



## THE CASE STUDY APPLIED THE CONTINGENT VALUATION METHOD(CVM) TO THE SABOPROJECT EVALUATION

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### ABSTRACT

The benefits of the sabo works were concentrated on the effects of decreasing direct damage, but as for the other items having effects, no actual evaluation has been conducted under the present conditions. And therefore, we have implemented an evaluation of the effects of improving the feeling of safety of the CVM (contingent valuation method) sabo works as one of the evaluation techniques, which is presented herein. The working procedure of the CVM can be divided into preliminary investigation, main investigation, analysis of the investigation data and evaluation. In the preliminary investigation, its objectives were set at preparing explanatory material, questionnaire and others, thereby grasping the trend of the preliminary investigation, to prepare for the main investigation. In the main investigation, having considered the result of the preliminary investigation, the effects of improving the feeling of safety of the sabo works were measured based on the questionnaire and explanatory material. After that, an analysis was made based on the result of measurement and the result of the obtained reasons for assent, to determine the amount to be paid for the works. The obtained result of measurement of benefits was, having considered the beneficiaries and the period for making payment, about 790 million yen as the effects of improving the feeling of safety of the sabo works in the basin of the Kano River. However, there exist several problems that need to be solved, and also there are only few examples using the CVM, and therefore it is desired that studies should be conducted from now on.

**KEYWORDS:** CVM (contingent valuation method), the proposed amount of money, amount of money that the people are willing to pay, assent ratio curve, bias

### INTRODUCTION

The benefits of the conventional sabo works were concentrated on the direct effects of decreasing damage, and while the other effects such as the indirect effects of decreasing damage, the effects that have influence on local economy, etc. (effects of improving the feeling of safety and effects of conserving mountain ranges and forests) were listed as items of effects, very few evaluations were actually made. However, many studies have been made in recent years concerning the analysis of the economic effects of public works, and evaluation techniques have been established not only for the direct effects of the works, but for various effects that are generated secondarily as well.

Firstly, the CVM is a technique to evaluate the effects brought by the works to be evaluated by means of the total amount of money that the beneficiaries are willing to pay as contribution. Also, the sabo works are usually put into practice by means of the public expenditure, and so the

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beneficiaries can enjoy the benefits free of charge. In the CVM, the total amount of money that the beneficiaries are willing to pay is obtained by supposing that the benefits obtained by the sabo works can only be enjoyed by paying for the same, thereby evaluating the value of the project. Therefore, there are 2 points in the CVM: (1) grasping who are the beneficiaries, and (2) grasping the average amount of money that the beneficiaries are willing to pay.(Kobayashi M.,1999)

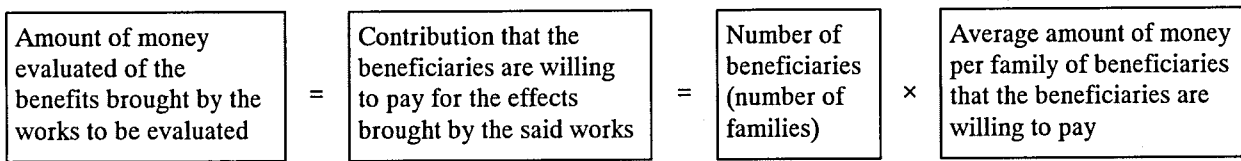


Fig. 1 Basic ways of thinking of evaluations by means of the CVM

### GENERAL PROCEDURES IN THE CVM

As general procedures in the CVM, it is usually implemented in 2 stages, "preliminary investigation" and "main investigation". It is very important how the questionnaire sheet is designed, and the main investigation needs to be carried out after having studied the contents of description of the questionnaire sheet by conducting the preliminary investigation. Accordingly the overall flow of the CVM is given below.

