

PAPER • OPEN ACCESS

## Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia

To cite this article: E Gravitiani *et al* 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **202** 012050

View the [article online](#) for updates and enhancements.

# Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia

E Gravitiani<sup>1,2</sup>, S N Fitriana<sup>1,2</sup> and Suryanto<sup>1,2</sup>

<sup>1</sup> Faculty of Economics and Business

<sup>2</sup> Universitas Sebelas Maret, Jln Ir Sutami 36A, Surakarta, Indonesia

Email: [e\\_gravity2000@yahoo.com](mailto:e_gravity2000@yahoo.com)

**Abstract.** Climate change has an adverse effect on the coastal area. When sea level is rising, it will lead to more frequent sea tides, flood, and abrasion. This condition will make the coastal communities, especially fishermen and traders, become vulnerable. This research aims to examine the social-economics vulnerability of coastal communities, especially fishermen and traders in Northern and Southern Java coastal area, which related to climate change. The data is collected from 216 respondents from the coastal area. The data is analysed using Livelihood Vulnerability Index (LVI) and, Livelihood Vulnerability Index – Intergovernmental Panel of Climate Change (LVI-IPCC). LVI analysis shows that the condition of coastal communities can be considered as vulnerable. However, based on LVI-IPCC analysis, the coastal communities are not vulnerable.

## 1. Introduction

Indonesia is one of the largest archipelago countries with more than 17,000 islands and 80,000 kilometres coastline [1]. This condition has placed Indonesia in a vulnerable position to the climate change, especially in term of sea level. IPCC [2] shows that starting on the 19th century global temperature has rose for 0.74° C, in average and will keep increasing up to 4.5° C. These uprising will affect sea level because of the meltdown in arctic icebergs. The effect can be seen in term of increased coverage of sea tides flood. In a long term, more and more small islands will disappear due to increased sea level. This condition will threaten the coastal communities' life. Moreover, the rise in sea level will also change the sea wave, increasing the frequency of sea tides flood, and destroying mangrove, which will lead to abrasion. Coastal areas are vulnerable to the effect of climate change, especially in term of sea level. This is mainly because Indonesian coastal area is characterized with high settlement density with crowded activities, such as salt farming, docking area, and tourism area as well.

Beach abrasion is the shrinkage in coastline from its previous position [3]. In general, 40 percent of total Indonesian coastline is damaged due to abrasion. In average, every year, 2-10 metres of coastline vanished as an effect of abrasion. Beach abrasion is caused by two main factors: an increase in sea level as the effect of global warming and the destruction of mangrove ecosystem. Both factors are caused by human activities. Other factors that contribute to the destruction of Indonesian beach, besides abrasion, are geological aspect, wave power, and whirlwind.

Northern and Southern Java coastal area is vulnerable to abrasion and tsunamis. Moreover, worse abrasion also adds to the vulnerability of both areas. This condition triggers the vulnerability of the coastal communities. Fishermen in coastal area mostly have several specific problems related to their livelihood, such as:



- a. Crucial ecosystem problem. Fish availability, which depend on season aspect, as well as fishermen's courage and safety in catching fishes, which depend heavily in wind condition and sea waves.
- b. Fish is one of food ingredients that can get easily rotten if not distributed immediately. This make the fishermen have to accept the price set by wholesaler.

The objective of this research is to analyze the vulnerability of fishermen who live in Northern and Southern Java coastal area, as well as trader in the same area, as a result of climate change.

## 2. Methodology

### 2.1. Location of the research

The location of research is a certain place where researcher collecting respondents' data needed. For the southern Java coastal area, Bantul Regency is chosen as the location of research. The data is collected from several beaches in this Regency such as Parangtritis, Depok, Kwaru, and Pantai Baru. Meanwhile, for the northern Java coastal area Demak Regency (Morosari Beach and Purworejo village coast) and Semarang City (Maron beach, Marina beach, Tambak Mulyo, and Tambak Rejo) are chosen for survey.

### 2.2. Research types

This research uses quantitative descriptive approach. This approach aims to describe the facts and the nature of the population in certain areas in a systematic, factual, and accurate manner.

