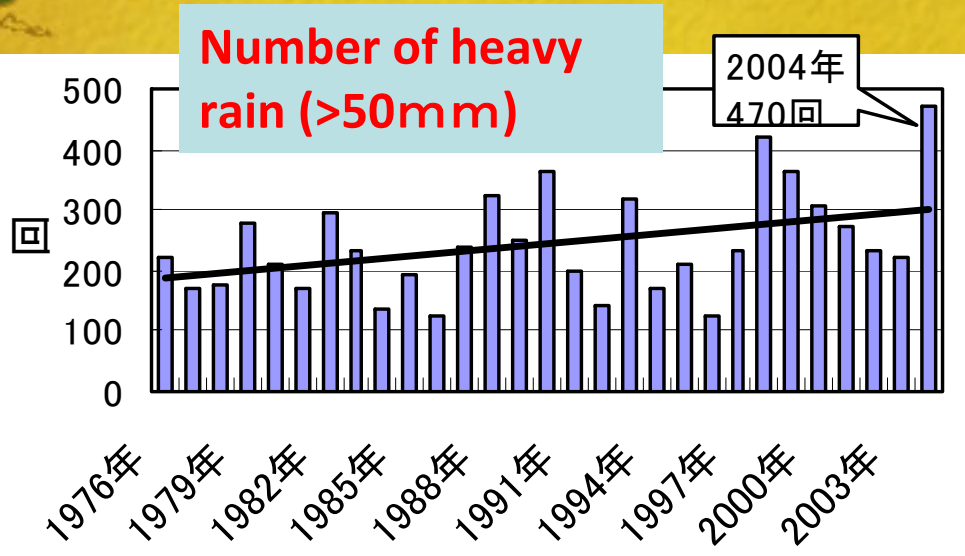


Impact of road network upon flood inundation

Guangwei HUANG
Frontier Sciences,
The University of Tokyo

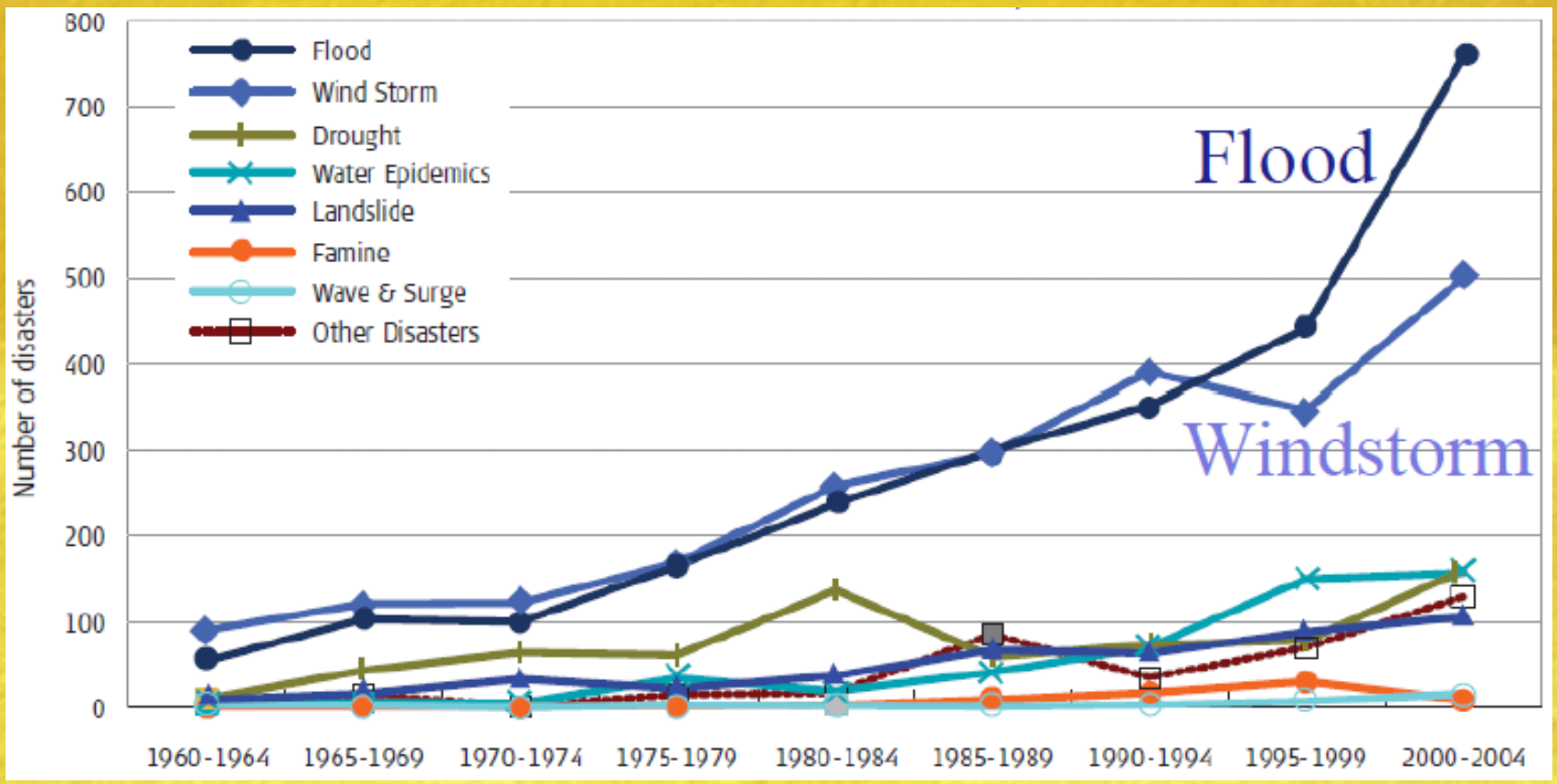


Background



In the past decade, more than 90% Japanese cities were affected by rainfall-related disasters

