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The 4th International Symposium on Green Technology for Value Chains 2019 23-24 October 2019, Tangerang, Indonesia

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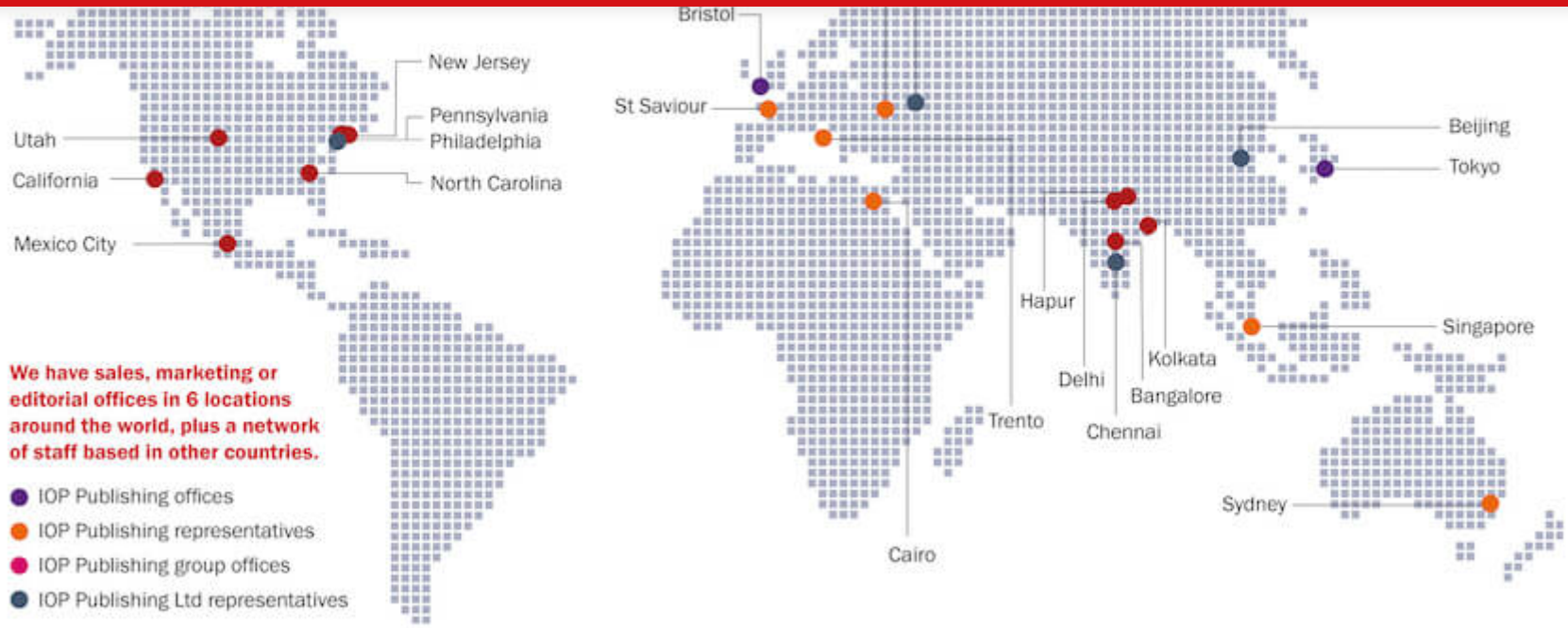