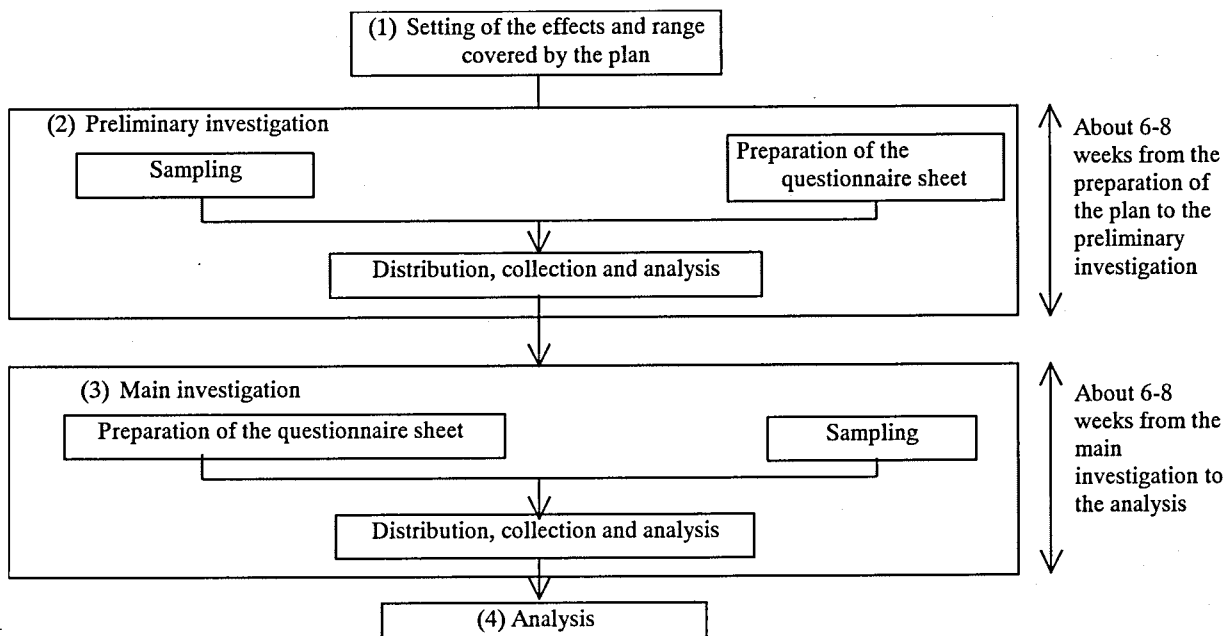


Fig. 2 Flow of the CVM

### WORK ASSOCIATED WITH THE CVM (CALCULATION PROCEDURE)

#### Setting of the effects and range to be measured

When implementing the CVM, the effects and range to be measured need to be clarified. In this investigation, the effects of improving the feeling of safety of the debris flow prevention works have been measured by means of the CVM, of which explanations are given below.

Regarding the range of investigation, in order to prevent a duplicate counting of the effects brought by the sabo works of the river system as well as by the river works, we have decided to

include the municipalities within the basin to the minimum extent.

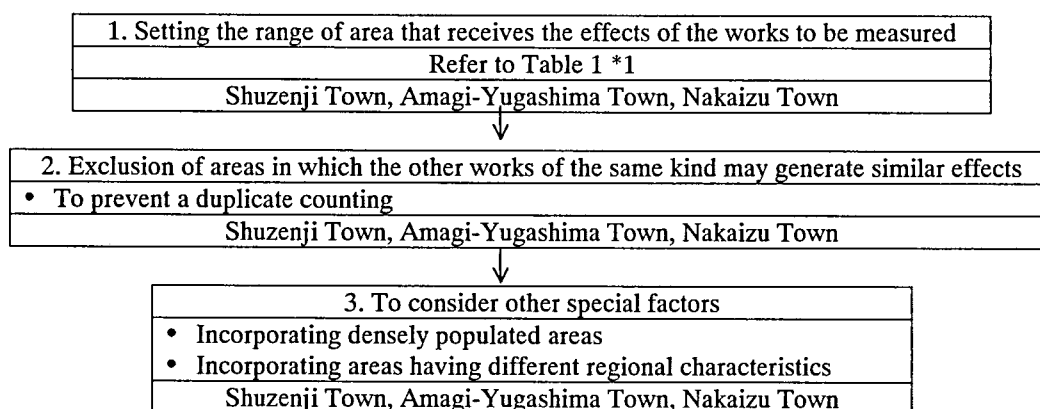


Fig. 3: Setting procedure of the range to be measured

Table 1: Items of Effects to be Measured by the CVM \*1

Works to be measured	Items of effects		
		Contents	Areas to be measured
River system sabo prevention works	Improvement in the feeling of safety	Improvement in the safety of local communities	Entire municipalities including flood susceptible areas
	Improvement in the function of a forest	Effects of conserving mountain ranges and forests	Entire municipalities including flood susceptible areas
Debris flow prevention works	Improvement in the feeling of safety	Improvement in the safety of local communities	Entire municipalities including flood susceptible areas
Steep slope failure prevention works	Improvement in the feeling of safety	Improvement in the safety of local communities	Entire municipalities including threatened areas
Landslide prevention works	Improvement in the feeling of safety	Improvement in the safety of local communities	Entire municipalities including threatened areas

## Preliminary investigation

### *Sampling*

The main objectives of the preliminary investigation are to verify the appropriateness of the explanatory material and questionnaire, and therefore the number of samples may be small, but it is required to listen to opinions of the people who answer the questionnaire sufficiently concerning the points that are not easy to understand for them, and others.

