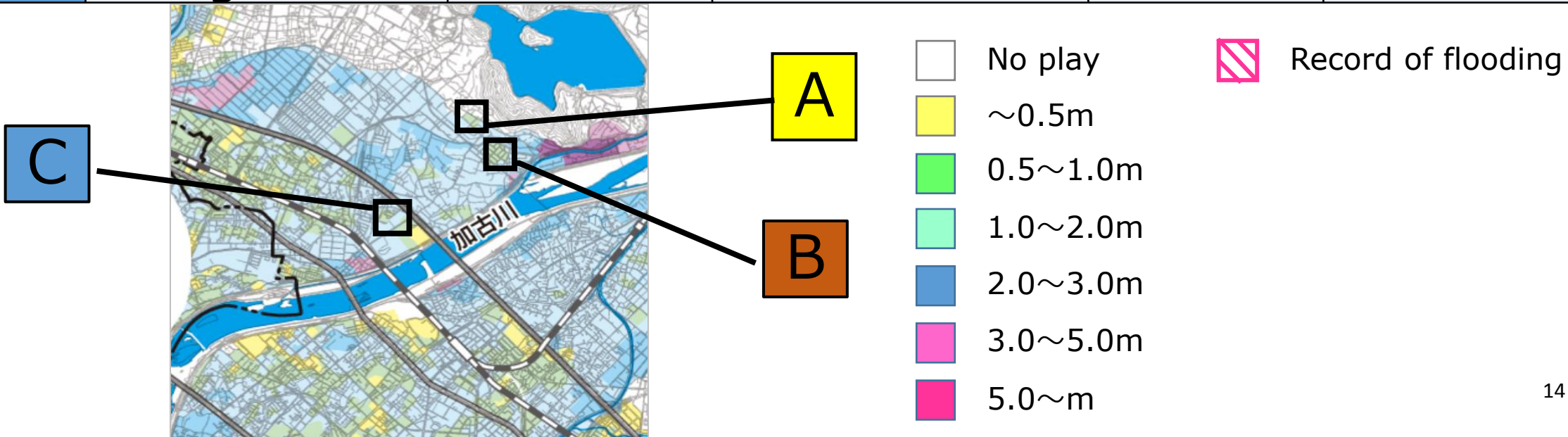
Factor ① Frequency of areal flooding
② Results of areal flooding