### 2.3. Data Source

Data source refer to any source that can give the information about the data needed in this research. Data can be divided into two categories based on the source: primary data and secondary data. Primary data is the data collected directly as the result of observation, interview, or distributed questionnaire. Secondary data is the data collected from other parties (institution or organization) database.

The respondents in this research are traders and fishermen in northern and southern Java coastal area, specifically in Bantul Regency, Demak Regency, and Semarang City. The secondary data used in this research is average rainfall intensity in the three areas. The secondary data is obtained from BPS. The data of average air temperatures in three areas in five consecutive years is obtained from NCDC.

### 2.4. Methods and data analysis

#### 2.4.1. Vulnerability index.

##### 2.4.1.1. Livelihood Vulnerability Index (LVI) approach.

The Livelihood Vulnerability Index (LVI) in this research is developed by Hahn et al. (2009), which consist of seven main components, namely Social Demographic Profile (SDP), Livelihood Strategy (LS), Health (H), Social Network (SN), Food (F), Water (W), Natural Disaster (ND), and Climate Variability.

The LVI indicators as presented above are developed into several indicators or sub-components based on the literature review of its main component. LVI in this research is calculated using the balanced weighted average approach [4]. By using this measurement, each of the sub-components will have the same contribution to the overall index, even though each of the main component consist of a number of different sub-components.

Each sub-component is calculated using different scale, thus the result should be standardized to be converted into a more general index. By converting the result into an index, the overall result can be calculated. Therefore, to convert the scale of each sub-component obtained from the life expectancy index [5], a composite index approach is used with the following calculations:

$$Index\ S_b = \frac{S_b - S_{min}}{S_{max} - S_{min}} \quad (1)$$

Notes:

$S_b$  = the value of the sub component in the region of b,

$S_{\min}$  = the minimum value of each sub-component, determined from the data of study sites.

$S_{\max}$  = the maximum value of each sub-component, determined from the data of study sites - standardized.

The mean value of sub-components is calculated using the following equation. After that, the value of main components is calculated.

$$Mb = \frac{\sum_i^n indeks_{b,i}}{n} \quad (2)$$

Notes:

$M_b$  = one of main component in the region of b (SDP, LS, H, F, W, SN, and ND).

Index  $b_i$  = value of sub-components indexed by i.

The value of LVI is obtained based on the equation as follow:

$$LVI_b = \frac{\sum_{i=1}^7 W_{M_i} M_b^i}{\sum_{i=1}^7 W_{M_i}} \quad (3)$$

The equation can be written as follows:

$$LVI_b = \frac{W_{SDP}SDP_b + W_{LS}LS_b + W_H H_b + W_F F_b + W_W W_b + W_{SN}SN_b + W_{ND}ND_b}{W_{SDP} + W_{LS} + W_H + W_F + W_W + W_{SN} + W_{ND}} \quad (4)$$

Source: Hahn et al. (2009) [6]

Notes:

$LVI_b$  = vulnerability index value for one of b region, weighted from seven main components.

$W_{M_i}$  = the amount of sub components that reflects all of the main component with the same contributor for the overall LVI [4].

The scale of LVI values ranges from:

- 0 – 0.2 = Not vulnerable
- 0.21 – 0.4 = Vulnerable/Moderate
- 0.41 – 0.5 = Very vulnerable

#### 2.4.1.2. LVI – IPCC approach (Livelihood Vulnerability Index – Intergovernmental Panel of Climate Change).

LVI-IPCC index is an alternative option to calculate LVI by combining the definition of vulnerability according to IPCC. The exposure of this research population is measured using the number of flood occurred for the last five consecutive years. Climate variability is measured using the average of standard deviation of the maximum and minimum value of monthly air temperature for the last five years. The adaptive capacity is measured using demographic profile in each area such as number of female as the head of family, occupation, and social network (percentage of household that provide support to their neighbor). Sensitivity is measured using the status of food availability, water condition, and health level in a certain area. Table 1. Explains the method in computing LVI-IPCC.