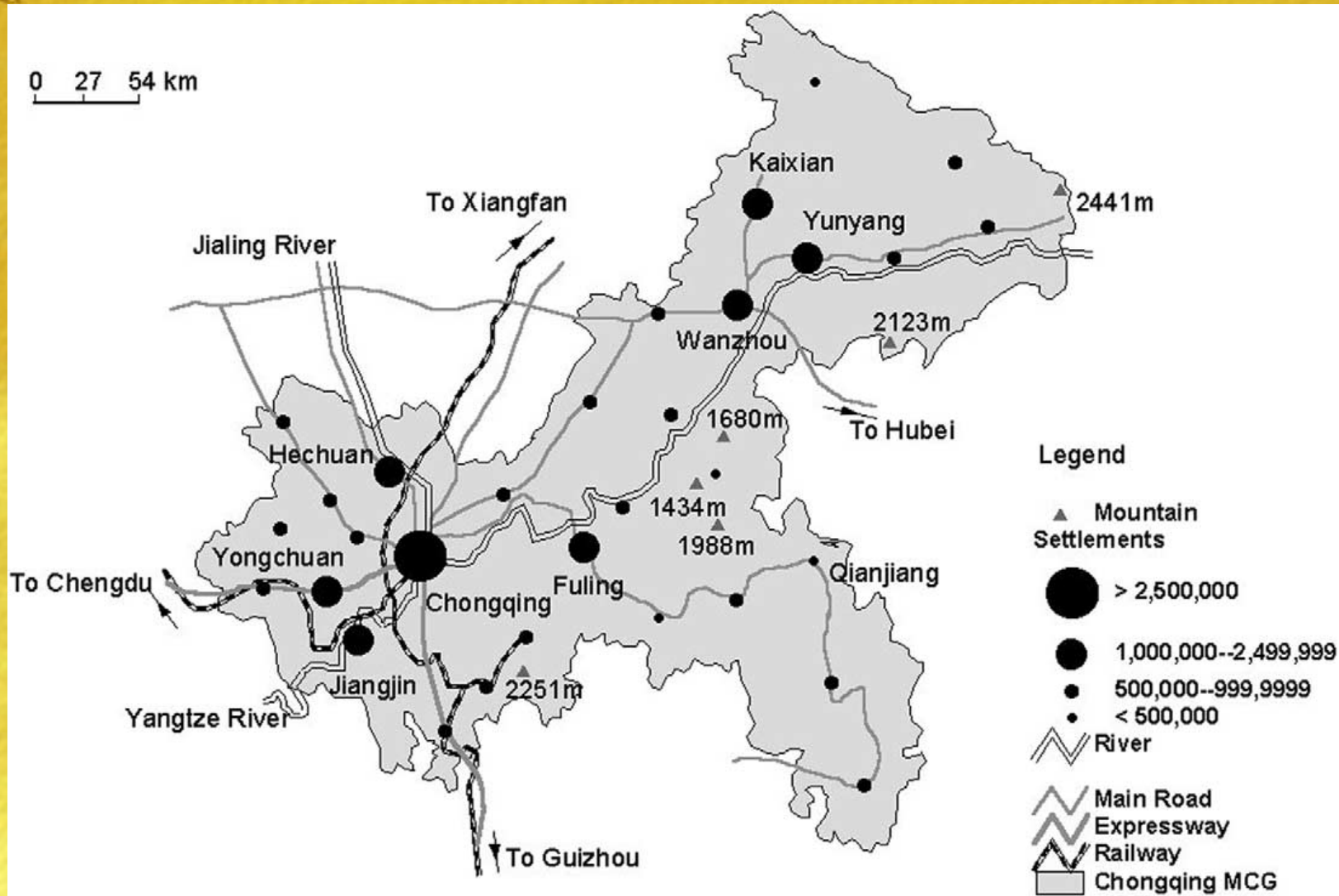




Flood

Windstorm

Better understanding, new concepts and innovative countermeasures





2004年7月13日
新潟水害



新潟7.13



新潟7.13



98那珂川水害

Niigata Flood on July 13, 2004

Number of cars : 500



Erosion occurred in between road and road-side house

Dangerous underpass

2903



Relation between Roads and urban flood

Traffic stop due to flooding

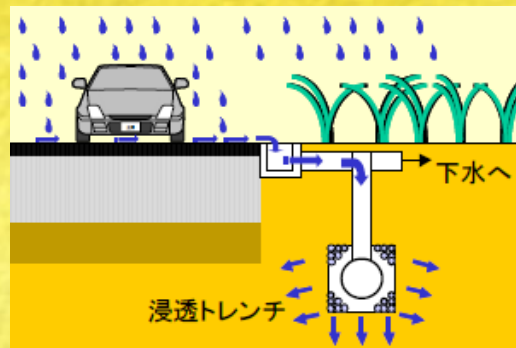