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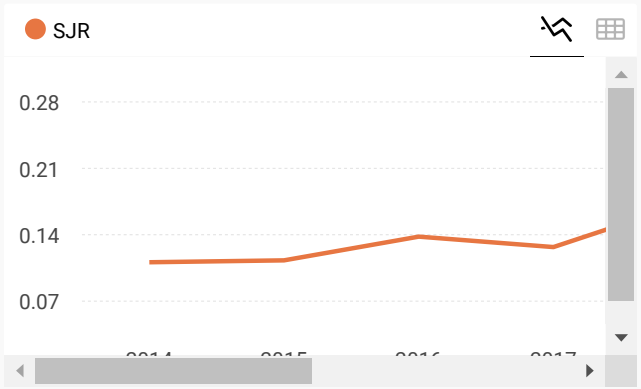
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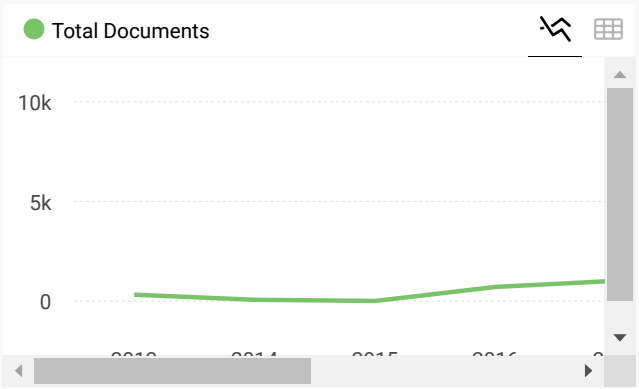
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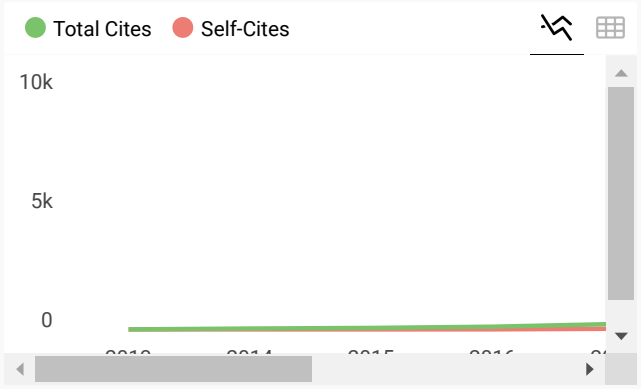
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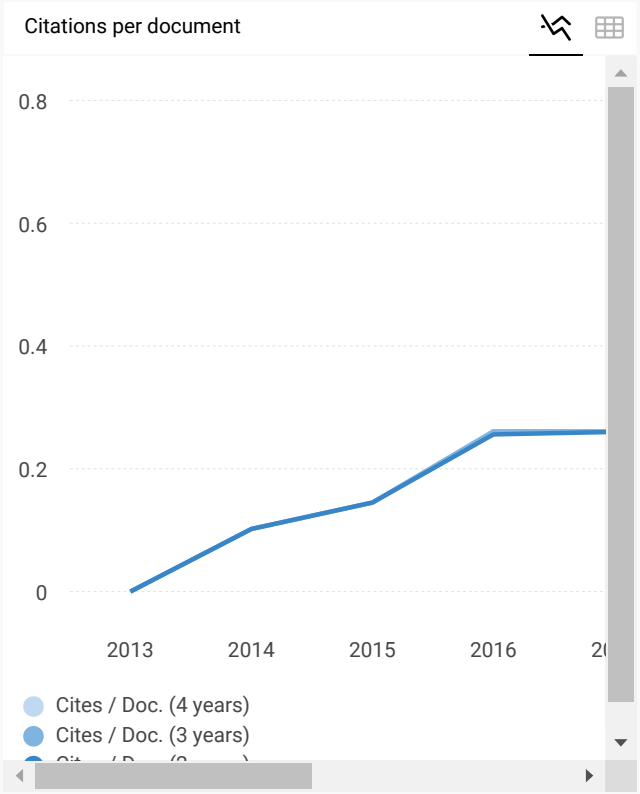
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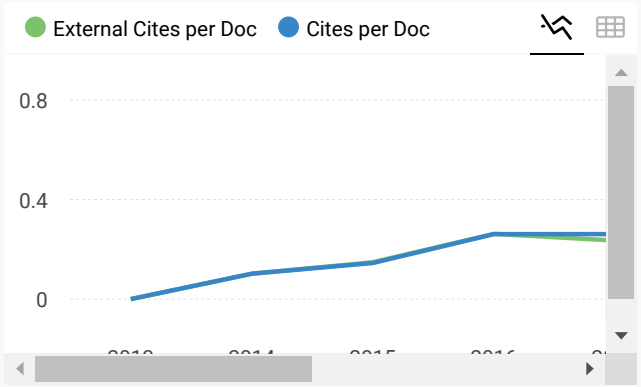
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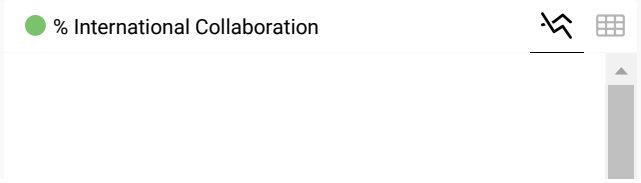
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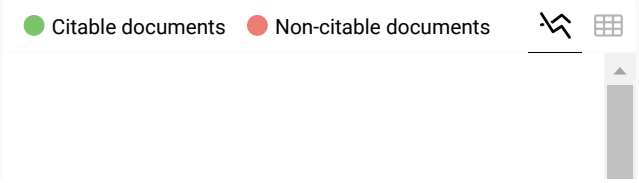
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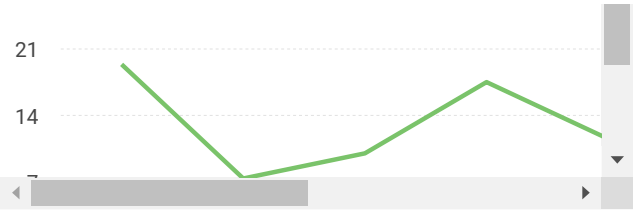