### *Preparation of the explanatory material and questionnaire (for the preliminary investigation)*

In the preliminary investigation, verification of whether the explanatory material and questionnaire are easy to understand or not, and setting of the proposed amount of money in the main investigation are carried out.

#### 1) Explanatory material

Replies to questions must be made after having completely grasped for what kinds of works the subjects suppose that they will share expenses. Hence, material explaining the outline of the works so that it can be easily understood shall be prepared, making use of photos, drawings and others where necessary.

#### 2) Questionnaire - an amount of money that the people are willing to pay -

Ask the subjects about the amount of money that they are willing to pay, supposing that they themselves will share the expenses of the works to be evaluated. Also, since the amount of money to be replied cannot be foretold at the stage of the preliminary investigation, a free replying method

shall be employed.

3) Questionnaire - reason of judgment -

Irrespective of whether or not the subjects assent to the shared expenses, all the subjects shall be asked about the reason of judgment, thereby shutting out the bias resulting from "high spirits" and others.

4) Questionnaire - others -

In the preliminary investigation, questions are to be raised on the material and questionnaire that are not easy to understand, in which improvements will be made at the main investigation.

***Distribution, collection and analysis***

The objectives of the preliminary investigation are to verify the appropriateness of the questionnaire, and it is required to listen to opinions of the people who answer the questionnaire sufficiently on whether the explanatory material and questionnaire are easy to understand or not, and others. Accordingly it is desired that a method of distribution by postal mail = method to collect the questionnaire by visiting the people should be employed.

**Main investigation**

***Preparation of the explanatory material and questionnaire (for the main investigation)***

Based on the result of the preliminary investigation, the explanatory material and questionnaire shall be improved and prepared. The following items can be counted as the points to be improved.

1) Improvement in the explanatory material and questions

Concerning the points that the subjects felt that they are not easy to understand, they should be changed into those that are easier to understand.

2) Setting of the proposed amount of money

In this main investigation, attention should be paid as to whether the replies are easy to make for the people making replies, and a question should be asked about whether they assent to or reject (Yes - No) the proposed amount of money. At that time, a question shall be raised about the amount of money that they are willing to pay by means of a 2-stage, 2-item method. Regarding the proposed amount of money, an amount of money that is proposed initially should be set in 6 stages based on the result of judgment.

3) Setting of the method of payment

The main methods of payment can include the shared expenses, taxes and donations. However, there actually exists a system of the shared expenses in the steep slope failure prevention works. Also, the way of asking about taxes is likely to invoke resistive answers, because in Japan collection of money for a specific purpose is not generally practiced. Therefore, when the effects of the sabo works are measured, it is desired that the question about the amount of money that they are willing to pay should be raised in the form of a donation.

4) Setting of the period of payment

In calculating the amount of money that they are willing to pay, a setting of the period of payment affects the result greatly, and hence the setting of the period of payment is important.

**Table 2** Type of Abnormal Data and Method of Exclusion

Type	Outline	Method of Exclusion
High Spirits	<ul style="list-style-type: none"> <li>A reply that does not evaluate the works themselves, but assents to or rejects them due to the other factors.</li> </ul>	<ul style="list-style-type: none"> <li>A reply that mentions that "there is significance in that everybody gives a donation" as the reason for "assenting" to the donation, should be excluded.</li> </ul>
Lack of understanding	<ul style="list-style-type: none"> <li>A reply selecting "assent" without any particular reason and without understanding the contents of the works or the meanings of questions.</li> </ul>	<ul style="list-style-type: none"> <li>A reply that mentions that "I cannot understand the explanation of the works" as the reason for "not assenting" to the donation, should be excluded.</li> </ul>
Resistive reply	<ul style="list-style-type: none"> <li>A reply that is deemed to have selected "not assenting" to this type of investigation as a means to express a will to object to it.</li> </ul>	<ul style="list-style-type: none"> <li>A reply that mentions that "such works should be implemented within the range of taxes collected until now by the national or municipal government" as the reason for "not assenting" to the donation, should be excluded.</li> </ul>
Indifference	<ul style="list-style-type: none"> <li>A reply that is deemed to have indifference to the works as the reason for "not assenting" to the shared expenses.</li> </ul>	<ul style="list-style-type: none"> <li>A reply that mentions that "I am indifferent to it" or "I do not want to mention the reason" as the reason for "not assenting" to the donation, should be excluded.</li> </ul>

**Sampling**

The heads of families residing in the area under consideration shall be selected by random sampling by means of the basic resident registers.