Studied in Transportation field

Imperviousness

Studied in Hydrology and road engineering

How roads affect urban flooding patterns?

My research initiative






The objective

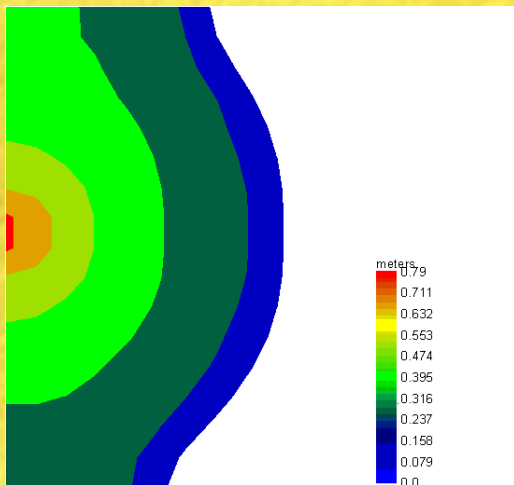
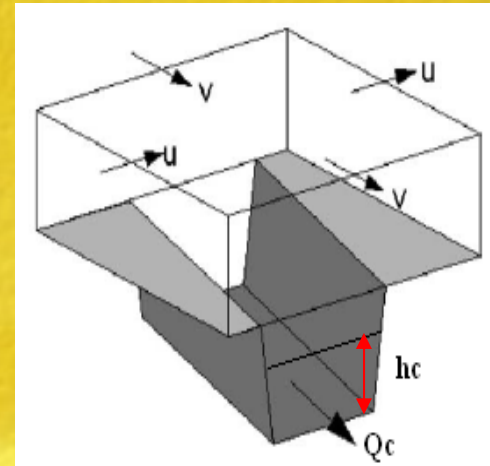
To present a case study to show the relationship between road patterns and urban flooding characteristics.

It is also intended to address the possibility to use roads to alleviate flood disaster.