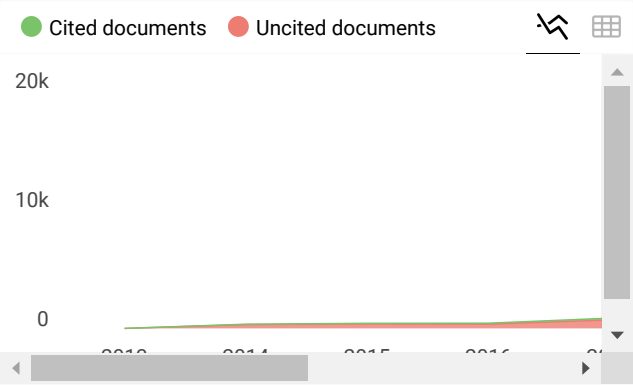

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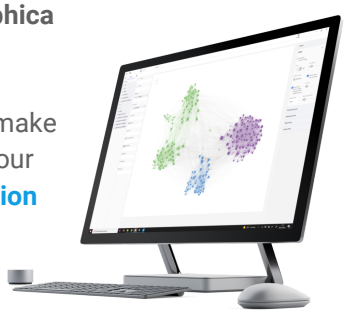

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Wastewater management strategies planning of Cimahi city based on 2018 city sanitation strategy guideline

IOP Conf. Series: Earth and Environmental Science **483** (2020) 012020 doi:10.1088/1755-1315/483/1/012020

Wastewater management strategies planning of Cimahi city based on 2018 city sanitation strategy guideline

H R Yasya*, Iwan Juwana

Department of Environmental Engineering, Faculty of Civil Engineering and Planning, National Institute of Technology, Bandung, Indonesia

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Abstract. Cimahi City is one of the developing cities in Indonesia that has low service sanitation condition, especially in domestic wastewater management. In 2016, the coverage of domestic wastewater services in the city only reached 68.17 %. It shows that 31.83 % of Cimahi region is not yet served with wastewater systems. In consequences, some communities discharging their wastewater to the stream. This matter could lead to water pollution that will indirectly affecting public health, potentially waterborne diseases. Based on these problems, this research was carried out to calculate the level of risk in each urban village of Cimahi. The risk level is stated in the form of scores 1-4 with a description of 1 is very low risk; 2 is low risk; 3 is high risk; 4 very high risk. The risk calculation considers the determinants (exposure and impact) which consist of the percentage of wastewater service, risk index based on the EHRA study, perceptions of related regional organizations, population, population density, poverty rates, and regional categories. The results obtained from the calculation of the risk of domestic wastewater in Cimahi show that the Pasirkaliki, Cibabat, Citeureup, Cipageran, Baros, and Cibeber have a very low risk; Cimahi and Utama are at low risk; Karangmekar, Cigugur Tengah and Cibeureum are at high risk; while Padasuka, Setiamanah, Leuwigajah and Melong have a very high risk, respectively.

Keywords: Cimahi City, Domestic Wastewater, Risk Score, Exposure Factor, Impact Factor

1. Introduction

Human life is not only concerns about social relationship, but also relationship with the environment. One of the things that is considered to achieve the welfare of human relations with the environment is stated in the aspect of sanitation. According to The Great Dictionary of Indonesian Language (KBBI), sanitation is an effort to create a certain situation in the health sector, especially public health. Definition of environmental sanitation is a way to develop a healthy environment, especially the physical environment (land, water, and air). Sanitation is an aspect of carrying out a development which is a basic human need [3]. One of the sanitation development policies in Indonesia refers to the needs of the communities (demand-driven), not only a technical target (supply-driven) [2]. Indirectly, these definitions illustrate that sanitation aspects are very important to be planned, implemented and evaluated thoroughly.

However, research shows that sanitation conditions in Indonesia reached a critical point. The sanitation targets achievement of the Millennium Development Goals (MDGs) in Indonesia also illustrates insignificant progress. This achievement is still below the average compared to the achievements of other countries. In fact, the coverage of sanitation services in Indonesia only reached

55 % in 2004 which was the lowest service among South-eastern Asian countries [4]. One of the developing cities in Indonesia is Cimahi, West Java. This city has a 40.2 km^2 total land area which consists of 21.51 km^2 developed land and inhabited by 532,987 residents. Cimahi is consists of 15 urban villages and 3 districts. Meanwhile regarding the sanitation condition, Cimahi is relatively low especially in the management of domestic wastewater. The service coverage of domestic wastewater in this city has only reached 68.17 % [1]. The main impact is the level of pollution in water bodies that are still high, which will harm the community [5].

A strategy that can control the sanitation system in Cimahi City is highly needed to reach the communities welfare. The strategy planning must be done carefully to achieve services coverage target on domestic wastewater management as the main objective. Therefore, firstly we have to identify the level of risk for each urban village in the city. Risk level identification is carried out by considering several factors that are interrelated with the risk of sanitation in the domestic wastewater sector. Mapping should be done according to the risk level to facilitate strategies planning and right on the target.

