Holistic Water Management at the Community Level, Case Study Jabung District, Malang Regency, Indonesia

To cite this article: I R D Ari et al 2020 IOP Conf. Ser. Earth Environ. Sci. 448 012062

View the article online for updates and enhancements.
Holistic Water Management at the Community Level, Case Study Jabung District, Malang Regency, Indonesia

I R D Ari¹, W Rukmi¹ and N Elya¹

¹ Department of Regional and Urban Planning, Engineering Faculty, Universitas Brawijaya, Malang 65145, Indonesia
dwiari@ub.ac.id

Abstract. Access to safe water as a basic infrastructure is still a major problem throughout the world, and it is the main concentration to be solved as stated in SDGs pillars 6 and 9. Availability access to basic needs such as infrastructure of water is also one important homework to deal with for the Indonesian government along with the Universal Access 100-0-100. The research aim is to measure the Water Poverty Index (WPI) through the 5-component to propose a poverty eradication strategy of the water infrastructure at the community level. Jabung District in Malang Regency is chosen as the case study, wherein at about 33,19% and 16% of households are the receiver of Raskin (Poor Rice) program and Program Keluarga Harapan (Family Hopes Program) – the poverty alleviations programs in Indonesia. Both field observation and depth interviews are conducted towards 548 heads of households at the compiling data. The WPI measurement indicates that 1 of the 15 villages have the low safe value of WPI. Among the fifth component, the environment shows the worst scale of the WPI whereby 14 villages have a value of 49,16 (unsafe value), so integrated water management strategy by incorporating water balance for both domestic and non-domestic purposes is indispensable.

1. Introduction

Indonesian government has been doing hard to eradicate poverty through some poverty alleviation programs such as Beras Miskin (Raskin – Poor Rice) Program, Kartu Indonesia Pintar (KIP – Indonesia Smart Card), Program Keluarga Harapan (PKH – Family Hopes Program), Kartu Keluarga Sejahtera (KKS – Wealth Family Card), and Kartu Indonesia Sehat (KIS – Indonesian Health Card). Jabung District in Malang Regency, East Java Province has a huge number of the recipient's poverty program, consist of 33,19% and 16% households as the recipients of Raskin Program and PKH, respectively from primary data from District, 2019.

Recent years, poverty is no longer view as an economic aspect only but also can be seen from other dimensions [6] [7] [8]. Access to safe water as a basic infrastructure is still a major problem throughout the world, and it is the main concentration to be solved as stated in SDGs pillars 6 and 9. The main programs that can be carried out to reduce poverty according to the [14], are improving road and electricity facilities in rural areas, improving water, and sanitation facilities to improve health [13]. Access to infrastructure for the community is important because it can create economic improvements for the poor, especially in isolated areas [2]. Along with it, the Indonesian government
has been putting a target to achieve 100% households both in urban and rural areas with access to safe water through the Universal Access 100-0-100.

Consist of five components – Resources, Access, Capacity, Use, and Environment, measurement of Water Poverty Index (WPI) might give a specific illustration of the relationship between water availability, and the level of community welfare at a specific location [11]. Hence, the development of a basic idea of the research is on how to deal with poverty in the Jabung District through the water management strategy.

2. Literature

The basic idea of the research is on how to develop a poverty eradication strategy in the perspective of water management, wherein poverty is not only viewed merely from the economic aspect, but also for the water infrastructure development. Poverty in Indonesia is a development problem that is characterized by the limitations to get education and health services, the inability to access clean water, sanitation and shortcomings in meeting the basic needs of clothing, food, and shelter. Poverty is a low level of welfare caused by many things, such as low levels of health and education, community access to clean water and sanitation, lack of security, and lack of better life opportunities [14].

The WPI takes account of the water needs of the environment so that this can be integrated into water management strategies – this will help to maintain ecological integrity and protect the ecosystems that are essential to support our livelihoods. By incorporating measures of water use by industry and agriculture, the WPI does not neglect the importance of water needs for food and other productive purposes. The WPI provides a means of understanding the complexities of water issues by integrating the physical, social, economic and environmental aspects, and linking water and poverty issues.