The main difference between LVI-IPCC and LVI is in the integration of its main component. Different from the separation of main component in LVI computation, in LVI IPCC, the components will be grouped based on the category of plans, thus the formula is as follows:

$$CF_d = \frac{\sum_{i=1}^n W_{M_i} M_{di}}{\sum_{i=1}^n W_{M_i}} \quad (5)$$

Notes:

$CF_d$  = definition of IPCC contributor factors (exposure, sensitivity or adaptive capacity) for region of d (the northern and southern coast of Java),

$M_{di}$  = main component of the d-region which indexed by i

$W_{M_i}$  = the weighted value of main components, and is the amount of each main components contributor factor.

The combination of the three contributor factors is calculated using the following equation:

$$LVI - IPCC_d = (e_d - a_d) * S_d \quad (6)$$

LVI-IPCC<sub>d</sub> is the index of LVI in the region of d, which reflected from vulnerability framework of IPCC.

Notes:

e = score of d region (same as the main component in natural disaster and climate variability),

a = score of adaptive capacity in the region of d (weighted from average of main component in social-demography, livelihood strategy, and social network)

s = score of sensitivity in the region of d (weighted from of main component in health, food and water).

The scale of LVI-IPCC between -1 and (-0.4) refer to 'not vulnerable', -0.41 – 0.3 refer to 'moderate', and 0.31 - 1 which refer to 'very vulnerable'.

Main component and sub-component of Livelihood Vulnerability Index (LVI) design developed by Hahn *et al.* (2009) [6] are:

1. Socio Demographic : dependency ratio, percentage of female head of household, percentage of households where head of household never attended school, percentage of a household with family members need assistance
2. Livelihood : percentage of a households whose family members work outside the community/ outside the city, percentage of a households who depend on agriculture as their main source of income, average index of livelihood agricultural diversification
3. Health : percentage of a households whose have average time required to go to a health facility, percentage of a households with chronic illness in family members
4. Social network : the mean value of aids accepted : ratio of aids given (range : 0.5-2), Average debt: ratio of money lending (range 0.5-2), and percentage of a households whose did not go to the local government to ask for support in the past year
5. Food : percentage of families who depend on family farming for food, average of months households experienced food shortages, Percentage of households that do not store crops
6. Water : percentage of households using natural water sources, Average time required to go to natural water source (minutes), Percentage of households with no consistent water supply, inverse of average number (in liters) of water stored per household
7. Natural disasters and climate variability: average amount of flood, and hurricane in the last 5 years, percentage of households not receiving a climate warning, percentage of households suffers death and being victim due to the natural disaster in the last 5 years, Standard deviation of average monthly temperature based on daily maximum temperature, average standard deviation of monthly temperature based on daily minimum temperature, Standard deviation from the average monthly rainfall.

**Table 1.** Contributing factor of vulnerability in IPCC.

| Factor contributor of vulnerability | Main components  |
|-------------------------------------|--|
| Exposure                            | Natural disasters and climate Variability                          |
| Adaptive Capacity                   | Social-demography profile<br>Livelihood strategy<br>Social Network |
| Sensitivity                         | Health, Food, Water  |

Source: [6]

### 3. Result and Discussion

#### 3.1. LVI result for the southern coast of Java

The result of standardized sub-components and calculation of the LVI index on 114 respondents show that the vulnerability level of the respondent can be categorized as vulnerable in facing the climate change, the score for each component is shown in the table 2.