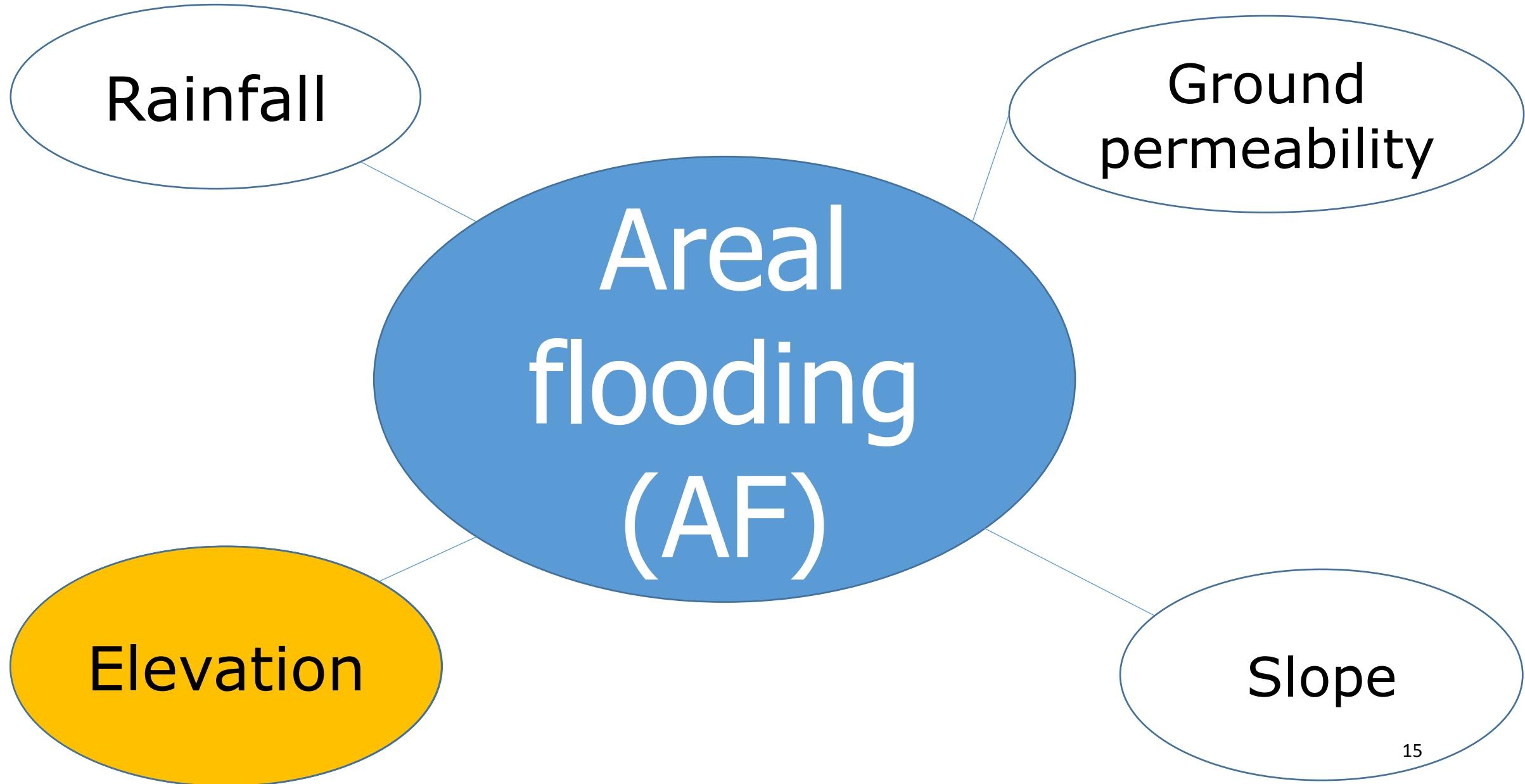
Select typical characteristics

3. Measurement of elevation | Study areas

mark	Area's name	The risk of AF	The change of land use	Results of AF	Anticipated depth
A	Old Masuda	×	city→city	×	0m
B	New Masuda	○	paddy→city	×	0.5~1m
C	South Degawara	○	paddy→city	○	0.5~2m



3. Measurement of elevation



3 . Measurement of elevation | Result

Elevation

Highest

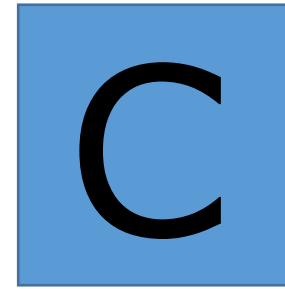


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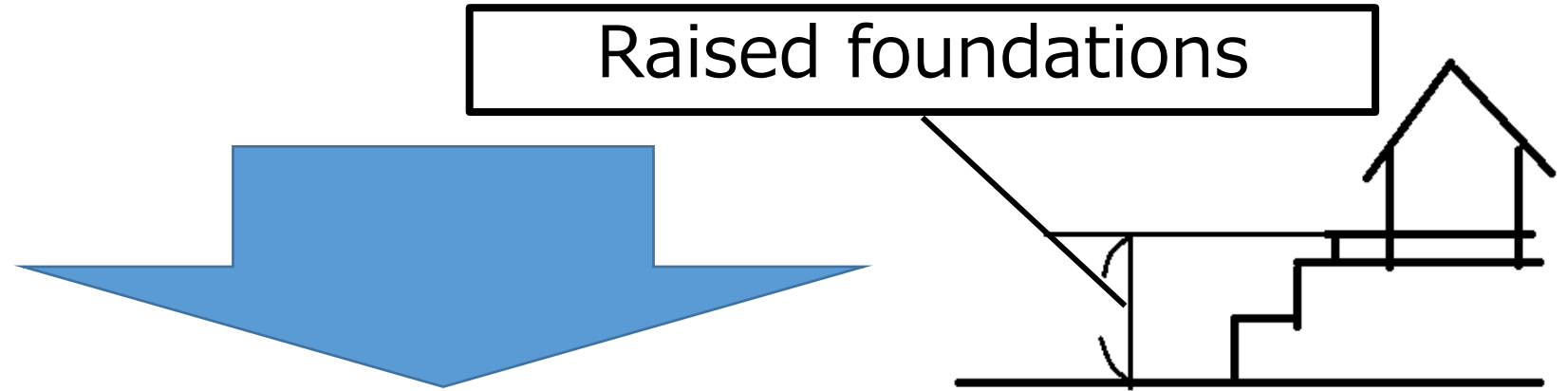
Lowest



MEANWHILE...