Based on [10], there are five components in the WPI consist of resources, access, capacity, use, environment. Calculation of resource to effort to mitigate water availability. Access is calculated to determine the ease of being served water, sanitation, and health waste. Capacity is calculated for the effectiveness of people's ability to manage water. Utilization is how water is used for different purposes, it includes domestic, agricultural, and industrial use. Environmental components to determine environmental integrity related to water and ecosystem goods and services from aquatic habitats in the area.

Water management strategies will help to maintain ecological integrity and protect the ecosystems that are essential to support our livelihoods. The WPI provides a means of understanding the complexities of water issues by integrating the physical, social, economic and environmental aspects, and linking water and poverty issues [13]. In addition, since the WPI has a few criteria, it is easy to apply, which is based on cost-effectiveness, using existing data, transparent analysis process, and easy to understand. Finally, by considering the five components the WPI, its result could explain the relationship between water availability, and the level of community welfare, as well as develop a priority water demands, and tools for management of clean water source [12].

3. Methodological Approach

3.1 Data Collection and Sampling

Based on Slovin Formula with 5% error of level, a number of respondents are 548 households consist of 51% and 49% poor and non-poor households, respectively. Two types of data are collected consist of primary data – through field observation, sampling of water and interview, and secondary data – through formal institution at the level of Jabung district and Malang regency. A head of household answered face-to-face questionnaire interview as its representative and conducted within two weeks by four surveyors in September 2019.

3.2 Water Poverty Index

The following formula is a basic measurement of the WPI at a particular location (Sullivan, 2013).
\[ \text{WPI} = \frac{\sum_{i=1}^{N} w_i X_i}{\sum_{i=1}^{N} w_i} = \frac{w_r R + w_a A + w_c C + w_u U + w_e E}{w_r + w_a + w_c + w_u + w_e} \] (1)

\( X_i \) denotes to component \( i \), and \( w_i \) denotes as the weight of the component for the WPI at that location. The \( R – A – C – U – E \) is an abbreviation of the fifth components – Resources, Access, Capacity, Use, and Environment, respectively. Then, the weight of each component is labelled as \( w_r, w_a, w_c, w_u, \) and \( w_e \). The value of WPI is in the range between 0 – 100. Then, there are four levels of the WPI as illustrates in Table 1, meaning that the higher value of the WPI of a certain area the lower poverty level of its area.

### Table 1. Classification of water poverty index

| No. | Scale         | Water Poverty Index  |
|-----|---------------|----------------------|
| 1   | 0 – 47,9      | Severe               |
| 2   | 48,0 – 55,9   | High                 |
| 3   | 56,0 – 61,9   | Medium               |
| 4   | 62,0 – 67,9   | Medium Low           |
| 5   | 68,0 – 100    | Low Poverty Index    |

Source: [6]

Referring to [11], the following sub-components are measured for the research since it has a quite similar characteristic of the location.

### Table 2. Component and subcomponent of the water poverty index

| No | Component (R) | Sub-component                  |
|----|---------------|---------------------------------|
| 1  | Resource (R)  | a. Volume surface water         |
|    |               | b. Volume groundwater           |
|    |               | c. Volume piped water           |
| 2  | Access (A)    | a. Number of households with access to clean water |
|    |               | b. Number of households with access to Sanitation |
|    |               | c. Number of households with access to the healthy waste |
| 3  | Capacity (C)  | a. Public welfare               |
|    |               | b. Education level – head of households with 12-year schooling |
|    |               | c. Health level – the number of people suffering from water-related diseases in the household |
|    |               | d. The level of the regional income distribution |
| 4  | Use (U)       | a. Standard basic water needs (litre/capita/day) |
|    |               | b. Domestic water demand (litre/capita/day) |
|    |               | c. Area of irrigation (Hectare) |
|    |               | d. Area of cultivation, agriculture (Hectare) |
| 5  | Environment (E)| a. Quality of surface water and groundwater |
|    |               | b. Vegetation cover              |

Source: [10]