In the investigation to be conducted this time, the effective number of replies targeted is 300. If 300 effective replies are obtained, by setting the initial proposed amount of money in 6 stages by means of the 2-stage, 2-item method, about 150 pieces of information on assent or rejection are obtained per 1 proposed amount of money. In the CVM, it is generally supposed that about 100 effective replies per proposed amount of money will suffice, and in order to meet such a level of conditions, we have set the number at 300. However, the target of the effective number of replies is set at more than 300, and so about 360 times of sampling shall be made in the area under consideration.

If the area under consideration is substantially wide, then after having sorted out investigation implementation areas out of the said area under consideration, the people shall be selected by sampling.

**Distribution and collection**

The main investigation shall be carried out by means of a visiting and interviewing method. By using the method of distribution by postal mail and collection, sufficient explanations of the contents of the works cannot be given, and so it is not desirable in the CVM.

**Analysis**

**Exclusion of abnormal data**

In order to calculate an accurate amount of money that the people think they can pay, if there is any inconsistency or problem in a subject's reply, it needs to be excluded. The 4 types given in Table 2 can be considered as abnormal data.

**Estimation of an assent ratio curve**

From the reply data of 1 person (the first amount of money proposed is assumed to be  $D_n$ ), the number of replies to 3 types of amounts of money:  $D_{n-1}$ ,  $D_n$ ,  $D_{n+1}$  can be obtained (excluding the abnormal data).

<All the reply patterns (A - E and the data that can be obtained)>

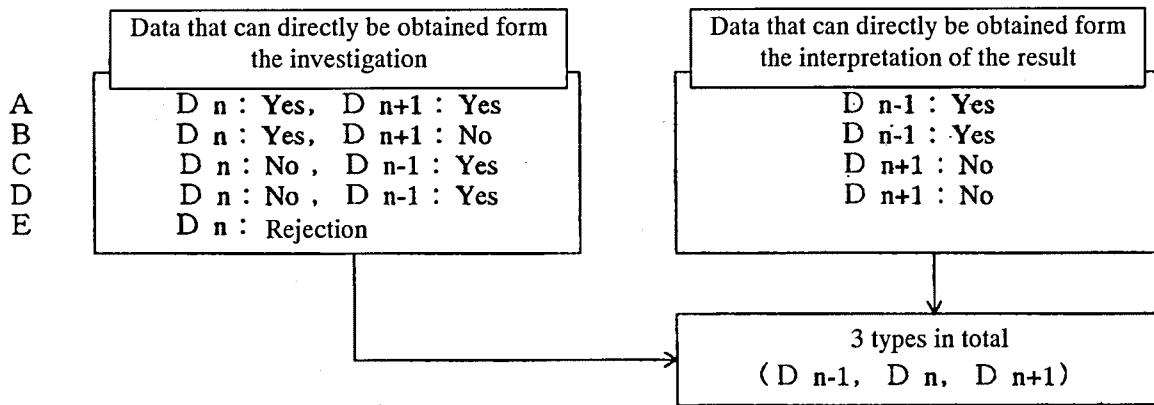


Fig. 4 Study pattern that can be estimated

By means of these data, an assent rate curve shall be estimated to calculate an average amount of money that the people are willing to pay. The assent rate in relation to the proposed amount of money: Yen D<sub>n</sub> in Table 2 is represented by the following expression.

$$D_n = \frac{Y_{1,n} + Y_{2,n} + Y_{3,n} + Y_{2,n+1}}{N_{2,n-1} + Y_{2,n-1} + N_{2,n} + R_n + Y_{2,n} + N_{2,n+1} + Y_{2,n+1}}$$