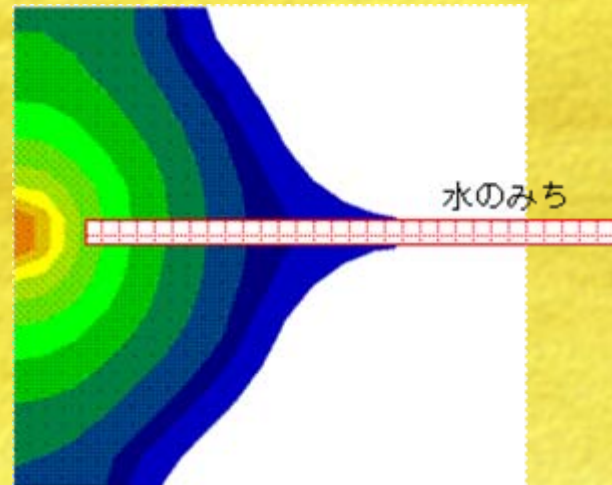


What was done

- Development of a hybrid-model which can simulate both 2-D overland flow and 1-D flow along road network (1D)



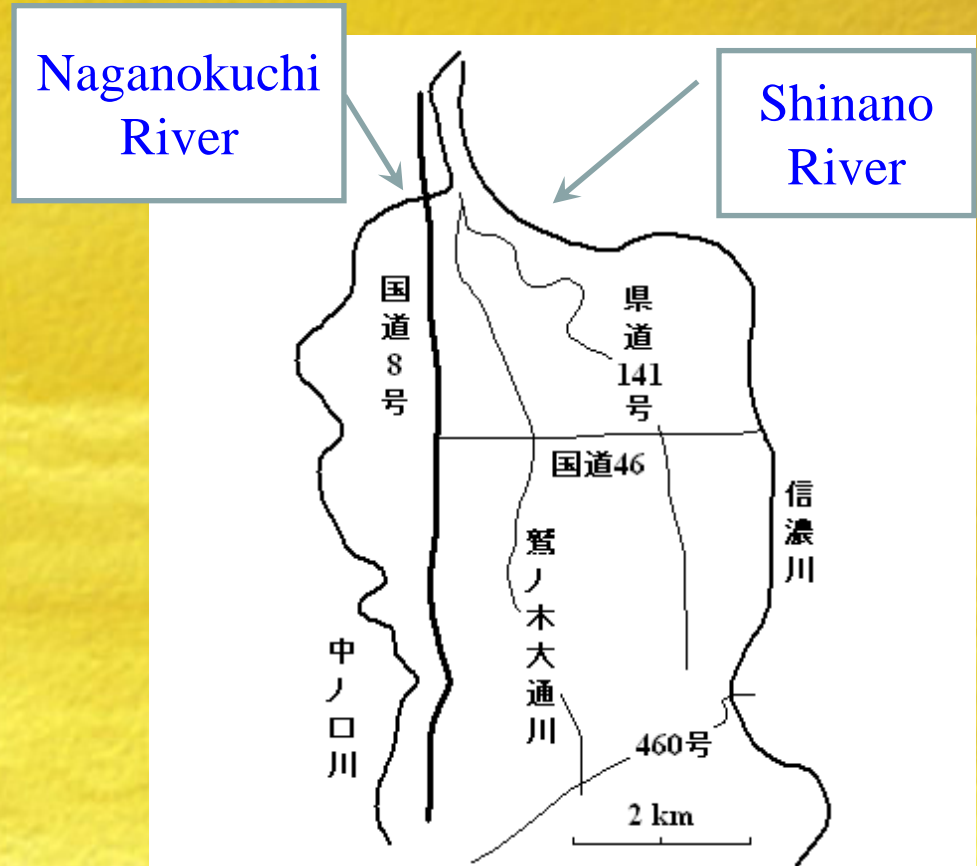
Without



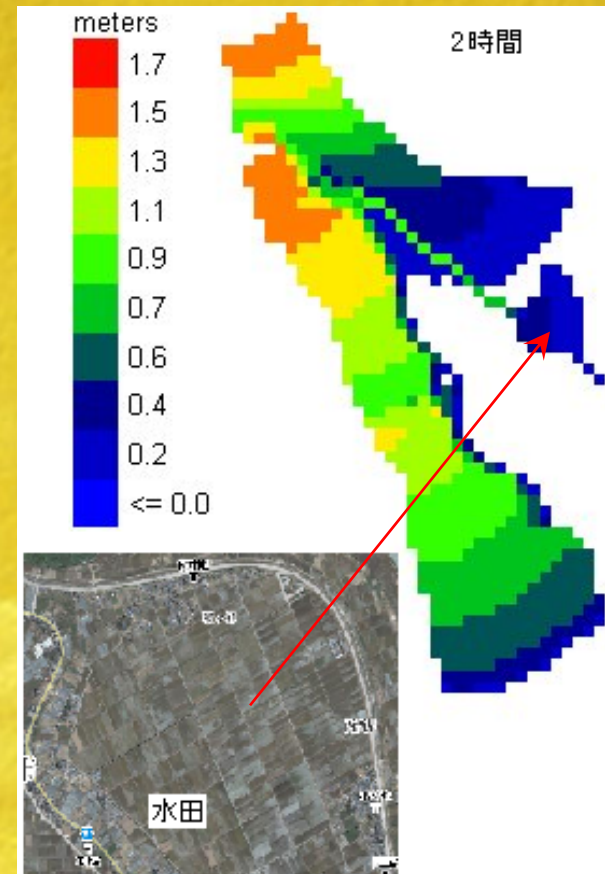
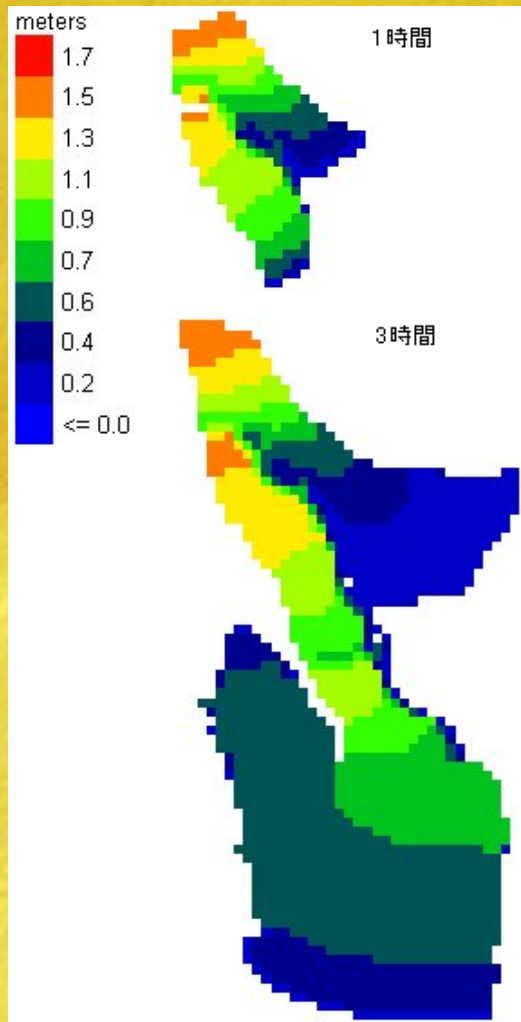
