THA STRUCTURE OF SATISFACTION FOR WATER RESOURCES OF CITIZENS

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***ABSTRACT*:** This research is a purpose to solve the water issue in Shikoku Island. There are difficulties to make some compromise for whole basin. First, Water resource has uncertainty. For example, we need to consider about flood and drought due to climate change. Secondly, Relationship between the burden of the source area and the beneficiary is not clear. It is difficult to share the understanding of each others for proper water resources sharing. Therefore it is necessary to form an agreement on adaptation policy as a result from the information sharing and understanding. In order to establish a regional management system, we must making information of the policy impact and sharing them. We are making the recognition map of issues by 4 prefecture's citizens. Then we have created a logic model based on an integrated recognition map. This report will describe the structure of satisfaction for water resources of citizens.

KEYWORDS: climate change, recognition map, logic model

1. INTRODUCTION

Fourth Assessment Report of IPCC (Intergovernmental Panel on Climate Change) is reported to bring a lot of drought and heavy rain by the impact of climate change. In fact, we feel that climate change caused by global warming. The amount of rain is different for each region. However, there is great variation in rainfall recently. Climate change is to change the traditional weather patterns. For example, a change in weather patterns such as rain and wind. Frequency of droughts and floods are due to recent climate change. This means that rainfall patterns are changing. In other words, climate change will affect water resources the most. We need to prepare for the changes in water resources.

Water resources for us often think of drinking water. Water has supported directly and indirectly the lives of the people. Safe drinking water has led to people's health and life issues. Stable supply of agricultural water is needed for ensuring food. Sewage treatment is necessary for public health. Water pollution control is also necessary for the environment. Flood control projects to prepare for floods and typhoons are important to protect lives and property of citizens. Therefore, it is necessary to respond to climate change and the appropriate management of water resources.

2. POSITIONING PAPER

2.1 Target area

The university is located in Kochi Prefecture in Shikoku, Japan. Shikoku is the area adjacent the flood and drought. Rainfall south of Shikoku is often plagued by flood damage, low rainfall northern Shikoku has been plagued by

drought damage. Water resources are skewed to the south of Shikoku. Many attempts have been made in order to make effective use of water resources in this climate characteristic. There are difference of the situation between the south side and the north by this climate characteristic. Therefore, the adjustment has been made based on a common understanding “one of Shikoku”. Water resources of Yoshino River water system are supporting the economic base on Shikoku. However, allocation of water resources has become a serious problem, because the stability of water resources has declined by climate change.

Shikoku has been faced with problems about allocation of water resources in the past. This problem must be solved, but it is difficult to solve the environmental issues and vested interests. In addition, they cannot propose a method of efficient allocation of water resources. They don’t know much there are water resources in Shikoku, including reservoirs and groundwater. Because water resources are more and more changing by climate change, allocation of water resources has become a very complicated problem. Therefore, we aimed at building the policy evaluation system based on supply and demand equilibrium analysis of water resources for Yoshino River water system and Shikoku.

2.2 Overview of the project

We are trying to research the following items. Need to integrate these items, to construct the policy evaluation system based on supply and demand. As the first step of the third item, describe citizen’s consciousness of the water resources in this paper.

1. Quantitative evaluation and improvement of uncertainty about climate change
2. Impact assessment by climate change in drought, flood and water pollution
3. Selection systems of policy options to maximize the benefits in the society of uncertainty

First we need to know the future water resources to build the policy evaluation system. Therefore, we predict the probability of floods and droughts in the future. Climate change predictions are made by scaling down. However, there is varies widely between in global scale of the basic model. We shall endeavor to improve the accuracy of predictive models. As a second item, we need to consider climate change impacts on water quality, because the water quality has deteriorated during drought. We make a quantitative evaluation of water quality due to climate change at the drought, calm water and flood. We will choose policies that maximize the social benefits on the basis of these results. If we evaluate the policy, we will emphasize the economic impact of the policy. Problems of water resources of Yoshino River water system that support the economic base of Shikoku becomes a problem of economic. In addition to the natural science approach to predict climate change, we need to evaluate the economic impact of climate change. Economic impact of climate change is to evaluate changes in the industrial and living environment. The survey of citizen’s consciousness needs to be done for each region. Allocation of water resources is very different in each prefecture by the historical background. As a result, the frequency of droughts that occur in each prefecture is different. For example, drought of Kochi prefecture once every 2.5 years, Tokushima prefecture is only once in20 years. Consciousness to the drought is different depending on how often that occurs; accordingly consciousness of water resources is very different in each prefecture. Allocation of water resources is necessary that to consider the benefit assessment based on citizen’s consciousness. We will be able to consider the policies to maximize the social benefits. “The policy evaluation system based on supply and demand equilibrium analysis of water resources” can be constructed by integrating the results of three

studies. Policies are chosen that maximizes the social and economic impact. Of course, the chosen policy is also being considered for future climate change.