2. Methods

2.1. Determination of priority for exposure and impact factor

Determination of priority was required in this research for each exposure and impact factor. Exposure factors were elements that exposed to risk, consist of domestic wastewater services coverage, risk indexes of the domestic wastewater sector (the result of Environment Health Risk Assessment (EHRA) study), and perceptions of related Region Government Agency (RGA). The EHRA study could be learned from “Practical Guideline of Environment Health Risk Assessment Implementation” document published by Indonesian Ministry of Health in 2014. While impact factors were elements that affected and related to exposure factors. These factors were consisting of the population, population density, poverty rate, and region category (urban or rural). Determination of priority was based on importance and contribution of these factors to overall domestic wastewater risk assessment. The method used in this study was Analytical Hierarchy Process (AHP). In this method, the variables of each factor will be given in numeric number based on the subjective consideration. The result from this priority determination was shown in percentage form [10]. Due to the numeric number that given was objective, researcher determined this priority based on consideration of data collection year, detail of data, and data validity for each exposure factor and impact factor. In the schematic form, this hierarchy could be seen in the Figure 1 and Figure 2.

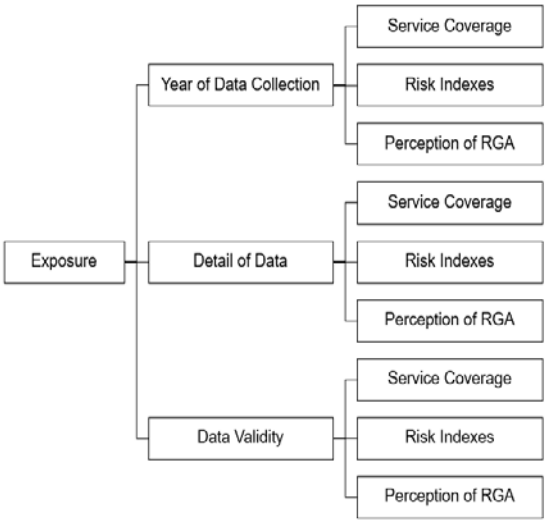

Figure 1. Analytical hierarchy of exposure factor

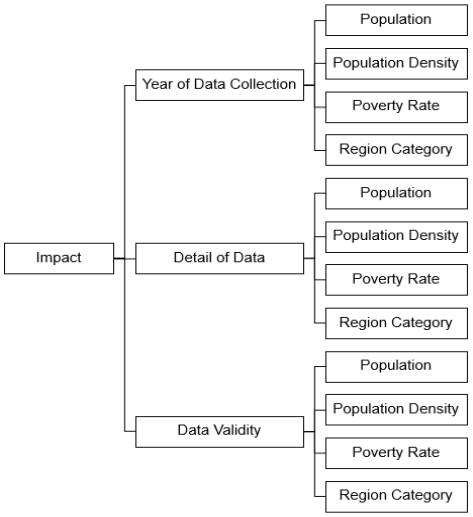

Figure 2. Analytical hierarchy of impact factor

2.2. Calculation of risk score based on exposure factors and impact factors

Calculation of risk score based on exposure factors including service coverage (domestic wastewater), risk indexes, and perceptions of related RGA calculations. The first exposure factor, service coverage, could be calculated by the following equation (1) [6]:

$$\% \text{ service coverage} = \frac{\text{wastewater system served household per village}}{\text{Total number of household per village}} \; x\; 100\% \quad (1)$$

Then the second factor was risk index based on EHRA study, could be calculated by using the following equation (2) [8]. Prior to the EHRA study, it is necessary to determine number of sample using Slovin formula in the equation (3). This determination should be done because on the EHRA study we will do a questionnaire and observation in several houses as its sample. Slovin formula is used because applied sampling technique was a cluster sampling [9]. Sample distribution also determined based on strata of each urban villages in Cimahi, therefore the villages in the same strata will have the same risk index. Referring to the Practical Guide to EHRA Implementation 2014 Document, stratification was carried out by considering population density, poverty rate, watersheds, and flood-prone areas.

n = Percentage of exposed household (%) x Percentage of weight of hazard sources (%) (2)

where n is Risk index (%), and the percentage of weight of hazard sources was determined on EHRA study.

$$n = \frac{N}{1-Ne^2} \quad (3)$$

where n is Number of sample, N is Total population, and e is Error rate (%).

It should be noted that to obtain domestic wastewater sector risk index, the document published by Ministry of Health of the Republic Indonesia is used in this EHRA study. On the document, the risk assessment of domestic wastewater through EHRA study covers three aspects to be considered: household wastewater discharging, household clean water sources, and clean-healthy or hygiene life behaviour. From each of these aspects, the hazard source variables were determined which have potency to increase the risk index. Then for the third factor, perception of related RGA was carried out through mode calculation based on risk scores frequency given only.