Value of R is sum up of (a) – (b) – (c) and then divided by three, wherein the data is collected through primary data at the level of the household. Value of A is compiled from secondary data at the district level, then the value of each sub-component is the percentage of each data towards a total number of households at each village. Through the questionnaire survey, the data of C is compiled, the value is the percentage of each sub-component in a household. For the U component, data is collected through primary survey toward a head of household interview for data (a) and (b), and secondary data from Agriculture Agency of Malang Regency for data (c) and (d). Measurement quality of water for the E component is conducted at the Environmental, Infrastructure and Information System Laboratory of Regional and Urban Planning Department, Engineering Faculty, Universitas Brawijaya. Sample of
water is collected from three types of water resources – wells, the reservoir of HIPPAM (community water management association), and water pipeline of PDAM (Local Company of Drinking Water). Then, data of vegetation cover is sum up of irrigation and rainwater rice fields that are collected from the Agriculture Agency of Malang Regency.

4. Result
Table 2 depicts the number of recipients at every village in Jabung District in 2018 [5]. The largest number of Raskin recipients are family who lives in Kemiri Village. Meanwhile, the smallest number of it lives in Taji Village with the percentage of 12 and 2 of the total number of Raskin recipients, respectively. Then, the largest number of PKH recipients are households in Kemiri Village. Meanwhile, the smallest one is in Gunungjati Village at about 10% and 3% among the total percentage of PKH recipients. As a whole, the largest number of recipients of both Raskin and PKH live in Kemiri Village. In other words, it is assumed that in general residents in Kemiri Village have the lowest community welfare amongst the others.

| Village           | Total Number of Household | Number of Raskin Recipients (household) | Percentage of Raskin (%) | Number of PKH Recipients (household) | Percentage of PKH (%) |
|-------------------|---------------------------|----------------------------------------|--------------------------|-------------------------------------|-----------------------|
| Kenongo           | 894                       | 353                                    | 5                        | 152                                 | 5                     |
| Ngadirejo         | 610                       | 286                                    | 4                        | 127                                 | 4                     |
| Taji              | 331                       | 98                                     | 2                        | 127                                 | 4                     |
| Pandansari Lor    | 1.132                     | 472                                    | 7                        | 255                                 | 8                     |
| Sukopuro          | 1.620                     | 465                                    | 7                        | 235                                 | 7                     |
| Sidorejo          | 927                       | 405                                    | 6                        | 214                                 | 7                     |
| Sukolilo          | 1.422                     | 464                                    | 7                        | 214                                 | 7                     |
| Sidomulyo         | 1.480                     | 497                                    | 8                        | 260                                 | 8                     |
| Gading Kembar     | 1.218                     | 483                                    | 8                        | 227                                 | 7                     |
| Kementren         | 2.815                     | 320                                    | 5                        | 152                                 | 5                     |
| Argosari          | 1.022                     | 521                                    | 8                        | 255                                 | 8                     |
| Slamparejo        | 1.287                     | 406                                    | 6                        | 178                                 | 6                     |
| Kemiri            | 1.538                     | 750                                    | 12                       | 326                                 | 10                    |
| Jabung            | 2.146                     | 654                                    | 10                       | 307                                 | 10                    |
| Gunungjati        | 943                       | 261                                    | 4                        | 108                                 | 3                     |
| **Total**         | **19.385**                | **6.435**                              | **100**                  | **3.137**                           | **100**               |

Water Poverty Index

1. Resource (R)
Based on field observation, there are two types of access to water resources namely piped and non-piped water connection. Two types of piped water connection, the first is a household which acquires water resources through piped water connection system from PDAM (Local Company of Drinking Water) Malang Regency. The second piped water availability in the district is defined for the households who acquire water resources through a simple piped water connection developed by the community water management association, namely HIPPAM. Through a simple piped water connection, raw water from the spring is transmitted to a reservoir then it is distributed to houses of the members of HIPPAM. Meanwhile, for the households who acquire water for their daily necessity directly from the groundwater – without water piped connection in the form of private and communal wells are categorized as the groundwater availability. In general, the depth of private and communal wells is about 10 – 20 meters.
Table 4. Water poverty index resource (R) Jabung District