With

One of applications: Shirone district

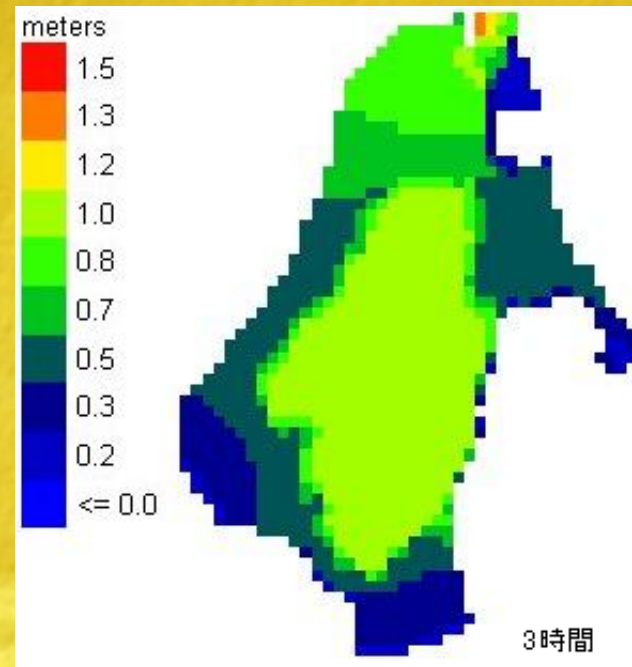
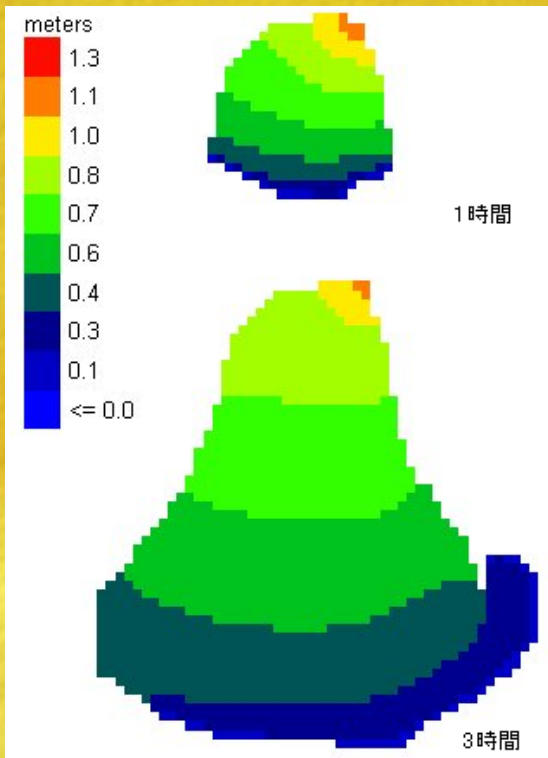
- In Niigata City
- Enclosed by the Shinano River and the Naganokuchi River
- a flat lowland
- Road network: National Roads No.8, No.46, No.460 and Prefectural Road No.146.