Similar to exposure factors, impact factors which consist of population, population density, poverty rate, and region category were also calculated using the same steps. Every calculation was carried out for each urban villages in this study area. The used formulas can be seen in equations (4) – (6):

$$\text{Population} = \frac{\text{Population per villages}}{\text{Total Population}}\ x\ 100\% \quad (4)$$

$$\text{Population density} = \frac{\text{Population per village (capita)}}{\text{Built area per village (Ha)}} \quad (5)$$

$$\text{Poverty rate} = \frac{\text{Number of poor household per village}}{\text{Total number of household per village}}\ x\ 100\% \quad (6)$$

Region category = Give 1 if rural and give 2 if urban

After the exposure and impact factors were calculated, data normalization is need to be done to convert into a score

Percentage of service coverage (%) risk score:
Score 1, if X > B + 0.75C
Score 2, if X > B + 0.5C
Score 3, if X > B + 0.25C
Score 4, if X < B + 0.25C ..... (7)

Risk score for factors besides percentage of service coverage (%):
Score 1, if X < B + 0.25C
Score 2, if X > B + 0.25C
Score 3, if X > B + 0.5C
Score 4, if X > B + 0.75C ..... (8)

Information:
X = Data that will be converted into a score
B = Minimum value in data series
C = Interval value (maximum value-minimum value)

In this study, the mapped risk score was the final score resulted from multiplication of the final exposure factors score and the final impact factors score. Before multiplying these two factors, each element was multiplied according to the priority (%) based on the result of AHP method applied. The following steps and equations (9)-(11) were applied to this calculation:

$$\text{Exposure score} = (E1 \times B1) + (E2 \times B2) + (E3 \times B3) \quad (9)$$

Information:
E1 = Risk score based on percentage of service coverage
E2 = Risk score based on risk index (EHRA Study)
E3 = Risk score based on perception of RGA
B1 = Priority of service coverage (%)
B2 = Priority of risk index (%)
B3 = Priority of RGA's perception (%)

$$\text{Impact score} = (I1 \times B4) + (I2 \times B5) + (I3 \times B6) + (I4 \times B7) \quad (10)$$

Information:
I1 = Risk score based on population
I2 = Score of risk based on population density
I3 = Risk score based on poverty rates
I4 = Risk score based on region category
B4 = Priority of population (%)

B5 = Priority of population density (%)
B6 = Priority of poverty rate (%)
B7 = Priority of region category (%)

Based on those calculation steps, the final score of domestic wastewater could be determined using the equation (11). This score will be mapped as a result in visual form.

$$\text{Domestic wastewater score} = \text{exposure score} \times \text{impact score} \quad (11)$$

An important note in this calculation was data normalization must be done at the end of each score calculation (exposure score, impact score, and multiplication result between the exposure score and the impact score). Normalization was still referred to the same formula in equation (8).

2.3. Planning of strategies

A strategy is needed to reduce the risk caused by the management of domestic wastewater that is not optimal. In this plan, the determined strategy aims at exposure risk scores, but not all exposure factors will be considered, only service coverage and risk index. Therefore, the strategy will include improvements in terms of managing domestic wastewater, clean water sources, and personal hygiene.

Realization of strategy could be done in these ways: increasing service coverage, both wastewater and clean water, as well as health promotion to improve personal hygiene. These ways were expected to be able to reduce the risk of exposure score, which could reduce the risk of domestic wastewater indirectly.

3. Results and Discussions

3.1. Determination of priority for exposure and impact factor

Weighting is done to determine priorities using the AHP method starting with compilation of the hierarchy as the basis of the analysis process. The hierarchy is set separately for exposure and impact factors. The levels in the hierarchy set in this step can be seen in Figure 1 and 2. By following the analysis using the AHP method, the results of determining priorities for each factor can be seen in Table 1 and Table 2.

Table 1. Priority of exposure factors

Factor	Priority
Service coverage	51%
Risk indexes	23%
Perception of RGA	26%

Tabel 2: Priority of impact factors

Factor	Priority
Population	40%
Population density	20%
Poverty rate	30%
Region category	10%

3.2. Calculation of risk score based on exposure factor and impact factors

As previously mentioned, the calculation is carried out to give a risk score caused by domestic wastewater management. This study was considered by exposure factors that consist of service coverage, risk index (based on EHRA study), and perceptions of RGA. Not only exposure factors, it was also considered by impact factor that consist of population, population density, poverty rate, and region category. Recapitulation of these calculations is listed in Table 3.

The first exposure factor calculated is the percentage of service coverage which is then converted into a score with equation (1) and (7). The wider area (high percentage), the lower the risk scores. When the urban village has high risk score on wastewater management, it shows its low service coverage. For example, Setiamanah and Utama have score 4, it mean these two urban villages have the lowest level of service coverage among other urban villages. Based on data collection, Setiamanah is 61 % coverage and Utama is 68 % coverage as can be seen in Figure 4.

For the second exposure factor and risk indexes were obtained from result of EHRA study with a 100 households as total sample (error rate = 10 %). Based on the result of urban village's stratification and the determination of hazard sources variables for each aspect, the next step is calculating number of exposed households by hazard sources. Those calculations must be done for each aspects of domestic wastewater sector in percentage form. Then the result of that calculation will be multiplied with number of priority of each hazard sources aspect (%). Priority determination is aimed to describe how much this hazard sources contributes to decrease environment quality in the form of percentage. The last result of risk scoring based on EHRA study can be seen in Table 3 (column 3). As noted previously, data was collected for each urban village strata in the city, so risk indexes value will be same for each village in the same strata. Risk index is directly proportional to its score. Too many considerations were taken in calculating this risk index and all of this are listed in the EHRA guideline.