**Table 2.** Index of sub-component, main component, and total LVI.

| Sub-component   | Composite Index of |                | Index of Main Component | Category        |                     |       |            |
|---|--------------------|----------------|-------------------------|-----------------|---------------------|-------|------------|
|   | Sub-component      | Main Component |                         |                 |                     |       |            |
| Socio-demography  |                    |                |                         |                 |                     |       |            |
| Number of dependency  | 0.252              | profile        | 0.242                   | Vulnerable      |                     |       |            |
| Percentage of women as head of Household  | 0.088              |                |                         |                 |                     |       |            |
| The average age of female head of household   | 0.766              |                |                         |                 |                     |       |            |
| The head of household has no Education  | 0.096              |                |                         |                 |                     |       |            |
| Households whose members need Help  | 0.009              |                |                         |                 |                     |       |            |
| Percentage of households with members working outside the City  | 0.158              |                |                         |                 | Livelihood strategy | 0.384 | Vulnerable |
| Percentage of households whose main sources of income still depend on the agricultural sector         | 0.684              |                |                         |                 |                     |       |            |
| Average index of farm livelihood classification (range: 0.20 – 1)                                     | 0.310              |                |                         |                 |                     |       |            |
| Average time required (minutes)   | 0.236              | Health         | 0.158                   | Not Vulnerable  |                     |       |            |
| Percentage of households whose family members have chronic illness                                    | 0.079              | Food           | 0.459                   | Very Vulnerable |                     |       |            |
| Percentage of households with the most food sources are from their own farmland                       | 0.816              |                |                         |                 |                     |       |            |
| Average number of households in a month that has food shortage(range: 0-12)                           | 0.007              |                |                         |                 |                     |       |            |
| Percentage of households that do not store crops  | 0.553              |                |                         |                 |                     |       |            |
| Percentage of households utilizing natural water resources  | 0.921              |                |                         |                 | Water               | 0.244 | Vulnerable |
| Average time required to go to water source (minutes)   | 0.025              |                |                         |                 |                     |       |            |
| Percentage of households with consistent water supply   | 0.026              |                |                         |                 |                     |       |            |
| The inverse to average amount of water (in litres) stored per household (range:> 0-1)                 | 0.002              |                |                         |                 |                     |       |            |
| Average receive: ratio of receiving (range: 0-15)   | 0.459              | Social Network | 0.599                   | Very vulnerable |                     |       |            |
| Average borrow: ratio of money lending (range: 0.5 - 2)   | 0.409              |                |                         |                 |                     |       |            |
| Percentage of households who have never gone to local government to seek for support in the past year | 0.930              |                |                         |                 |                     |       |            |
| Natural disasters and climate   |                    |                |                         |                 |                     |       |            |
| The average amount of flood   |                    |                |                         |                 |                     |       |            |

| Sub-component   | Composite Index of |                | Index of Main Component | Category   |
|---|--------------------|----------------|-------------------------|------------|
|   | Sub-component      | Main Component |                         |            |
| disaster over the last 5 years  | 0.391              |                | 0.353                   | Vulnerable |
| Percentage of households who do not receive warnings about the arrival of flood disasters | 0.670              |                |                         |            |
| Percentage of households suffering flood in the last 5 years                              | 0                  |                |                         |            |
| Average standard deviation of monthly temperature based on daily maximum temperature      | 0.514              |                |                         |            |
| Average standard deviation of monthly temperature based on daily minimum temperature      | 0.115              |                |                         |            |
| The average value of standard deviation from the average rainfall per month               | 0.428              |                |                         |            |
| <b>Value of LVI</b>   |                    |                |                         |            |

Table 2 shows the result of LVI computation for all components (main components and sub-components). The LVI value for southern Java coastal area is 0.348, which shows that the fishermen and traders in the area is vulnerable to climate change. Moreover, we find that Bantul Regency is the most vulnerable area to tides flood because of climate change.

### 3.2. LVI-IPCC (Livelihood Vulnerability Index-Intergovernmental of Climate Change) approach

LVI-IPCC is an alternative method developed from LVI as the proxy of community livelihoods vulnerability caused by the climate change. The scale from -1 - (-0.4) which refer to 'not vulnerable', - 0.41 - 0.3 which refer to 'vulnerable/moderate', and 0.31 - 1 which refer to 'highly vulnerable'.

**Table 3.** The calculation of contributing factors in LVI-IPCC for Bantul Regency.

| Factor contributor of IPCC for vulnerability | Index of main component | Weight of sub-component | Value of factor contributor | Category              |
|--|-------------------------|-------------------------|-----------------------------|-----------------------|
| <b>Exposure</b>                              | <b>0.353</b>            | 6                       | <b>0.353</b>                | Very Vulnerable       |
| <b>Adaptive capacity</b>                     | <b>4.159</b>            | 11                      | <b>0.378</b>                |                       |
| - Socio-demographic                          | 0.242                   | 5                       |                             | Vulnerable            |
| - Livelihood strategy                        | 0.384                   | 3                       |                             |                       |
| - Social network                             | 0.599                   | 3                       |                             |                       |
| <b>Sensitivity</b>                           | <b>2.669</b>            | 9                       | <b>0.296</b>                |                       |
| - Health                                     | 0.158                   | 2                       |                             |                       |
| - Food                                       | 0.459                   | 3                       |                             |                       |
| - Water                                      | 0.244                   | 4                       |                             |                       |
| <b>LVI-IPCC Index Value</b>                  |                         |                         | <b>-0.007</b>               | <b>Not Vulnerable</b> |

