Household behavior towards shallow groundwater saving in Pekanbaru City

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Abstract. Growth in household activities that increase water resource needs can be incompatible and their availability can be threatened. Limited water supply makes groundwater a primary need because it is easily exploited and practical. This paper attempts to understand the behavior of shallow groundwater saving by households and to observe the influence between knowledge, attitudes, and practice with their behavior. This research was conducted in the Bukit Raya Subdistrict in Pekanbaru City with 113 respondents, analyzed using a quantitative approach (SPSS). The results showed that knowledge, attitudes, and practice had a positive influence of 32.4% on shallow groundwater saving behavior. This research concludes that knowledge is the most influencing shallow groundwater saving behavior seen from the influence of attitude and practice.

1. Introduction
Water is unlimited and susceptible resource which is needed to sustain life, development, and environment [1,2]. Clean water resource of Indonesian comes from groundwater which becomes the main choice [3]. In Indonesia’s urban area, it has a high dependency on dug wells which is around 22 percent [4]. Dug well is an access to get shallow groundwater. Indonesia has become one of the countries that contributes environmental damage due to human behavior, especially urban area [5]. Therefore, the annual population growth makes the needs of shallow groundwater increasing. Groundwater becomes the main choice of urban clean water which comes from aquifer can cause environmental damage. This damage is caused by massive overuse which increases sea water intrusion, groundwater table decrease, and flood risk growth [6,7].

The main problem of Indonesia urban groundwater is the interaction between groundwater and the user behavior, especially household. Excessive groundwater extraction for household activities cannot be denied due to the direct impact on groundwater use. Behavior related to the environment can raise most of the environment problem which is very complex and dynamic [8,9].

In the community, environment problem can be determined through behavior. Behavior is developed into knowledge, attitude, and practice [10]. Knowledge is a process of “know”, and it happens after people sense certain objects. According to Notoatmodjo, total attitude is formed by belief (faith), idea, concept, and emotional life (emotional evaluation) towards an object also the tendency to act [10]. Then, practice needs supporting factor (external) such as facility or a possible condition in order to realize attitude into a real practice.
So far, it is not found the study about the relation of knowledge, attitude, and practice on shallow groundwater saving behavior by the household in Bukit Raya Sub-district Pekanbaru City. This study is conducted to see this problem by determining the effect of knowledge, attitude, and practice on shallow groundwater saving behavior of households in urban area community. Then helping the campaign to create direct consciousness about the importance of groundwater saving on households in order to keep groundwater provision.

2. Materials and methods
This research was conducted with quantitative method. The data were collected through questionnaire for respondents. Respondents were households located in Bukit Raya Sub-district Pekanbaru City. Bukit Raya Sub-district was chosen because it has the average number of households and family members in Pekanbaru City, then Bukit Raya Sub-district can represent Pekanbaru City.

The households were chosen by purposive sampling, for those who had dug well-sourced from shallow groundwater. Purposive sampling was chosen because there is no data on the population of the use of dug wells in Pekanbaru City. The researcher searched for samples until the researchers obtained samples that the household considered to be shallow groundwater users from dug wells to fill out the questionnaire. The number of households in the Bukit Raya sub-district is 24,594 [11]. The survey data were conducted by collecting 113 households that participated. The total sample size of 113 households has exceeded the determination of the number of samples based on a statistical agreement that is at least 30 samples [12].

The questionnaires were divided into four parts. The first part was about knowledge of shallow groundwater issues in urban areas. The second part was about attitude of responses to shallow groundwater use such as water-saving attitudes, and responsibility for protecting shallow groundwater sources. The third part was practice of activities that have been carried out related to the use of shallow groundwater such as water recycling, while the fourth part was about behavior of shallow groundwater usage habits carried out at home and outside the home such as using gallon bottled water for drinking. The first to third parts were independent variables and the fourth part was dependent variable.

After obtaining the data, they were collected to be tested on the validity and reliability then be analyzed. Then, the data analysis was conducted by determination coefficient test which is processed by software SPSS version 22.