Table 3. Domestic wastewater risk score

Urban Village	1	2	3	4	5	6	7	8	9	10	11	12	13
	51 %	26 %	23 %	-	-	38 %	20 %	32 %	10 %	-	-	-	
Pasirkaliki	1	1	4	1.7	1	1	2	1	2	1.3	1	1	1
Cibabat	2	1	3	2.0	1	4	4	1	2	2.8	3	3	1
Citeureup	1	1	4	1.7	1	2	2	1	2	1.7	1	1	1
Cipageran	1	1	4	1.7	1	3	1	1	2	1.9	2	2	1
Baros	1	2	4	2.0	1	1	1	1	2	1.1	1	1	1
Cigugur Tengah	2	2	1	1.8	1	3	4	4	2	3.4	4	4	2
Karang Mekar	2	2	3	2.2	2	1	2	3	2	1.9	2	4	2
Setiamanah	4	2	3	3.3	4	1	3	3	2	2.1	2	8	4
Padasuka	3	1	3	2.5	3	3	4	3	2	3.1	3	9	4
Cimahi	2	2	3	2.2	2	1	3	4	2	2.5	3	6	3
Melong	3	2	3	2.7	3	4	4	1	2	2.8	3	9	4
Cibeureum	2	2	1	1.8	1	4	4	4	2	3.8	4	4	2
Utama	4	2	1	2.8	3	2	1	3	2	2.1	2	6	3
Leuwigajah	3	2	4	3.0	4	3	1	2	2	2.2	2	8	4
Cibeber	1	1	4	1.7	1	2	1	2	2	1.8	2	2	1

Note:

Column 1 : Service Coverage
Column 2 : Perception of RG
Column 3 : Risk Index
Column 4 : Total Score Exposure
Column 5 : Exposure Score
Column 6 : Population
Column 7 : Population Density
Column 8 : Poverty Rate
Column 9 : Region Category
Column 10 : Total Score Impact
Column 11 : Impact Score
Column 12 : Total Score
Column 13 : Domestic Wastewater Score

After calculating the risk indexes as previously described, the third exposure factor is obtained based on interview with Region Government Agency (RGA) related to domestic wastewater management. The given perception ranged from one to four (1-4). The score of 1 is given by the member of RGA to the urban villages in Cimahi that have good wastewater management, while score of 4 is given to those that have inadequate wastewater management. The risk scores for each urban village given by RGA listed on Table 3 (column2).

The first impact factor to be calculated is the population which can apply the formula in equation (4), so that it produces a value in the form of a percentage. After conversion through data normalization, the risk score can be seen in Table 3 (column 6). After calculating the population and the risks posed, the population density calculation is obtained from the division of the population

(capita) by the built up area (Ha) as written in equation (5). The results are listed in Table 3 (column 7). The third factor is the poverty level obtained from the number of poor households divided by the number of households per village as in equation (8). Column 8 in Table 3 shows a recapitulation of risk scores based on poverty levels. In contrast to population calculations, population density, and poverty levels, risk scores by area category can be given directly by identifying each urban village based on that category (rural or urban). If the village is included in the urban category, a score of 2 is given, whereas if the village is included in the rural category, a score of 1 will be given. In this study, it is known that 15 villages in Cimahi City are included in the urban category, therefore that they have the same score of 1

Based on the calculation of exposure and impact scores, a summary can be seen in Table 3 columns 4, 5, 10, and 11. Total exposure and impact scores (columns 4 and 10 Table 3) are obtained by multiplying each score by a percentage of priority. This step uses the equations (9) and (10). While the results in Tables 3 columns 5 and 11 are data normalization and calculated using equation (8). And the final step is to multiply the exposure score and impact score which can be seen in Table 3 column 12 then followed by normalization data to provide a final score of domestic wastewater risk. The multiplication between these factors shows that the risk element (exposure) and the related element (impact) are directly proportional. The greater the risk received by urban villages (exposure factor), the greater the risk of overall domestic wastewater management. For example, the low coverage of domestic wastewater services can indicate that wastewater management in the village has risks. Likewise from the impact factor, if it is said that a village is too densely populated, then domestic wastewater management also has risks because it must be applied to various regions and communities. In certain cases such as Central Cigugur which has a significant difference between exposure and impact score, it can be interpreted that the coverage of domestic wastewater services is good, however based on the impact score, Central Cigugur is still at risk. In other words, even though the service is good, it does not rule out the possibility that the area is still at risk because of overcrowding and poverty levels.