| Village       | Groundwater availability (m) | Piped water availability (m³/capita/year) | WPI (R) |
|---------------|------------------------------|------------------------------------------|---------|
| Kenongo       | 0                            | 90000                                    | 100     |
| Ngadirejo     | 0                            | 118800                                   | 100     |
| Taji          | 0                            | 55800                                    | 100     |
| Pandansari Lor| 0                            | 221400                                   | 100     |
| Sukopuro      | 0                            | 300600                                   | 100     |
| Sidorejo      | 10                           | 0                                        | 100     |
| Sukolilo      | 10                           | 0                                        | 100     |
| Sidomulyo     | 10                           | 0                                        | 100     |
| Gading Kembar | 0                            | 111600                                   | 100     |
| Kemantren     | 0                            | 28450                                    | 100     |
| Argosari      | 0                            | 73800                                    | 100     |
| Slamparejo    | 0                            | 127800                                   | 100     |
| Kemiri        | 0                            | 67800                                    | 100     |
| Jabung        | 10                           | 0                                        | 100     |
| Gunungjati    | 10                           | 0                                        | 100     |

It can be seen from Table 4 that five villages use piped water sources and the other six villages have water resources from groundwater through the wells. Meanwhile, the rest of the three villages have both water resources in the form of wells – groundwater and piped water. The whole villages have water resources available through both groundwater as well as piped water, hence the value of water availability index of Resources component is 100.

2. Access (A)

The whole households in Jabung District are served by clean water for their daily needs – as it is measured at the WPI of Resources component (Table 3). Sanitation access depicts the percentage number of houses with individual latrine. Access to houses with healthy waste is measured through the ownership of an individual septic tank because the existence of a septic tank indicates an effort to treat domestic wastewater. From the collecting data, it is found that some houses in some villages do not have their septic tank. They have latrine but without a septic tank, so that some of them use the communal septic tank in together with their nearby houses, or they simply flow the greywater directly to the common drainage or river.

Table 5. Water poverty index access (A) Jabung District

| Village       | No. of House | Water Access (%) | Sanitation Access (%) | Septic tank Access (%) | WPI (A) |
|---------------|--------------|------------------|-----------------------|------------------------|---------|
| Kenongo       | 405          | 100              | 48                    | 0                      | 49      |
| Ngadirejo     | 306          | 100              | 54                    | 1                      | 52      |
| Taji          | 97           | 100              | 62                    | 0                      | 54      |
| Pandansari Lor| 441          | 100              | 43                    | 0                      | 48      |
| Sukopuro      | 518          | 100              | 76                    | 2                      | 59      |
| Sidorejo      | 499          | 100              | 54                    | 20                     | 58      |
| Sukolilo      | 528          | 100              | 94                    | 2                      | 65      |
| Sidomulyo     | 468          | 100              | 47                    | 0                      | 49      |
| Gading        | 454          | 100              | 77                    | 0                      | 59      |
Table 5 illustrates that access to clean water in Jabung District is good, indicated by a value of 100% which means that all villages have received clean water services. Two villages have sanitation access less than 50% consist of Pandansari Lor and Sidomulyo Village. Moreover, the value of access to the septic tank is still very poor, indicated by the value in some villages is 0%, which means that some houses still dispose of greywater carelessly because they do not have a septic tank. Hence the WPI value of Access is in between 48 – 67.

3. Capacity (C)

One of the components of the WPI analysis is the capacity which includes the level of health, education level, and expenditure distribution which is analysed using the Gini index. The level of education is calculated from the number of people who have a minimum high school education. It is stated that compulsory education for Indonesian is 12 years of schooling [6] [7].

Table 6. Water poverty index capacity (C) Jabung District

| Village            | Health Level (%) | Education Level (%) | Index Gini | WPI (C) |
|--------------------|------------------|---------------------|------------|---------|
| Kenongo            | 89               | 60                  | 0.71       | 66      |
| Ngadirejo          | 100              | 70                  | 0.72       | 71      |
| Taji               | 100              | 83                  | 0.59       | 71      |
| Pandansari Lor     | 100              | 77                  | 0.76       | 77      |
| Sukopuro           | 100              | 65                  | 0.68       | 67      |
| Sidorejo           | 100              | 82                  | 0.77       | 80      |
| Sukolilo           | 75               | 76                  | 0.68       | 72      |
| Sidomulyo          | 100              | 100                 | 0.43       | 72      |
| Gading Kembar      | 100              | 78                  | 0.64       | 71      |
| Kemantren          | 100              | 59                  | 0.77       | 68      |
| Argosari           | 96               | 79                  | 0.69       | 74      |
| Slamparejo         | 100              | 73                  | 0.78       | 76      |
| Kemiri             | 100              | 34                  | 0.76       | 55      |
| Jabung             | 100              | 66                  | 0.65       | 66      |
| Gunungjati         | 100              | 100                 | 0.69       | 85      |