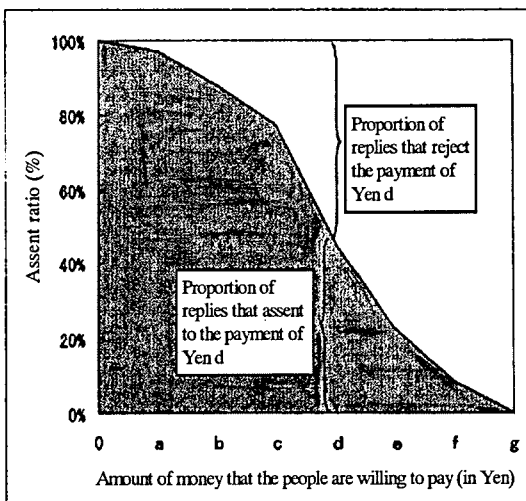


Fig. 5 Example of an assent ratio curve

Calculation is made by means of this. The numerator is a total of all the replies that expressed assent to Yen D<sub>n</sub>, or that is interpreted as having expressed assent, out of the first amount of money proposed being Yen D<sub>n-1</sub>, D<sub>n</sub>, D<sub>n+1</sub>. The denominator is a total of all the effective replies of which first amount of money proposed was Yen D<sub>n-1</sub>, D<sub>n</sub>, D<sub>n+1</sub> and the replies that expressed substantial rejection to Yen D<sub>n</sub>. (The replies that expressed substantial rejection to the other first amount of money proposed: R<sub>n-1</sub>, R<sub>n+1</sub> are not included in the denominator for obtaining the assent ratio.)

By means of the assent ratio curve that has been obtained as above, the proposed amount of money is plotted in the horizontal axis, and the assent rate curve is plotted in the vertical axis. The average amount of money that the people are willing to pay is calculated as the area given by the shaded part (area integral) in Fig. 5.

**Calculation of an annual average amount of money that the people are willing to pay**

Since the average amount of money that the people are willing to pay is the one evaluated at the present time, by means of a discount rate (4%) (Ministry of Construction 1999), the amount of payment every other year during the period of payment shall be converted to the present value, thereby obtaining an annual average amount of money that the people are willing to pay (present

value).

**Calculation of benefits**

The obtained annual average amount of money that the people are willing to pay shall be multiplied by the number of families, to calculate the total amount of money that the people are willing to pay (=benefits).

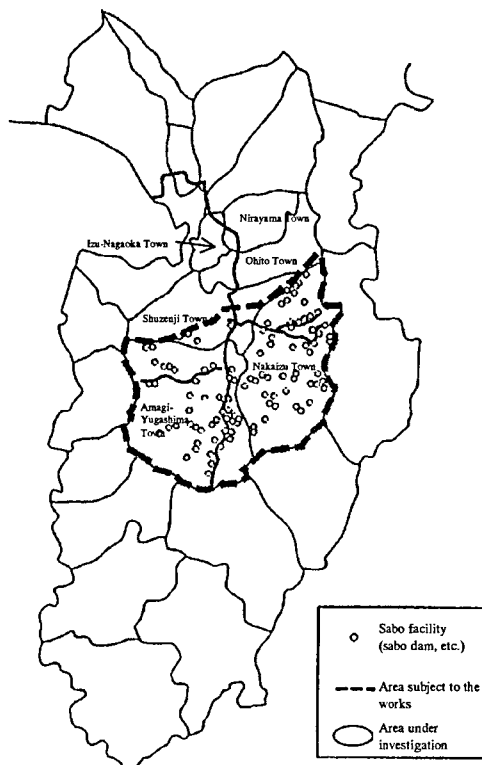
$$(\text{Total amount of money that the people are willing to pay}) = (\text{Annual average amount of money that the people are willing to pay (present value)}) \times (\text{Number of families}) \times (\text{Period of payment})$$

**AREAS TO BE MEASURED**

The areas where improvement in the feeling of safety will be measured are as shown in Fig. 6. And the number of families in each municipality in the areas to be measured is given in Table 3.

When determining the areas to be measured, a duplicate counting (repeated counting) of the effects brought by the sabo works of the river system as measured in the CVM needs to be prevented. Also, since measurement is made at the safety side in the cost-benefit analysis, we have decided that the municipalities within the basin should be set to the minimum extent. Note also that, when the sabo works of the river system are measured in the CVM, the areas to be measured this time should be excluded.

To put it specifically, in the basin of the Kano River, we have determined that Shuzenji Town, Nakaizu Town and Amagi-Yugashima Town in the upper reaches of the sabo control point should be the areas to be measured, based on the idea that "areas regarding which a duplication may occur when similar investigation is conducted in the basin of the Kano River should be excluded", and "the areas should be within the range where there are effects of the debris flow prevention works."