3.3. Planning of strategies

In this study, strategies are planned based on exposure risk scores. Ways that can be done to reduce the risk score is to increase service coverage and decrease the risk index. In the planning stage of this strategy, the score will not be determined, but the service coverage and risk index, because indirectly these two factors can influence the final risk score. Increased service coverage is applied to high-risk and very risky urban villages. Meanwhile the risk index consists of managing household wastewater, household clean water sources, and cleanliness, but only clean water and household hygiene will be controlled to reduce the risk score. This is due to the various methods in the guidelines used in this study (using several households as samples when collecting data in the EHRA study), therefore changes in the risk index of the household wastewater management sector will not provide a significant final score. Strategies are planned based on minimum service coverage targets and changes in risk index which can be seen in Table 4 and Figure 4. The following changed as seen in the Table 4 will affect risk area mapping as can be seen in Figure 5.

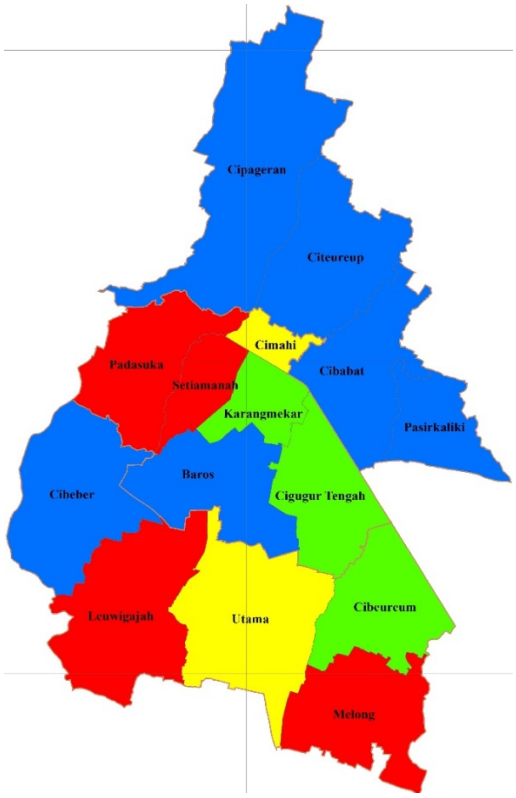

Figure 3. Map of domestic wastewater risk areas

Table 4. Risk score target

Urban Village	Service Coverage	Risk Index (%)			Exposure Score	Domestic Wastewater Score
		Hygiene	Domestic wastewater	Clean water source		
Pasirkaliki	92.92 %	14	12	1	1	1
Cibabat	79.13 %	9	9	1	1	1
Citeureup	86.03 %	14	12	1	1	1
Cipageran	85.28 %	14	12	1	1	1
Baros	88.47 %	14	12	1	1	1
Cigugur Tengah	78.77 %	0	21	0	1	2
Karang Mekar	81.03 %	9	9	1	1	1
Setiamanah	78.00 %	9	9	1	1	1
Padasuka	78.00 %	9	9	1	1	1
Cimahi	80.99 %	9	9	1	1	1
Melong	78.00 %	9	9	1	1	1
Cibeureum	78.20 %	0	21	0	1	2
Utama	70.00 %	0	21	0	2	2
Leuwigajah	78.00 %	14	12	1	1	1
Cibeber	87.70 %	14	12	1	1	1