Table 6 shows that generally, respondents in Jabung District have a good health condition, meaning that none of the households has a water-related disease. The lowest level of education is found in Kemiri Village, as well as the lowest Gini index value is also found in Kemiri Village, it means that there is an income gap in the village. So, the conversion value of the WPI for the variable capacity of Kemiri Village is the lowest compared to others.
4. Use (U)

Data of existing domestic water use is compiled through questionnaire interview, wherein each household is calculated the daily water consumption multiple with the total number of households. Data of the domestic water demand is calculated between the number of samples – head of households with a standard of water demand (100 l/person/day). Table 7 depicts that ratio between the existing domestic water use and the standard domestic water demands shows that the water source can serve the water needs of the respondents.

**Table 7. Water poverty index use (U) Jabung District**

| Village         | Existing domestic water use (l/village/day) | Domestic water demand (100 x pop) (l/village/day) | Domestic water use | Irrigation rice field (Ha) | Rainwater rice field (Ha) | The utilisation of agricultural land | WPI (U) |
|-----------------|--------------------------------------------|--------------------------------------------------|--------------------|----------------------------|---------------------------|-------------------------------------|---------|
| Kenongo         | 90,000                                     | 10,000                                           | 9,00                | 52,36                      | 263,01                    | 0,20                                | 60,00   |
| Ngadirejo       | 118,800                                    | 6,600                                            | 18,00              | 36,91                      | 1016,25                   | 0,04                                | 52,00   |
| Taji            | 55,800                                     | 3,100                                            | 18,00              | 33,1                       | 1162,19                   | 0,03                                | 51,50   |
| Pandansari Lor  | 221,400                                    | 12,300                                           | 18,00              | 111,16                     | 600,57                    | 0,19                                | 59,50   |
| Sukopuro        | 300,600                                    | 16,800                                           | 17,89              | 138,21                     | 1047,67                   | 0,13                                | 56,50   |
| Sidorejo        | 12,750                                     | 10,400                                           | 1,23               | 33,78                      | 209,4                     | 0,16                                | 58,00   |
| Sukolilo        | 20,350                                     | 15,000                                           | 1,36               | 54,68                      | 310,69                    | 0,18                                | 59,00   |
| Sidomulyo       | 13,350                                     | 16,500                                           | 0,81               | 40,47                      | 201,44                    | 0,20                                | 35,00   |
| Gading Kembar   | 127,750                                    | 12,200                                           | 10,47              | 99,79                      | 318,25                    | 0,31                                | 65,50   |
| Kemantren       | 28,450                                     | 30,400                                           | 0,94               | 102,88                     | 1606,99                   | 0,06                                | 28,00   |
| Argosari        | 92,150                                     | 10,300                                           | 8,95               | 83,77                      | 962,52                    | 0,09                                | 54,50   |
| Slamparejo      | 147,200                                    | 13,600                                           | 10,82              | 123,76                     | 1406,45                   | 0,09                                | 54,50   |
| Kemiri          | 67,800                                     | 16,400                                           | 4,13               | 183,2                      | 2398,84                   | 0,08                                | 54,00   |
| Jabung          | 35,800                                     | 24,700                                           | 1,45               | 83,99                      | 705,78                    | 0,12                                | 56,00   |
| Gunungjati      | 25,500                                     | 10,300                                           | 2,48               | 45,94                      | 2622,95                   | 0,02                                | 51,00   |

The general result of the WPI of use component, it is found that the highest value of the District is in Gading Kembar Village (65.50). Meanwhile, the lowest value is in Kemantren Village (28.00).

