

Urban Environmental Climate Map for Community Planning

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Abstract

Urban climate is the one of important issues for urban planning. Especially in Japan, we have an originally hot and humid climate. Therefore, this issue has to be taken into consideration in the planning processes. But, stakeholders cannot consider urban climate in planning process, because urban climate is difficult to understand for non-expert. Therefore we are proposing the Urban Environmental Climate Map for urban planning. The role of this map is to provide the some information from the urban climate expert to the place of decision making. So, the purpose of this map is to support decision. On the Urban Environmental Climate Map, the essence of climate research output is described. When stakeholders make decision, they can use this map as a communication tool. In this paper, we discuss the framework of Urban Environmental Climate Map, and shows the example of applications of this map to the community planning workshop.

1. Introduction

Urban climate has been becoming one of important issues for urban planning from the view of urban heat island mitigation and air pollution reduction. Especially in Japan, planning with urban climate is very important, because we have an originally hot and humid climate. The inhabitants of the cities are exposed to the more severe climate caused by urbanization. Therefore, this issue has to be taken into consideration in the planning processes. But, stakeholders cannot consider urban climate in planning process, because urban climate is difficult to understand for non-expert.

Therefore some researchers are proposing the "Urban Environmental Climate Map" for urban planning in Japan. The role of this map is to provide the some information from the urban climate expert to the place of decision making. So, the purpose of this map is to support decision. On the Urban Environmental Climate Map, the essence of climate research output is described. When stakeholders make decision, they can use this map as a communication tool.

Thus, the conceptual framework has been proposed. But, we can see few actual use of Urban Environmental Climate Map. So, in this study, Urban Environmental Climate Map is actually created, and the community planning workshop by using Urban Environmental

Climate Map was held. In this paper, we report the community planning workshop by using Urban Environmental Climate Map.

2. 'Urban Environmental Climate Map'

Although Urban Environmental Climate Map has been proposed in recent years in Japan, the definition of the map such as the purpose and contents is not unified. Therefore, we defined purpose and contents of the map in this study as follows.

2.1 Purpose of Urban Environmental Climate Map

"Urban Environmental Climate Map" is made for urban planning, architectural design, and environmental policy making. The role of this map is to provide some information from the view of urban climate to the place of decision making (including public involvement). Therefore, the purpose of creating this map is to support decision. On "Urban Environmental Climate Map", the essence of climate research results by experts is described. When stakeholders (Citizen, Planner, Architect, Specialist, and so on.) make decision about urban planning, architecture design, and environmental policy, they and experts (Climatologists) can use this map as a communication tool. (Fig.1)

2.2 Two Maps of Urban Environmental Climate Map

Urban Environmental Climate Map shall consist of following two maps.

1) Climate Analysis Map: The map which represents the present conditions of the urban climate (such as wind and thermal environment) in the focused area intelligibly.

2) Recommendation Map (Hint Map): The map which represents "Place which requires an improvement" and "Place which should be conserved" from the view of urban climate. It is created from Climate Analysis Map.

Although these maps should be created at the urban scale (about 1/25,000) and district scale (about 1/2,500), we created Urban Environmental Climate Map focusing on the district scale in this study. This is because that this study focuses on the application of Urban Environmental Climate Map to the community planning workshop.

3. Urban Environmental Climate Map of Komagabayashi District

Komagabayashi District, that is a part of Kobe, is the

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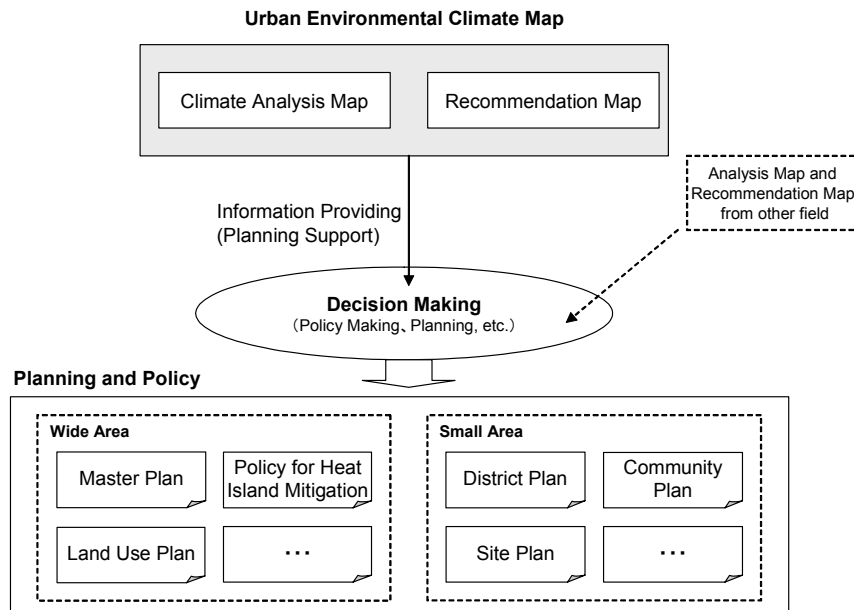