3. Results and discussion
Descriptive statistic based on the average value showed 86.5% of the respondents had very well groundwater saving knowledge, 71.5% of the respondents had positive groundwater saving attitude, 78.6% of the respondents had positive groundwater saving practice, and 70.3% of them had positive groundwater saving behavior. According to the collected data result which can be processed, 113 respondents obtained the value for validity test with critical coefficient (r table = 0.184) or more, then the instrument was considered as valid. The used instrument is for measuring knowledge, attitude, practice, and behavior in households. 41 items of statements were identified as valid. So, the respondent data could be progressed into reliability test. Reliability test shows that Cronbach Alpha 0.664 > 0.60 which means that items in questionnaire are reliable as data collection tool in this research. Multiple linear regression analysis is used to find out the influence of independent variables on dependent variables. Regression equation is used to facilitate in reading and conducting interpretation on result of this regression analysis. The result of simple and multiple linear regression test can be seen in table 1.

| Table 1. The result of multiple linear regression test. |
|-----------------------------------------------|
| Model | Un-standardized Coefficients | B | Std. Error |
|-------|------------------------------|---|------------|
| 1     | Constant                     | 1.692 | 3.467 |
|       | Knowledge                    | .416  | .140  |
|       | Attitude                     | .223  | .085  |
|       | Practice                     | .302  | .125  |
Equation of multiple linear regression obtained from table above is as follows:

\[ Y = 1,692 + 0.416X_1 + 0.223X_2 + 0.302X_3 \]

From table of multiple linear regression equation result above, it can be concluded that the constant only has two independent variables which have positive value and interconnected. If independent variables such as knowledge (X1), attitude (X2), and practice (X3) increase then behavior (Y) is increasing. Among these three independent variables, which is most influential is knowledge because it has variable coefficient value which is higher than attitude and practice.

The next analysis is, determination coefficient test (R²) in this research is conducted to find out attachment or closeness between dependent variables with independent variables. The closer to 1% or 100% then the greater the influence of independent variables on dependent variables. Result of R² test can be seen in table 2.

| Model | R  | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|----|----------|------------------|---------------------------|
| 1     | .569 \( a \) | .324     | .305              | 4.040                     |

\( a \). Predictors: (Constant), Knowledge, Attitude, Practice

Table 2 above obtained value of R Square/R² = 0.324 or 32.4 percent, which means that the influence contribution percentage of knowledge (X1), attitude (X2) and practice (X3) variables on behavior (Y) variable is 32.4 percent, while the rest 67.6 percent is affected by other variables which is not included in this model.

Statistical analysis shows that knowledge, attitude, and practice have effect on shallow groundwater saving behavior. The results showed the effect of shallow groundwater saving from this research variable 32.4 percent. Based on SNI (Indonesian National Standard) 2002 with a population of between one million to two million having household water needs of 150-210 liters per person per day [13]. Pekanbaru City which has a population of 1,064,566 residents could save shallow groundwater by 48.6-68.04 liters per person per day, therefore shallow groundwater needs decreasing to 101.4-141.96 liters per person per day [11].

Even though the effect is still quite small, this is because there is substitution of groundwater to other water resources such as water recycling, gallon drinking water, rainwater, and other water resources. The result of research is in accordance with theory of knowledge, attitude and practice have positive effect on behavior. Independent variable which is knowledge is the most important between other independent variables. Furthermore, knowledge and information of living environment are greatly needed to influence society’s behavior which contributes to shallow groundwater saving [14]. The decision to behave can be improved by giving more information related to knowledge and awareness and/or by giving many choices such as substitution and save shallow groundwater [15].

4. Conclusions
This research concludes that knowledge of shallow groundwater saving by households is very good and positive. In this research, we have sorted behavior of shallow groundwater saving from knowledge, attitude, and practice of households. The use of these variables can explain, predict, and change household behavior. Household behavior can save shallow groundwater for 32.4 percent. To emphasize shallow groundwater saving, it is very important to consider the increase of household knowledge and motivate shallow groundwater saving behavior more broadly. By understanding shallow groundwater saving behavior through knowledge, can make more creative and effective information through media which aims to encourage shallow groundwater conservation.

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