**Fig. 6** Area under investigation

**Table 3** Number of families in the areas under investigation

Effect to be measured	Investigation	Name of municipality	Number of families	Target number
Improvement in the feeling of safety	Areas of implementation	Shuzenji Town	5,671	160
		Nakaizu Town	2,407	70
		Amagi-Yugashima Town	2,478	70
Total			10,556	300

**PRELIMINARY INVESTIGATION**

**Sampling**

As the people under preliminary investigation, we have chosen heads and officials of 10 neighborhood associations in the municipalities in other areas in which CVM investigations are scheduled in the same period using similar questionnaires. Regarding the people under preliminary investigation, we selected them based on the decision of the committee that "although there is no problem even if the number of people investigated is small, it is important that the people under investigation fully understand the contents of investigation before evaluating

the questionnaire sheet and making a reply on the amount of money they are willing to pay, to which the committee has agreed. Also, for the same reason, it is desired that the preliminary investigation should be made by means of a visiting and interviewing method, and therefore we have chosen heads, officials and others of neighborhood associations who are likely to show an understanding of such investigation.

And in order to set the amount of money that the people are willing to pay in the main investigation, we have asked the people under preliminary investigation to consider not only the amount of money that the head or official of a neighborhood association is willing to pay as an individual, but also the overall trend and opinions, etc. of the people in the town and others.

#### **Works under investigation and effects under investigation**

We have chosen the effects of improvement of the feeling of safety in the "Steep Slope Failure Prevention Works (tentative name)", as well as the effects of conservation of mountain ranges and forests in the "River System Sabo Plan (tentative name)" within the administrative range of other construction work offices under direct supervision. The effects in each of the works have been assumed to last as long as 100 years.

#### **Amount of money that the people are willing to pay**

A free replying method has been employed for the amount of money that the people are willing to pay. It has been assumed that the payment shall be made in the form of a donation, and the period of payment shall be 10 years hereafter. When the questionnaire was prepared at first, the period of having effects were assumed to be 100 years, and so it has been considered that the period of payment should also be 100 years. However, we have set the period of payment as 10 years, based on the judgment of the committee that "the period of payment of 100 years is difficult for the people under investigation to make judgment based on assumptions, and (having considered the life of a human) a period that is easy to make judgment should be set".

#### **Others (whether or not the questionnaire sheet is easy to understand, etc.)**

Questions were made on hazardous spots, hazardous torrents, the degree of recognition of the designation of hazardous areas, and the degree of recognition of the works. Also, appropriateness was verified as to whether or not the questionnaire sheet is easy to understand.

#### **Result of the preliminary investigation**

As a result of the preliminary investigation, it has been verified that the period of having effects is 100 years, and the appropriate period of payment is 10 years. Also, we have decided that the proposed amount of money should be set between 500 yen and 50,000 yen. Based on the result of the preliminary investigation, we have decided to change the main investigation as shown in Table 4.