The overall value of LVI-IPCC is -0.007. This value indicates that fishermen and traders livelihood in southern Yogyakarta is not vulnerable to sea tides flood, which caused by climate change. This result is differing from the LVI result because in LVI-IPCC there is an integration of several components into one formula. The exposure index for natural disaster is lower than adaptation capacity index (social-demographic, living strategy, and social network), thus the result of LVI-IPCC has a negative value and not vulnerable.

Therefore, it can be concluded that southern Java coastal communities' livelihood is vulnerable based on LVI result. However, based on LVI-IPCC southern Java coastal communities' livelihood is not vulnerable. This difference is due to some integration in the

components of LVI. Generally, LVI measures the average of each component, while in LVI-IPCC the components are integrated into three main components and measured using different formula (LVI-IPCC formula).

### 3.3. The Analysis of Livelihood Vulnerability Index (LVI) result in the northern coast of Java

The result of LVI computation on the survey data of northern Java coastal communities shows that the fishermen and traders livelihood is vulnerable to climate change. The value of each component is presented on the following table 4.

**Table 4.** Index of sub-component, main component, and total LVI.

| Sub-component   | Composite Index of Sub-component | Index of Main Component |           | Category        |
|---|----------------------------------|-------------------------|-----------|-----------------|
|   |                                  | Main Component          | Component |                 |
| Number of dependency  | 0.214                            | demographic Profile     | 0.213     | Vulnerable      |
| Percentage of female head of household  | 0.029                            |                         |           |                 |
| The average age of female head of household   | 0.559                            |                         |           |                 |
| The head of household has no education  | 0.108                            |                         |           |                 |
| Households whose members need Help  | 0.157                            |                         |           |                 |
| Percentage of households with members working outside the city                                | 0.314                            | Livelihood strategy     | 0.390     | Vulnerable      |
| Percentage of households whose main sources of income still depend on the agricultural sector | 0.578                            |                         |           |                 |
| Average index of farm livelihood classification (range: 0.20 - 1)                             | 0.278                            |                         |           |                 |
| Average time required (minutes)   | 0.250                            | Health                  | 0.199     | Not vulnerable  |
| Percentage of households whose family members have chronic illness                            | 0.147                            |                         |           |                 |
| Percentage of households with the most food sources are from their own farmland               | 0.892                            | Food                    | 0.474     | Very vulnerable |
| Average number of households in a month that has a difficulty to eat (range: 0-12)            | 0.002                            |                         |           |                 |
| Percentage of households that do not store crops  | 0.529                            |                         |           |                 |
| Percentage of households utilizing natural water resources                                    | 0.892                            | Water                   | 0.236     | Vulnerable      |



|   |       |   |              |                   |
|---|-------|---|--------------|-------------------|
| Average time required to go to water source (minutes)   | 0.039 |   |              |                   |
| Percentage of households with consistent water supply   | 0.00  |   |              |                   |
| The inverse of average amount of water (in litres) stored per household (range > 0-1)                 | 0.011 |   |              |                   |
| Average receive: ratio of receiving (range: 0-15)   | 0.389 | Social network                            | 0.563        | Very vulnerable   |
| Average borrow: ratio of money lending (range: 0.5 - 2)   | 0.428 |   |              |                   |
| Percentage of households who have never gone to local government to seek for support in the past year | 0.873 |   |              |                   |
| The average amount of flood disaster in the last 5 years  | 0.121 | Natural disasters and climate variability | 0.436        | Very vulnerable   |
| Percentage of households who do not receive warnings about the arrival of flood disasters             | 0.922 |   |              |                   |
| Percentage of households suffering flood disaster over the last 5 years                               | 0.147 |   |              |                   |
| Average standard deviation of monthly temperature based on daily maximum temperature                  | 0.552 |   |              |                   |
| Average standard deviation of monthly temperature based on daily minimum temperature                  | 0.421 |   |              |                   |
| The average value of standard deviation from the average rainfall per month                           | 0.455 |   |              |                   |
| <b>Value of LVI</b>   |       |   | <b>0.359</b> | <b>Vulnerable</b> |