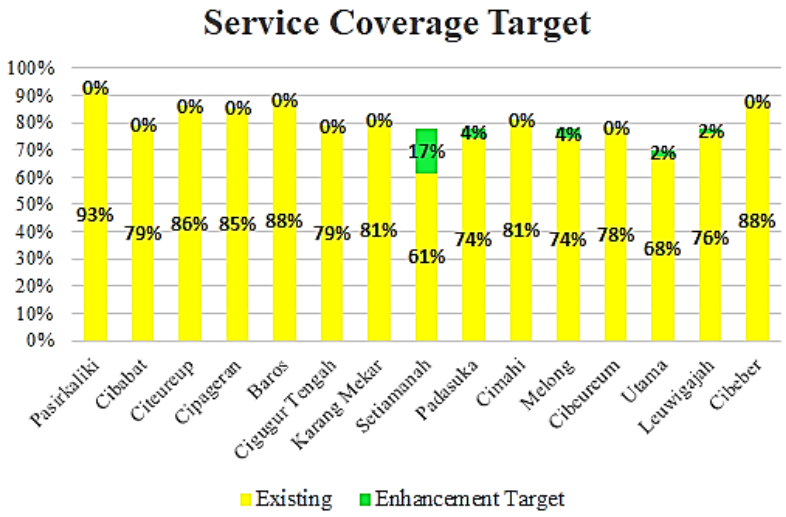

Figure 4. Domestic wastewater service coverage target

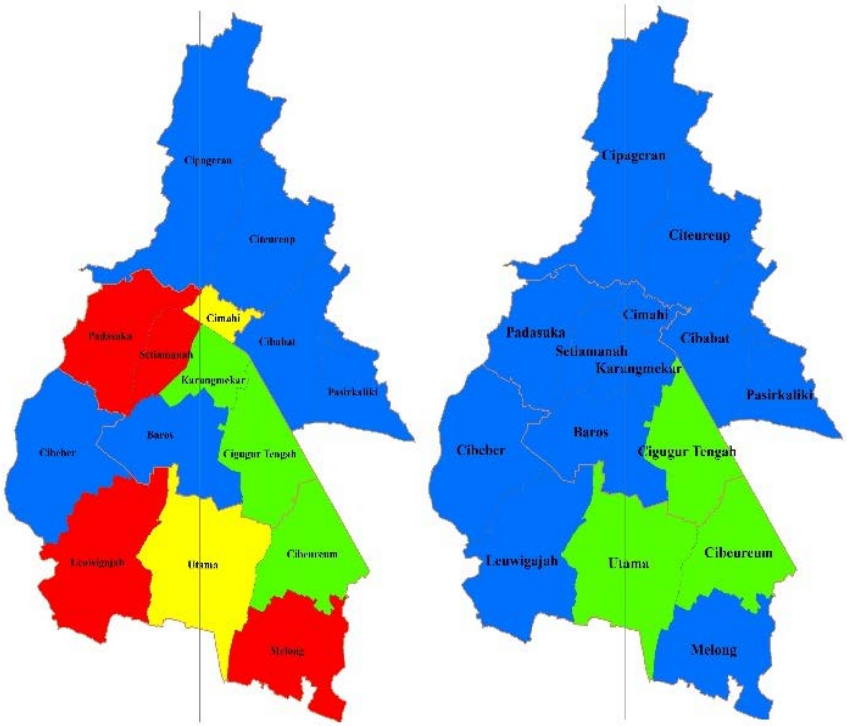

Figure 5. Domestic wastewater risk areas mapping based on strategy

The achievement of this target until 2024 can be realized by implementing additional wastewater facilities. There are additional 3 units of Wastewater Treatment Plants (IPAL) for Pasirkaliki, Cibabat, Citeureup, Cigugur Tengah, Karang Mekar, Melong, and Cibeureum. The addition of 126 communal WWTP units is planned to be carried out in Cipageran, Utama, Leuwigajah and Cibeber. The addition of 170 communal septic tanks will be implemented in Cipageran and Baros. The addition of 2,638 individual septic tank units will be carried out in Cipageran and Baros. In addition to the addition of wastewater facilities, it is also necessary to expand the water distribution system and promote health to reduce the risk index.

4. Conclusion

Based on consideration of exposure and impact factors, the calculation is done in stages and are interrelated to produce a level of risk in the form of a score (1-4). There are six very low-risk urban villages (Pasirkaliki, Cibabat, Citeureup, Cipageran, Cibeber and Baros), three low-risk urban villages (Karang Mekar, Cigugur Tengah, and Cibeureum), two high-risk urban villages (Cimahi and main), and four high-risk urban villages (Padasuka, Setiamanah, Leuwigajah and Melong).

Based on this evaluation, areas in the City of Cimahi which are included in the high and very high risk categories show the potential to reduce the quality of the environment which will endanger the community. Therefore, strategy or planning is needed based on factors that influence the assessment of domestic wastewater risk. Through this strategy, it is expected to reduce risk in the target villages. Before implementing a strategy is a target, observations are needed to ensure land availability, community characteristics, ability to pay, and others.

References

[1] Oche. Pengolahan Air Limbah Domestik di Kota Cimahi Begitu Rendah [Internet]. Cimahi: 2016 [cited on 2019 March 03]. Available from: https://jabar.pojoksatu.id/bandung/2016/03/03/pengolahan-air-limbah-domestik-di-kota-cimahi-begitu-rendah/

[2] Dokumen Informasi Kinerja Pengelolaan Lingkungan Hidup (DIKPLHD) Kota Cimahi Tahun 2019. Cimahi; 2019 [cited on 2019 April 16]. Available from:https://cimahikota.go.id/pengumuman/detail/323

[3] Sofyan L, Soewondo P, Kunaefi TD, Handajani M. Faktor-Faktor Penting Pengelolaan Sanitasi oleh Masyarakat di Kawasan Kumuh Perkotaan Bandung Raya. Bandung: Institut Teknologi Bandung; 2014

[4] Adhi E T 2009 Pelayanan Sanitasi Buruk: Akar dari Kemiskinan J*urnal Analisis Sosial* **5**(6): 76-87.

[5] Hikmat R R, Juwana I 2018 Pollution Load of Cisangkan River: The Domestic Sector *IOP Conference Series: Earth and Environmental Science* **277**: 1-7.

[6] Pedoman Strategi Sanitasi Kota 2018. Jakarta: Direktorat Jenderal Cipta Karya; 2018.

[7] Azhar J. Penilaian Risiko Kesehatan Lingkungan di dusun Kokoa Desa Marannu Kecamatan Lau Kabupaten Maros. Makassar: Universitas Islam Negeri Alauddin Makassar; 2016.

[8] Achmad S. Perancangan Algoritma Otomatisasi Normalisasi Data. Bandar Lampung: Universitas Lampung; 2018.

[9] Soleh, A. Z. Ilmu Statistika. Bandung: Rekayasa Sains; 2005.

[10] Saaty, T. L. Pengambilan Keputusan. Jakarta: Pustaka Binaman Pressindo; 1986.

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