**Table 4 Handling in the main investigation**

	Major results of the preliminary investigation	Handling in the main investigation
Explanations of the works	<ul style="list-style-type: none"> <li>○ They are easy to understand on the whole. (The high awareness of the people under investigation was also a factor.)</li> <li>● Many people misunderstood that the works will be implemented spending 100 years.</li> <li>○ However, many expressed opinions that they can understand that "the effects last for 100 years".</li> <li>● The cost of the works should be described.</li> <li>● The With - Without of the works should be made clearer (especially on the explanations of Without of mountain ranges and forests).</li> <li>○ Names of administrative sections should be described.</li> <li>* I cannot answer a question based on an assumption. (1 case: We counted it as an invalid vote.)</li> </ul>	<p>→ To clarify the descriptions.</p> <p>→ When a question is raised, the total amount of the cost of works shall be given as an answer.</p> <p>→ To come up with illustrations etc. to make the comparison clearer.</p>
Form of payment	<ul style="list-style-type: none"> <li>● Some expressed an opinion that the donation should be adopted because the will of an individual (family) can be reflected, and others were of an opinion that compelling force is required to a certain extent from the standpoint of the people under investigation.</li> <li>● There was an opinion that they feel uneasy about each of the percentages of share taken by the national and prefectural governments and by the local people.</li> <li>● The unit of payment should be "monthly" for the paying side, because the amount of money paid at a time is small, but in that case the price specified would not be based on the understanding of the works, and rather it would be judged from the amount of money that can be paid freely.</li> <li>● It is impossible to carry out the actual collection of money, and so "monthly" would lessen the seriousness of the answer.</li> <li>● Although the appropriate period of payment is about 10 years, some expressed an opinion that no particular period needs to be specified. (In the case of the effects of conservation of mountain ranges and forests, in particular.)</li> </ul>	<p>→ It should be a donation based on the point of investigation to ask an individual about his/her intention to pay.</p> <p>→ If a question is raised about it, an answer should be made that the works will be implemented by means of the donations only.</p> <p>→ The unit of payment shall be yearly.</p> <p>→ Ditto, above.</p> <p>→ It shall be 10 years both for the effects of improving the feeling of safety, and for of the effects of conservation of mountain ranges and forests.</p>
Setting of the proposed amount of money	<ul style="list-style-type: none"> <li>● Improvement in the feeling of safety: 0 - 60,000 yen/year On average about 12,000 yen/year Note, however, that many replied that it will be about 500 - 1,000 yen/year if a donation is actually to be collected.</li> <li>● Conservation of mountain ranges and forests: 1,200 - 120,000 yen/year On average about 30,000 yen/year Note, however, that the amount of money varies depending on each person under investigation, as compared with that for the improvement in the feeling of safety.</li> </ul>	<p>→ The lower limit should be set at 500 yen/year, and the upper limit at 50,000 yen/year.</p> <p>→ Ditto, above.</p>
Others	<ul style="list-style-type: none"> <li>● The meaning of "compensation for the damage calculated on trial" is hard to be understood, which is included in the questions on the improvement in the feeling of safety.</li> <li>● There is danger that the number of places where the works are carried out may have very little influence on the amount of money replied.</li> <li>● Others</li> </ul>	<p>→ To clarify the description. (To be compensated in the case of "Without")</p> <p>→ To clarify the description.</p> <p>→ Review of the reason for assent or rejection, review of the choices concerning the degree of recognition.</p>

## ABOUT THE MAIN INVESTIGATION

### Method of investigation

We have determined that the main investigation should be implemented by means of a visiting and interviewing method.

### Sampling

First, based on the number of families in the area under investigation obtained from the basic resident registers as of March 31, 1997, random sampling (stratified 2-stage sampling method) was made from the basic resident registers as of January, 1999 of each municipality.

### Amount of money that the people are willing to pay

The amount of money that the people are willing to pay was determined by means of the 2-stage, 2-item method. The first amounts of money proposed were 500 / 1,000 / 2,000 / 5,000 / 10,000 and 20,000 yen. The second amounts of money proposed were set, according to the first amounts of money proposed, at: 200 / 500 / 1,000 / 2,000 / 5,000 / 10,000 / 20,000 and 50,000 yen.

## RESULT OF THE MAIN INVESTIGATION

### Outline

The main investigation was implemented from February 20, 1999 through March 9. The number of replies made is as shown in Table 5.

### Result

As a result of excluding the abnormal data (see Table 1) from the 300 cases in total, the number of effective replies became 100 (33%).

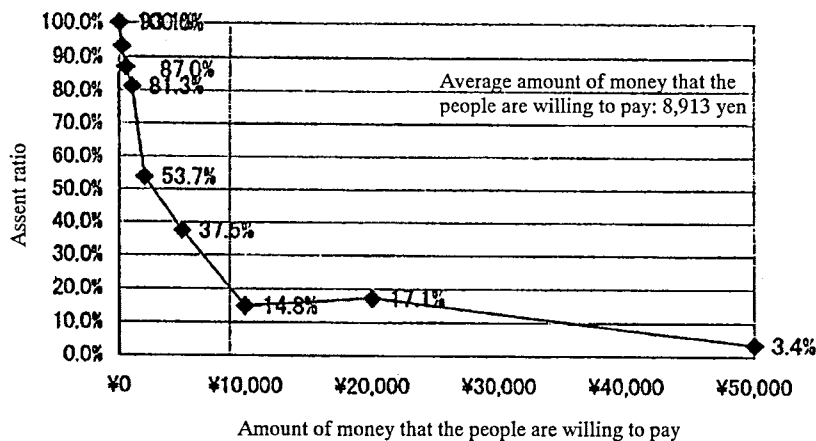
**Table-5** Status of collection of the main investigation

Effect to be measured	Name of municipality	Target number to be collected	Number of replies	Collection rate
Improvement in the feeling of safety	Shuzenji Town	160	160	100%
	Nakaizu Town	70	70	100%
	Amagi-Yugashima Town	70	70	100%
	Total	300	300	100%

The reason for such a small number of effective replies was that an unexpectedly large number of replies were excluded as abnormal data. In 78 cases (26%) of replies, in particular, payment of a donation was rejected for the reason that "such works should be implemented within the range of taxes collected until now by the national or municipal government", which have been excluded based on the judgment that there exists bias resulting from a "resistive reply"..