The calculation of LVI, including its main components and sub-components is presented in Table 4. The overall LVI index for the northern Java coast area is 0.359. This result indicates that fisherman and trader in the northern Java coast area, especially Demak Regency and Semarang City is vulnerable to climate change.

### 3.4. LVI-IPCC approach

LVI-IPCC is an alternative method developed from the Livelihood Vulnerability Index (LVI) to make the proxy of community livelihoods vulnerability on the effects of climate change. The scale of LVI-IPCC is ranged from -1 – (-0.4) as not vulnerable, -0.41 – 0.3 as vulnerable or moderate, and 0.31 - 1 as very vulnerable.

**Table 5.** The calculation of contributing factors in LVI-IPCC for Semarang City and Demak Regency.

| Factor contributor of IPCC for vulnerability | Index of main component | Weight of sub-Component | Value of factor contributor | Category               |
|--|-------------------------|-------------------------|-----------------------------|------------------------|
| <b>Exposure</b>                              | <b>0.436</b>            | 6                       | <b>0.436</b>                | <b>Very vulnerable</b> |

|                                |              |   |              |                        |
|--------------------------------|--------------|---|--------------|------------------------|
| <b>Adaptive capacity</b>       |              |   |              | <b>Very vulnerable</b> |
| - Social-demography            | 0.213        | 5 |              |                        |
| - Livelihood strategy          | 0.390        | 3 |              |                        |
| - Social network               | 0.563        | 3 |              |                        |
| <b>Sensitivity</b>             | <b>2.776</b> | 9 | <b>0.308</b> | <b>Very vulnerable</b> |
| - Health                       | 0.199        | 2 |              |                        |
| - Food                         | 0.474        | 3 |              |                        |
| - Water                        | 0.236        | 4 |              |                        |
| <b>Index value of LVI-IPCC</b> |              |   | <b>0.024</b> | <b>Vulnerable</b>      |

The overall value generated from the calculation of LVI-IPCC method is 0.024. This value indicates that fishermen and traders livelihood, in northern Java coast area, who suffer abrasion due to the climate change, is vulnerable.

#### 4. Conclusion

The objective of this research is to identify the regions in northern and southern coast zone of Java that suffer abrasion, due to the climate change and to calculate the social-economy vulnerability of the society who lives in the northern or southern coast zone of Java. The conclusions drawn based on the result of calculations in the study are stated as follows:

- a. Based on the analysis of LVI result, traders' and fishermen livelihood vulnerability level can be categorized as 'vulnerable' with an index value of 0.348 while based on the LVI-IPCC it can be categorized as 'not vulnerable' with an index value of -.007
- b. Based on the analysis of traders and fishermen livelihood vulnerability, using LVI, it shows that the vulnerability level of traders and fishermen in northern coast of Java can be categorized as 'vulnerable' with index value of 0.359 while based on LVI-IPCC it can be categorized as 'not vulnerable' with index value of 0.024

#### 5. References

- [1] DKP 2008 *Urgensi RUU Pengelolaan Wilayah Pesisir dan Pulau-Pulau Kecil* (On-line article: Dinas Kelautan Perikanan)
- [2] IPCC (Intergovernmental Panel of Climate Change) 2007 *Synthesis Report. An assessment of the Intergovernmental Panel of Climate Change* (Geneva: IPCC)
- [3] Triatmodjo, B 1999 *Teknik Pantai* (Yogyakarta: Beta Offset)
- [4] Sullivan C, Meigh J.R, Fediw, T.S 2002 *Derivational Testing of the Water Poverty Index Phase 1* (UK: Final Report Department for International Development)
- [5] UNDP 2007 *Human Development Report 2007/2008: Climate Change and the Right to Development. Himalayan Glacial Melting and the Future of Development on the Tibetan Plateau* (New York: UNDP)
- [6] Hahn, M.B, Riederer A.M, Foster 2009 The Livelihood Vulnerability Index: A Pragmatic Approach to Assessing Risks from Climate Variability and Change – A Case Study in Mozambique *Journal Global Environmental Change* **19** 74-88.
- [7] IPCC 2007 Fourth Assessment Report (AR4) of IPCC (2007) on climate change: The Physical Science Basis. From Heuristic and Supporting Decision Making to Understanding Genetic Regulation and Aiding Crop Improvement. *Europe.J. Agronomy* 15-31