Fig.1 Diagram of Using "Urban Environmental Climate Map"

study area of this study. This district is the residential area which has many old wooden houses and also high density area.

Fig.2 is the Climate Analysis Map of Komagabayashi district. This map represents high surface temperature area extracted by using airborne thermal-infrared image, high density area which has a negative influence on the ventilation, and major wind speed and direction for each our in the summer.

Fig.3 is the Recommendation Map of Komagabayashi district and created from Climate Analysis Map. This map represents "Place which should be conserved", "Place in which surface temperature should be made lower", "Place which requires the improvement of ventilation", and major wind direction in the daytime and the nighttime. In addition, 12 options of improving "Place in which surface temperature should be made lower" and "Place which requires the improvement of ventilation" are put together with the Recommendation Map. These options are based on previous urban climate researches. One of them is "cool roof".

On the other hand, we also created Climate Analysis Map at the urban scale (1/10,000). This map represents land use, sea breeze, land breeze, cold air drainage, and wind roses. (Fig. 4)

4. Community Planning Workshop by Using Urban Environmental Climate Map

In this study, we held community planning workshop by using Urban Environmental Climate Map of Komagabayashi district actually. The overview of the workshop is as follows.

1) Date: 27th November, 2004

2) Number of Participants: 30 (Residents:4; Local Government:4; Experts of Urban Climate:5; Planners:4; Students; Others)

3) Program of the Workshop:

-13:00-14:00 Field Inspection

-14:00-14:45 Lecture (Introduction to Urban Environmental Climate Map)

-14:50-15:00 Guide for Workshop

-15:00-16:30 Workshop

-16:30-17:00 Presentation

4) Process of the Workshop

(1) We divided all participants to four groups and make each group has one resident, one local government, one expert of urban climate, and one planner, at least.

(2) In each group, members selected or proposed the options that they would like to carry out in the district, and wrote down it on the tag.

(3) In each group, each member posted the tags on the map in order, with presenting the reasons.

(4) In each group, all members discussed about the options and selected some options they would take, with referencing Urban Environmental Climate Map.

(5) Each group described the options on the map and created proposal map. (They could not reduce the floor area in the district.)

5. Output of the Workshop

Each group could make proposal map and fig. 5 is one of them. In the workshop, they discussed about options of improving "Place in which surface temperature should be made lower" and "Place which requires the improvement of ventilation". And they also discussed about the place of the exterior unit of air-conditioner.

6. Summary

The summaries of this study are as follows.

- 1) We created Urban Environmental Climate Map at the district scale for planning support. (Fig.2 and Fig.3)
- 2) Non-experts of urban climate could understand Urban Environmental Climate Map and referenced it when they created the proposals.
- 3) Non-experts of urban climate could make proposals with considering urban climate by using methods we proposed in this study.