## CALCULATION OF THE AVERAGE AMOUNT OF MONEY THAT THE PEOPLE ARE WILLING TO PAY

The average amount of money that the people are willing to pay was calculated as 8,913 yen based on the assent ratio curve in Fig. 7.



Note) In the main investigation, because of the reasons such that there was a small number of effective replies and others, the result has shown that the assent ratio to 10,000 yen was higher than the assent ratio to 5,000 yen.

Fig. 7 Assent ratio curve

Since the average amount of money that the people are willing to pay is the one evaluated at the present time, the average amount of money that the people are willing to pay as has been calculated by means of a discount rate (4%): 8,913 yen/year-family shall be converted to the present value, thereby obtaining an annual average amount of money that the people are willing to pay (present value).

$$\begin{aligned}
 \text{(Average amount of money that the people are willing to pay (as converted to the present value))} = & \frac{\sum_{i=1}^n \text{Calculation of the annual average amount of money that the people are willing to pay}}{(1+r)^i} \\
 & n
 \end{aligned}$$

Where, n is the period of payment (10 years), and r is the social discount rate (4%).

As a result of this, the annual average amount of money that the people are willing to pay (present value) has been calculated as 7,518 yen/year-family.

## CALCULATION OF BENEFITS

As a result of calculating the total amount of money that the people are willing to pay (=benefits) from the obtained annual average amount of money that the people are willing to pay, it was about 790 million yen.

(Total amount of money that the people are willing to pay) = (Annual average amount of money that the people are willing to pay (present value)) X (Number of families) X (Period of payment)

Where, the number of families (under investigation) is 10,556, and the period of payment is 10 years for both of them.

$$(794,000,000 \text{ yen}) = (7,518 \text{ yen/year-family}) \times (10,556 \text{ families}) \times (10 \text{ years})$$

## MEASUREMENT OF BENEFITS OF THE DEBRIS FLOW PREVENTION WORKS IN THE BASIN OF THE KANO RIVER BY MEANS OF THE CVM

### Amount of money that the people are willing to pay

The annual average amount of money that the people are willing to pay as calculated in the foregoing item was 7,518 yen/year-family for the improvement in the feeling of safety. As compared with the result obtained by other investigation than the main investigation, it can be said

that the amount of money that the people are willing to pay in the basin of the Kano River is about average.

### **Existence of invalid replies**

In the investigation conducted this time, there was a high percentage of invalid replies that did not fully understand (the questions raised about the amount of money that the people are willing to pay) the effects of the improvement in the feeling of safety.

So many groups of people, in particular, mentioned that "such works should be implemented within the range of taxes collected until now by the national or municipal government" as the reason for giving an answer of "not assenting to the payment".

### **Number of effective replies**

In the investigation conducted this time, the number of collected cases was set at 300, assuming that the percentage of the invalid replies as shown in (2) above is about 30%. However, a very high percentage of invalid replies was generated that cannot be used for the calculation of the amount of money that the people are willing to pay as stated above, and therefore the number of replies that was used for calculating the effects of improvement of the feeling of safety became small, equaling 100. It should be noted that the estimated range of errors in the assent ratio varies depending on the proposed amount of money.

## **CONCLUSION**

In the CVM investigation, besides the donation, other ways of raising a question can be considered such as [1] the shared expenses, [2] fund-raising, etc. Bearing in mind that the measurement of the benefits of sabo works by means of the CVM will be transferred to the original unit, and that the CVM will be manualized, it is required that the ways of raising a question as in [1], [2] and others should be used. Also, in addition to the further propagation of the knowledge of disaster prevention, to improve the people's recognition and cooperation of the investigation using questionnaires and others is an important problem required for accurately grasping the consciousness of the people and for improving, on the basis of it, the accuracy of the CVM investigation.

It is not that the CVM is a fixed technique for evaluating the benefits of sabo works. Only one of the examples that have been studied in various areas as model cases is presented here. As stated in the text, there are a lot of problems that should be solved, such as the issue of bias in questionnaires, etc., and it needs to be put into general use only after examples of investigations have been accumulated from now on.

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