5. Environment (E)

The WPI of Environmental component is an average of the value of water quality sub-component and the ratio of vegetation cover. Table 8 indicates the results of the analysis of water quality testing using the STORET method based on the [4]. The value of water quality for each village is assessed from the quality of physical and non-physical water. Physical water quality is seen from the parameters of smell, taste and sediment. While the non-physical variables are carried out by laboratory tests with parameters PH, DO, turbidity, electric conductivity and salt content. The test result shows the quality of water in the level of light and moderate contaminated.
Table 8. Water poverty index environment (E) Jabung District

| Village       | Environment (E) | Water quality | Open space area (Ha) | Area each village (Ha) | The ratio of open space | WPI (E) |
|---------------|-----------------|---------------|----------------------|------------------------|-------------------------|---------|
|               |                 | (a)           | (b)                  | (c)                    | (b)/(c)                 |         |
| Kenongo       |                 | 75            | 315,37               | 181                    | 1.74                    | 38,37   |
| Ngadirejo     |                 | 75            | 1053,16              | 1643                   | 0.64                    | 37,82   |
| Taji          |                 | 75            | 1195,29              | 1735                   | 0.69                    | 37,84   |
| Pandansari Lor|                 | 75            | 711,73               | 1224                   | 0.58                    | 37,79   |
| Sukopuro      |                 | 75            | 1185,88              | 1394                   | 0.85                    | 37,93   |
| Sidorejo      |                 | 50            | 243,18               | 150                    | 1.62                    | 25,81   |
| Sukolilo      |                 | 50            | 365,37               | 321                    | 1.14                    | 25,57   |
| Sidomulyo     |                 | 50            | 241,91               | 288                    | 0.84                    | 25,42   |
| Gading Kembar |                 | 75            | 418,04               | 2447                   | 0.17                    | 37,59   |
| Kemantren     |                 | 50            | 1709,87              | 566                    | 3.02                    | 26,51   |
| Argosari      |                 | 75            | 1046,29              | 577                    | 1.81                    | 38,41   |
| Slamparejo    |                 | 75            | 1530,21              | 888                    | 1.72                    | 38,36   |
| Kemiri        |                 | 75            | 2582,04              | 1223                   | 2.11                    | 38,56   |
| Jabung        |                 | 50            | 789,77               | 682                    | 1.16                    | 25,58   |
| Gunungjati    |                 | 50            | 2668,89              | 270                    | 9.88                    | 29,94   |

In general, Table 8 shows that WPI value from the component of the environment do not show good result, wherein the whole villages have a value between 25.42 – 38.56. The main cause of it is due to the small availability of the sub-component open space in the village.

The following Table 9 exemplifies the final results of the WPI calculation covering the whole components – Resources (R), Access (A), Capacity (C), Use (U), and Environment (E).

Table 9. WPI of Jabung District

| Village     | R  | A  | C  | U  | E  | Value of WPI | Classification |
|-------------|----|----|----|----|----|--------------|----------------|
| Kenongo     | 100| 49 | 66 | 60,00| 38,37| 49,26        | High           |
| Ngadirejo   | 100| 52 | 71 | 52,00| 37,82| 50,98        | High           |
| Taji        | 100| 54 | 71 | 51,50| 37,84| 51,43        | High           |
| Pandansari Lor| 100| 48 | 77 | 59,50| 37,79| 51,42        | High           |
| Sukopuro    | 100| 59 | 67 | 56,50| 37,93| 51,66        | High           |
| Sidorejo    | 100| 58 | 80 | 58,00| 25,81| 52,98        | High           |
| Sukolilo    | 100| 65 | 72 | 59,00| 25,57| 52,73        | High           |
| Slamparejo  | 100| 49 | 72 | 35,00| 25,42| 49,16        | High           |
| Kemantren   | 100| 59 | 71 | 65,50| 37,59| 52,51        | High           |
| Argosari    | 100| 64 | 68 | 28,00| 26,51| 51,72        | High           |
| Slamparejo  | 100| 62 | 76 | 54,50| 38,36| 54,37        | High           |
| Kemiri      | 100| 63 | 55 | 54,00| 38,56| 49,95        | High           |
| Jabung      | 100| 63 | 66 | 56,00| 25,58| 50,95        | High           |
| Gunungjati  | 100| 67 | 85 | 51,00| 29,94| 56,55        | Medium         |
Refer to Khairuddin’s classification, the results of the WPI in Jabung District is found that 93% villages are classified as high poverty index, and the other 7% villages are categorised as medium poverty index. The component of the environment mostly causes the low value of the WPI due to the limitation of the green space. In the opposite, the value of component resources id the highest one, wherein, the whole village have a value of 100 due to water resources available through both groundwater and piped water connection to each house.