Various scenarios simulations



Area confined by roads has a high flood risk



The role of road is sensitive to elevation change in surrounding area




My concept: **FLOOD SHARING**

Wide area inundation
with shallow depth
is less damaging
than confined flood
with high depth

ROADS are key to
realize the flood
sharing scheme

What we need
Multi-purpose roads

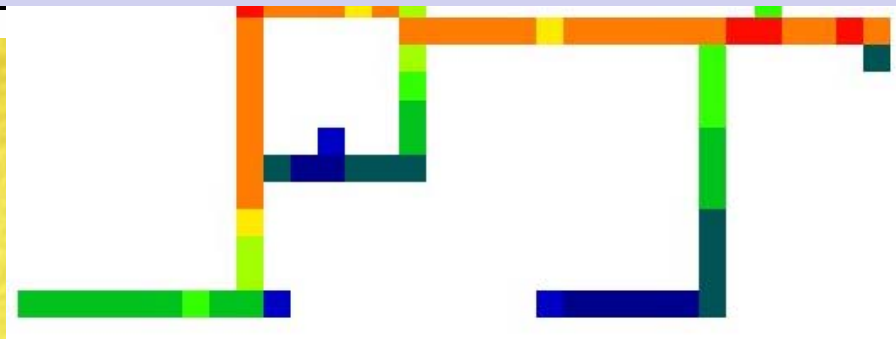


An additional proposal

In addition to mesh-based flood hazard map,
Road Flood Hazard Map




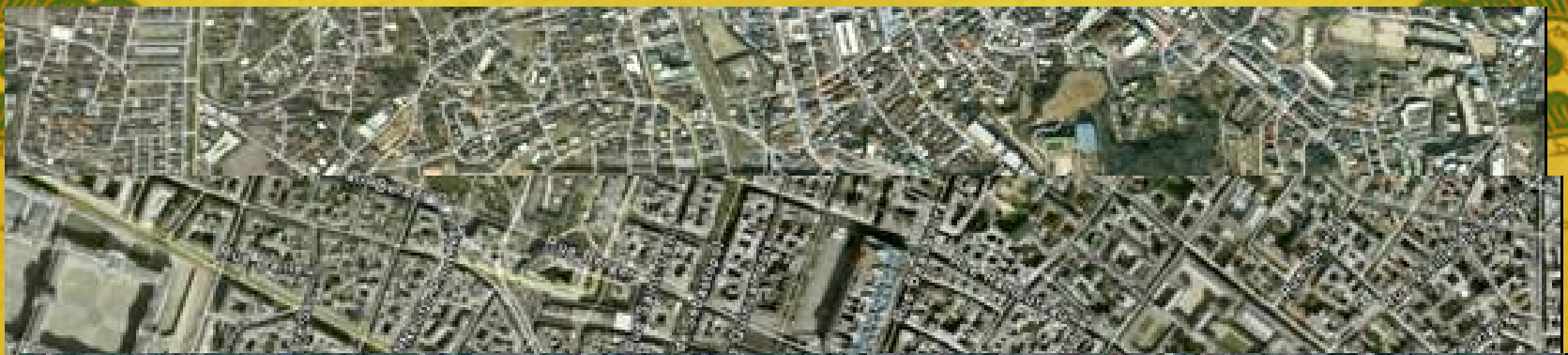
It will be very useful for evacuation planning,
especially for aged and kids





Conclusions

- Roads could exacerbate flood inundation if designed inappropriately.
 - Roads could be used to alleviate flood disaster if designed innovatively.
- 





Thank you for your attention!