Acknowledgement

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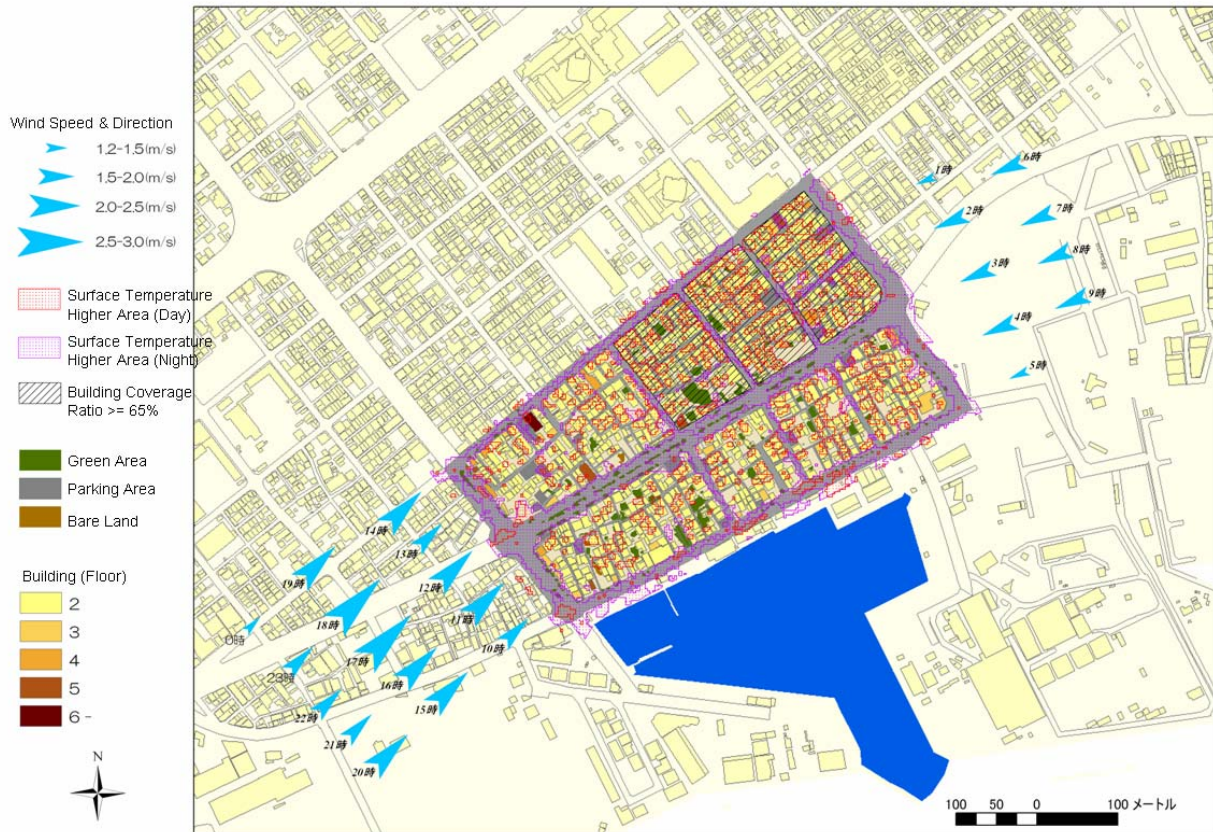