2.3 The purpose of this paper

This paper describes the structure of citizen's consciousness. Consciousness structure is used in the study of the allocation of water resources as a benefit assessment. Benefit assessment in this context is to understand the perceptions of citizens on the allocation of water resources. Therefore, the evaluation should be based on citizen's consciousness. That is to say, the framework for evaluation is citizen opinion against water resources. I have a hearing to the citizen for understand the framework. I want to develop the structure of citizen's consciousness on water resources based on the results of the hearing.

3. CITIZEN'S CONSCIOUSNESS AGAINST WATER RESOURCES

Citizen's consciousness against water resources is to understand through hearing. However, Japan can drink the water which is the safe and delicious by twisting a faucet. We can use water at any time; it is difficult to answer about satisfaction with water. Hearing must be made to those who have an interest in water resources. So, hearing was conducted targeting the citizens that participate in the activities of environmental preservation and the government officials that engaged in water project. I have tried to understand the citizen's consciousness on water resources. Hearings are conducted in for prefectures of Shikoku, interviewed four or five people in each prefecture.

3.1 Recognition map

I was thinking consciousness of water resources would be different in each prefecture from meteorological characteristics of the Shikoku. But the results of the hearing, the element of the framework were the same. We must be careful to be that the elements depend on attribution. For example,

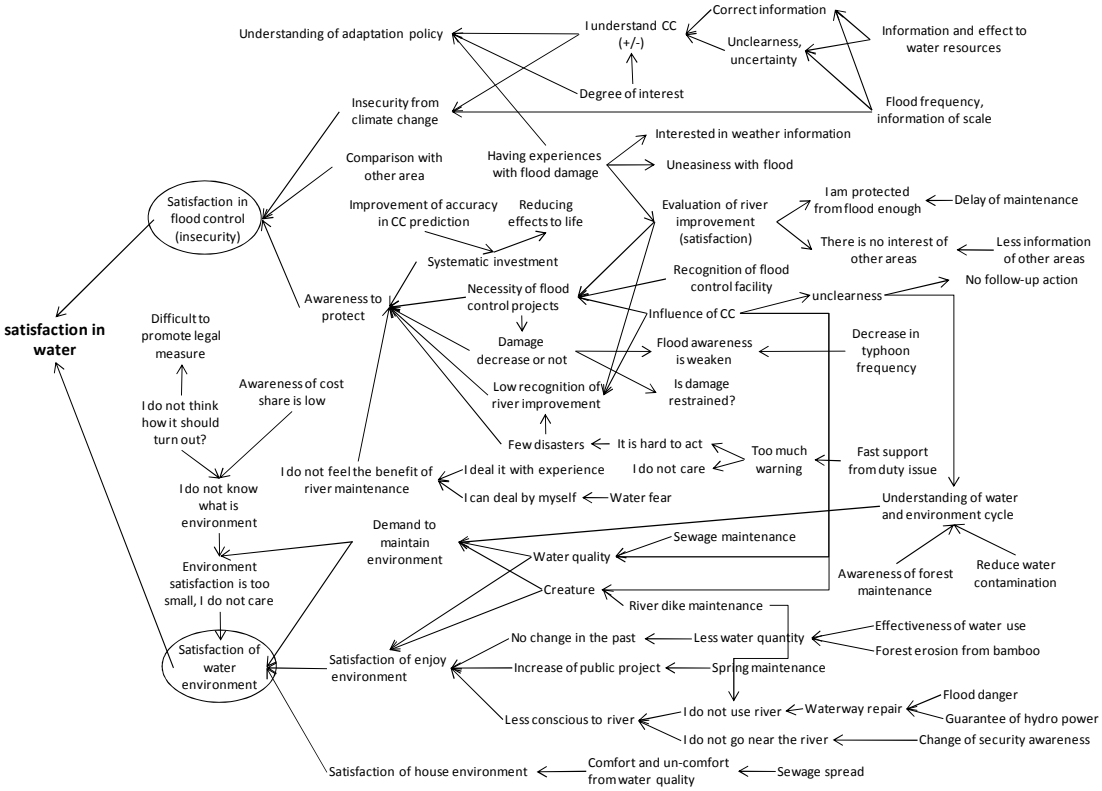

Figure1 the recognition map of "Flood" and "Environment"