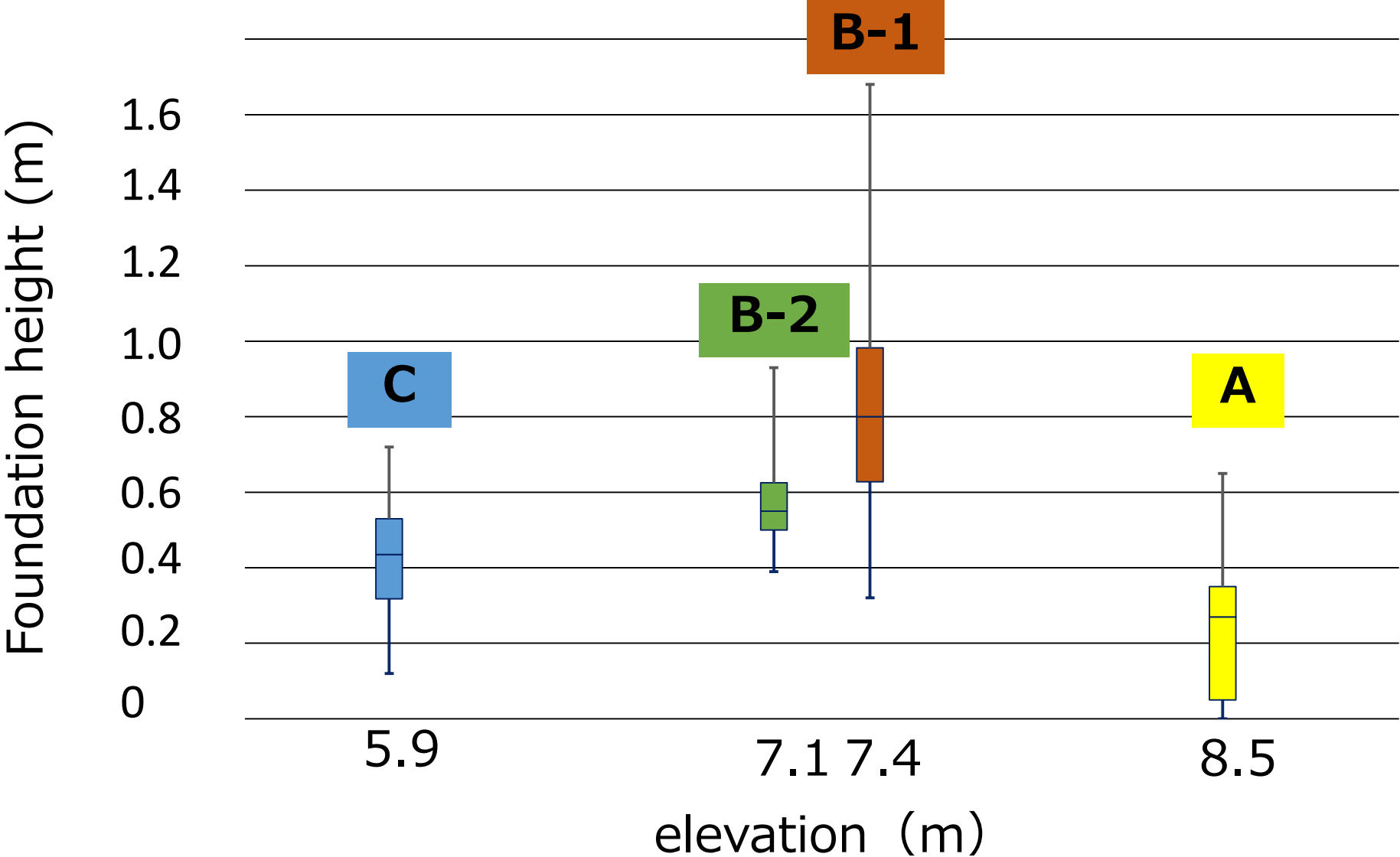
3 . Measurement of elevation | Result

- Many houses had raised foundations
- Foundations are several tens of centimeters high



Need to think about the height of “foundations”