Figure 1. Pentagram of the WPI for each village

The lowest WPI value is 49.16 in Sidomulyo Village, due to the low value of the three components – accessibility, use and environment. The highest WPI value is in Gunungjati Village with a WPI value of 56.55, though the value of the component environment is very low (29.94). Common characteristics of the villages with unsafe classification have a low value of the three components – accessibility, use, and environment. These variables should be prioritised for improvement compared to variables that already have better values.

5. Conclusion
The final result of the WPI of Jabung District might conclude that the whole village is in poor condition, since 14 of 15 villages are classified as unsafe. Moreover, 1 of 15 villages are classified as low safe. Considering the huge number of households as the recipients of the poverty program, it seems it has a strong correlation between the low WPI values with the poor condition of the community at the village level. It might not be too easy to prioritise one village to another regarding the poverty eradication strategy since the whole village does not have a high value of the WPI. Moreover, it seems that each village is surrounded with a quite similar village wherein they are quite similar in poverty so that it is not too easy to mobilise their local and extra-local resources to move out from the poverty [9].

Discussing the value of WPI as a tool to develop a water management strategy in order to lift the community from poverty is a big homework for the case of Jabung Village. However, two main strategies could be offered. Firstly, maintain or keep up the good condition of the community in the villages. In related to water resources, it is important to mitigate the resources of water for both groundwater as well as piped water availability. It is also important to maintain health condition and
education level in order to reduce the poverty gap within the community in the village. Secondly, improve the condition of the three-component – access, use, and environment. Actually, improvement of sub-component might give significant influence to other sub-components both at the same component of even between components, due to its relation to each other. Improvement of ownership of individual or private septic tank will improve health condition through the improvement of water quality. This is one of the very fundamental points that need to be tackled in the district. Next, water use balance between domestic use and agriculture sector is also necessary to develop. Better understanding among the community level on how to use water effectively is necessary to be developed. For example, that the blue water – such as surface and groundwater is firstly for the use of the needs of the people and production process, meanwhile for the agriculture sector might use the rainwater or the recycle water from the domestic use. Then, regarding the limit availability of the open scape, it is very significant to enhance community understanding on how to build more green areas in the very tiny space. For example, the community needs to be introduced to the green mobility activity through bio-philia and urban-farming in their surrounding houses conducted by the villagers since at the community level.

References
[1] Adhi E T 2009 Pelayanan Sanitasi Buruk: Akar dari Kemiskinan. Bandung. Jurnal Analisis Sosial. 14 pp 76-87
[2] Battchararayay B Oppenheim J Stern N 2009 Driving Sustainable Development Through Better Infrastructure: Key Elements of a Transformation Program
[3] Centre for Ecology and Hydrology 2017 Natural Environment Research Council
[4] Minister of Environment Decree No 115 2003 Concerning Guidelines for Determination of Water Quality Status
[5] District Jabung in Number 2018
[6] Maheswari J U Chaithanya S M 2014 Water Poverty Index Facts and Figures – a Review (India: VIT University)
[7] Ministry of Education and Culture Regulation 2016 Program Indonesia Pintar
[8] Pouliquen L 2000 Infrastructure and Poverty World Bank.
[9] Putnam R D 2000 Bowling Alone. Simon & Schuster. Inc. New York
[10] Sullivan C A et al 2003 The Water Poverty Index: Development and Application at the Community Scale Natural Resources Forum 189-199
[11] Sullivan C A Meigh J 2002 Calculating a Water Poverty Index 30 (7) (London: Centre for Ecology & Hydrology Wallingford, Oxfordshire)
[12] Sullivan C A Meigh J Fediw T 2002 Derivation and Testing the Water Poverty Index Phase 1 (London: Centre for Ecology & Hydrology Wallingford, Oxfordshire)
[13] UNHCR 2015 Water Sanitation and Hygiene
[14] World Bank Group 2014 Pengentasan Kemiskinan di Indonesia