Fig.2 Climate Analysis Map of Komagabayashi



Fig.3 Recommendation Map of Komagabayashi

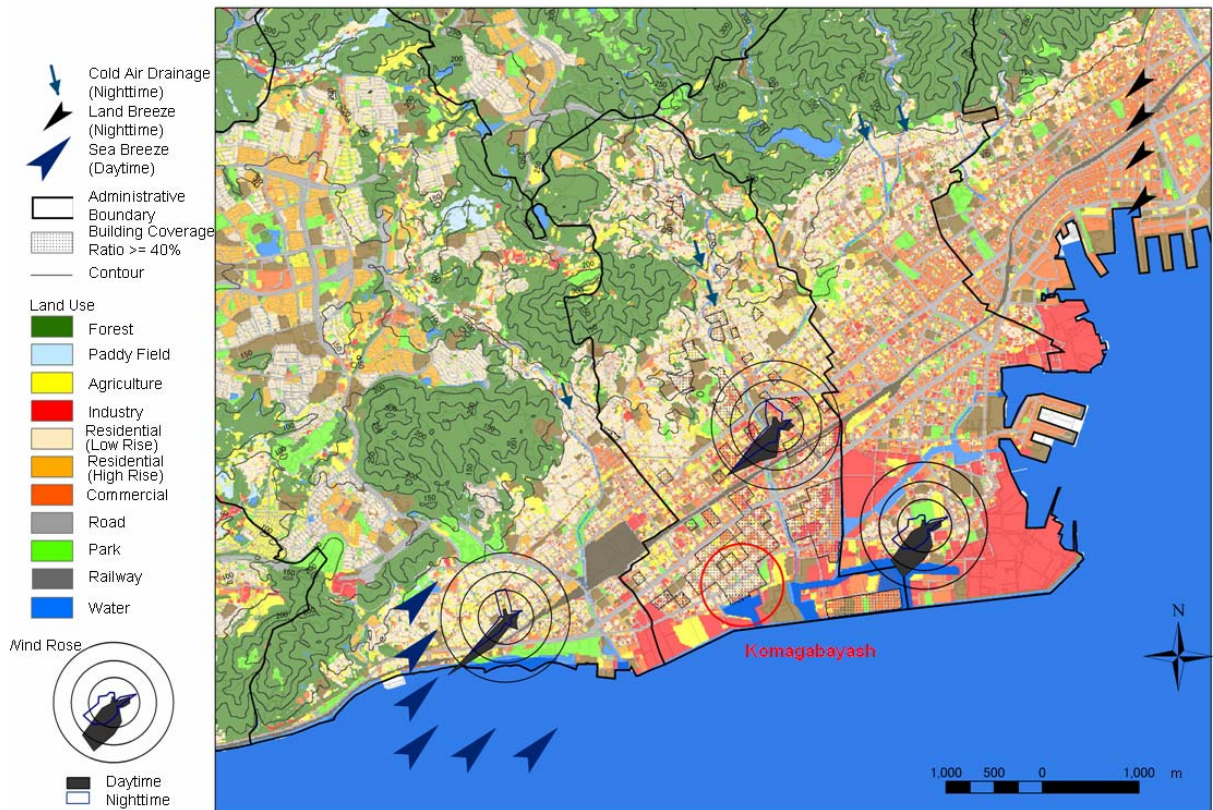


Fig.4 Climate Analysis Map at urban scale

<Policy for the Planning>

- 1) We should leave the existing landscape as much as possible (Good community is in the district because existing condition is good for the communications.
- 2) We should promote cool-roof but green roof in the district, for leaving the existing landscape
- 3) We should use the existing open space effectively.

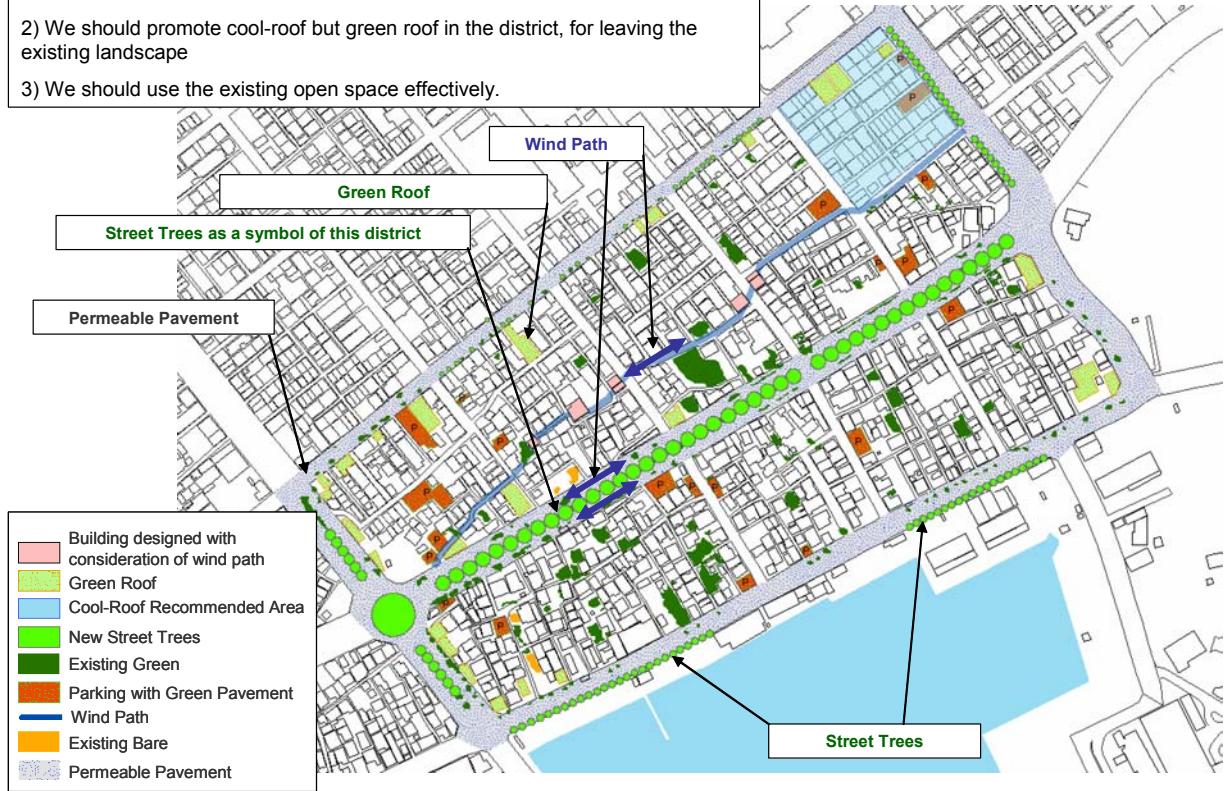


Fig.5 One of Proposals Planned by Participants