4 . The results of the survey on foundation height



5 . Survey by questionnaire | Result



〈B- I North〉
They raised their houses
at the time of rebuilding



〈B- II South〉
They didn't rebuild

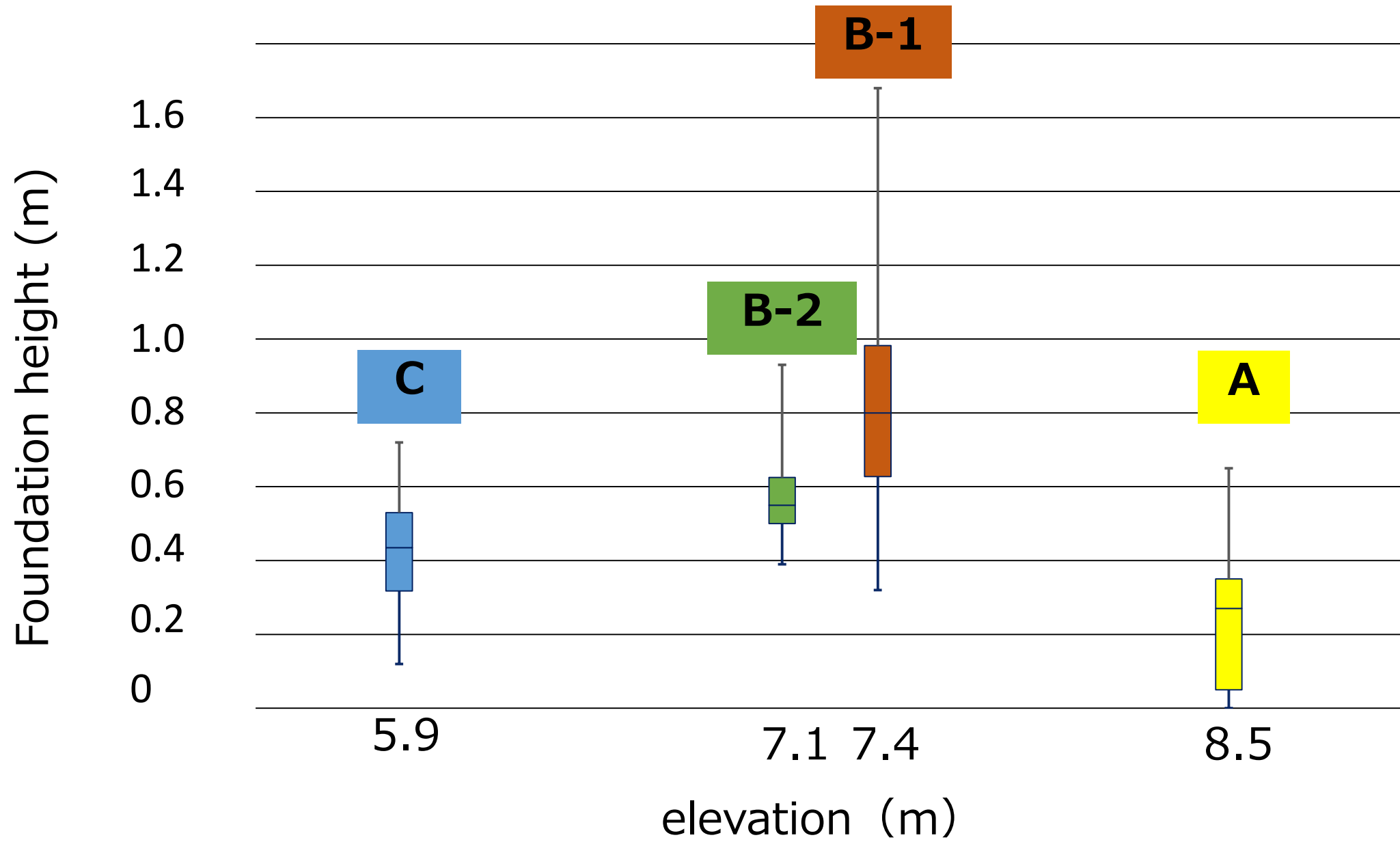
5 . Survey by questionnaire | Analysis

People start to live in the area.

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graph TD; A[People start to live in the area.] --> B[Living there for a long time, people become aware of the danger.]; B --> C[When rebuilding, people build higher foundations.];
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Living there for a long time,
people become aware of the
danger.

When rebuilding, people build
higher foundations.



6 . Conclusion

The flood hazard map of Kakogawa City does not consider areal flooding.



Measures against areal flooding are entrusted to residents.

6 . Conclusion

We should add

“hazard map considering areal flooding”

to the present flood hazard map.

7 . Future tasks

- To explain areal flooding to people
- To make a hazard map
considering areal flooding

Acknowledgements

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Residents of the Masuda Asahi complex , and Y.MATSUMOTO , a government president

Everyone who answered the interview in the survey area

References

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Thank you for listening!