those who can draw water from a well are a low consciousness to save water. Because they have never a problem of the water even if become the suspension of the water supply. Thus, consciousness may depend on the attribution. I was organizing elements for water extracted from these interviews as a recognition map (Figure 1). Recognition map are only represented by elements and their relationships. Figure 1 shows that are a list of the results obtained through interviews. The citizen's consciousness of water resources had three items. The items are Water utilization, Flood control and Environment. Recognition map of "Water" is shown in Figure 2 below. Figure 1 shows the recognition map of "Flood" and "Environment".

(1) Satisfaction in water utility

When we need water, we can use only turn on the tap at any time. We also think that it is safe. Satisfaction is considered as "using water as much as I want", "using water anytime I want" and "can use safe water" from these situation. Although satisfaction is decided by these elements, the level will depend on attribution, such as whether you have experienced drought. Satisfaction of those who have no experience of drought is low than people who have experienced. An experience the difference has been made the difference of consciousness to save water. Those who have no experience of drought do not feel the need to save water. Commune that has sufficient water resources does not appeal to the citizens to save water. A part of Figure 2 shows the relationship between satisfaction in water utility and an experience of drought the difference.

(2) Satisfaction in flood control

Water is an essential resource for human life, but including the risk of causing floods and landslides. Flood control project is intended to reduce the risk. Citizen opinion was content about consciousness to protect. People who experienced a flood have a strong consciousness that will want to protect. If the commune took measure, their satisfaction will be high. In other words, understanding of the adaptation is easily from those who experienced the damage (A part of Figure 1). On the one hand, if you do not feel the effects of the project, your consciousness of being protected is low (B part of Figure 1). So, satisfaction in flood control was defined in consciousness that is protected.

(3) Satisfaction of water environment

We are blessed with such a water cycle in the various human lives. Waterside which is the river and spring water is being utilized as a playground, rest and peace. So, we have wants to keeping the environment. We are enjoying the environment. However, it is difficult to think about the satisfaction of environment. Citizen opinion was content about comparison with the past reviews.

4. THE STRUCTURE OF CITIZEN'S CONSCIOUSNESS

Water is supported by the social activity with a rich natural, have the role that foster a culture. Citizen opinions are made of the items water utilization, flood control and environment. Recognition map is merely a grasp that how do you feel the water resources. I have removed the attributes and local conditions from this map and keep in only the elements of consciousness to understand as logic model (Figure 2). Of course, the final outcome is the satisfaction of "water utility", "flood control" and "water environment". I describe the process of creating the logic model as example of satisfaction in water utility. The top of Figure 2 is the recognition map, show on below a logic model.

The elements of the lower provide that satisfaction in water utility can be read from the

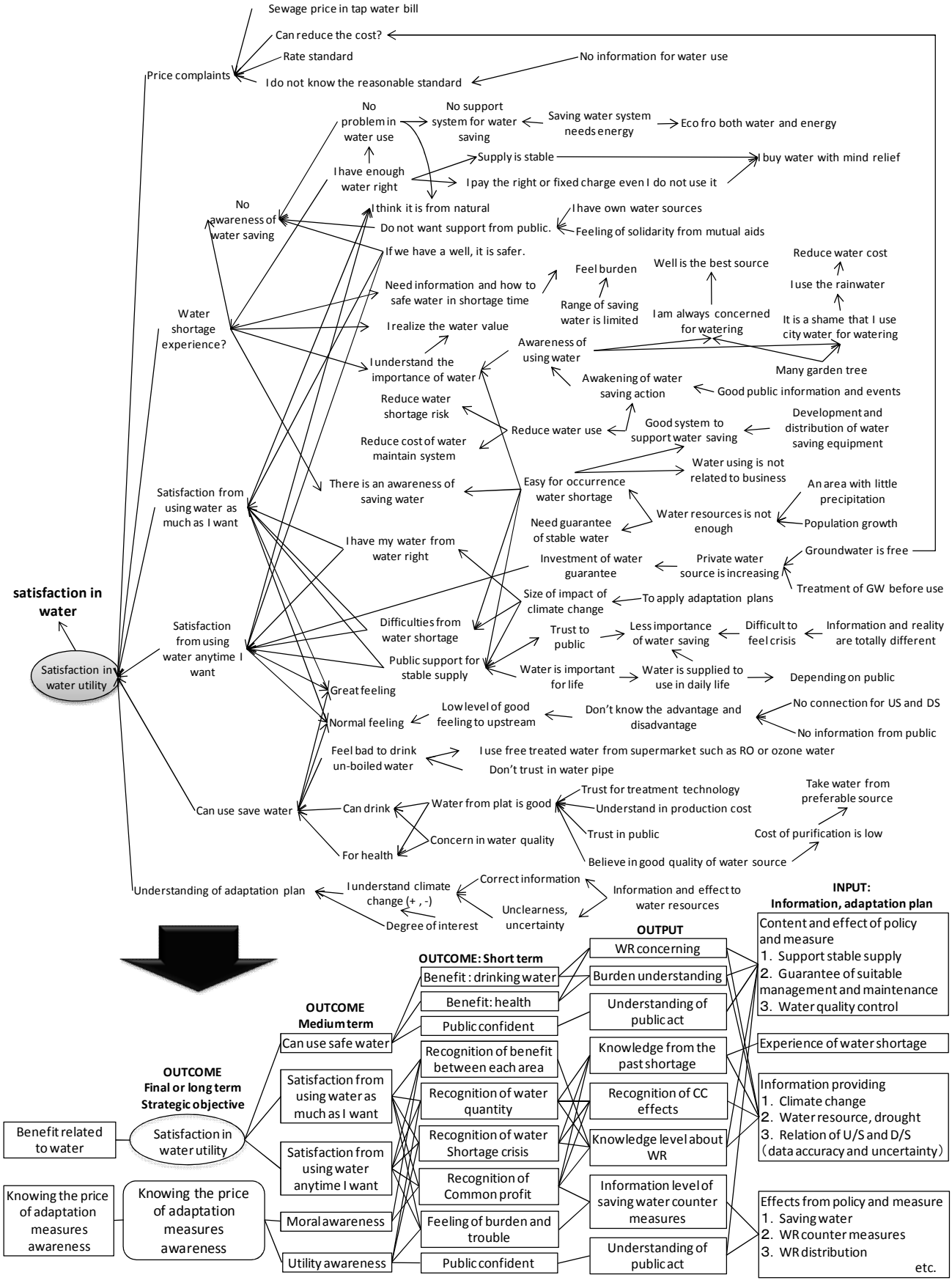

Figure2 recognition map and logic model to satisfaction in water utility

recognition map. The outcome of medium term "Can use safe water", "Satisfaction from using water as much as I want" and ""Satisfaction from using water anytime I want." The element of this lower define as knowledge outcome. It has been extracted satisfaction configured based on what's the recognition. This is a consolidation of information as a common element. The outcome of medium term is evaluated through knowledge outcome. In other words, for example "Can use safe water" are evaluated by the feeling that whether the benefits to health or whether the benefits of drinking. This benefit is evaluated from the recognition that good quality of filtration plant. The importance of being in good water utility is recognizing again by providing information to citizens. Even if we had the same information, they may have different ways of recognizing. Knowledge output positioned as the degree of understanding in the logic model. It is a level of understanding to information, so it is defined knowledge output. This below is the element as information input.

Here, it is another question that accept the policy and they evaluation of benefit. Even if they understand the environment important, they may decline the policy as be liable to agree in the general, but disagree in the particular. The higher benefits are not necessary accepting. Everyone try to save water is kept in good society that is suppressed the drought risk. However, not all try to save water pass through drought because it is a troublesome. Save water may reduce the satisfaction even if water resources as a common resource know them to important. Therefore, structure of consciousness consists of common elements to the two outcomes that have the concept benefits and accepting.

5. CONCLUSION

This paper ordered the citizen's consciousness about water resources as a logic model. This would be to devise a hypothesis for piece out the citizen consciousness. Therefore, interviews have become to be conscious of the final outcome. The covariance structure come into being that regard the deletion elements as serious in certain circumstances in analysis of the different data. So, I have been made a hypothesis what citizen's consciousness mean as the relationship between A and B from hearing. The important thing is that I was trying to understand the maximum of citizen's consciousness. In the future, I have to test the logic model of a hypothesis by the management cycle. I will do the quantitative evaluation according to the survey.

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