# Community Livelihood Vulnerability

*by* Suryanto Suryanto

---

**Submission date:** 10-Feb-2020 03:15AM (UTC+0700)

**Submission ID:** 1254072928

**File name:** avitiani\_2018\_IOP\_Conf.\_Ser.\_\_Earth\_Environ.\_Sci.\_202\_012050.pdf (218.53K)

**Word count:** 4003

**Character count:** 21331

PAPER • OPEN ACCESS

39  
Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia

To cite this article: E Gravitani *et al* 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **202** 012050

View the [article online](#) for updates and enhancements.

# Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia

E Gravitiani<sup>1,2</sup>, S N Fitriana<sup>1,2</sup> and Suryanto<sup>1,2</sup>

<sup>1</sup> Faculty of Economics and Business

<sup>2</sup> Universitas Sebelas Maret, Jln Ir Sutami 36A, Surakarta, Indonesia

Email: [e\\_gravity2000@yahoo.com](mailto:e_gravity2000@yahoo.com)

**Abstract.** Climate change has an adverse effect on the coastal area. When sea level is rising, it will lead to more frequent sea tides, flood, and abrasion. This condition will make the coastal communities, especially fishermen and traders, become vulnerable. This research aims to examine the social-economic vulnerability of coastal communities, especially fishermen and traders in Northern and Southern Java coastal area, which related to climate change. The data is collected from 216 respondents from the coastal area. The data is analysed using Livelihood Vulnerability Index (LVI) and Livelihood Vulnerability Index – Intergovernmental Panel of Climate Change (LVI-IPCC). LVI analysis shows that the condition of coastal communities can be considered as vulnerable. However, based on LVI-IPCC analysis, the coastal communities are not vulnerable.

9

## 1. Introduction

Indonesia is one of the largest archipelago countries with more than 17,000 islands and 80,000 kilometres coastline [1]. This condition has placed Indonesia in a vulnerable position to the climate change, especially in term of sea level. IPCC [2] shows that starting on the 19th century global temperature has rose for 0.74° C, in average and will keep increasing up to 4.5° C. These uprising will affect sea level because of the meltdown in arctic icebergs. The effect can be seen in term of increased coverage of sea tides flood. In a long term, more and more small islands will disappear due to increased sea level. This condition will threaten the coastal communities' life. Moreover, the rise in sea level will also change the sea wave, increasing the frequency of sea tides flood, and destroying mangrove, which will lead to abrasion. Coastal areas are vulnerable to the effect of climate change, especially in term of sea level. This is mainly because Indonesian coastal area is characterized with high settlement density with crowded activities, such as salt farming, docking area, and tourism area as well.

Beach abrasion is the shrinkage in coastline from its previous position [3]. In general, 40 percent of total Indonesian coastline is damaged due to abrasion. In average, every year, 235 metres of coastline vanished as an effect of abrasion. Beach abrasion is caused by two main factors: an increase in sea level as the effect of global warming and the destruction of mangrove ecosystem. Both factors are caused by human activities. Other factors that contribute to the destruction of Indonesian beach, besides abrasion, are geological aspect, wave power, and whirlwind.

Northern and Southern Java coastal area is vulnerable to abrasion and tsunamis. Moreover, worse abrasion also adds to the vulnerability of both areas. This condition triggers the vulnerability of the coastal communities. Fishermen in coastal area mostly have several specific problems related to their livelihood, such as:



2

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

- a. Crucial ecosystem problem. Fish availability, which depend on season aspect, as well as fishermen's courage and safety in catching fishes, which depend heavily in wind condition and sea waves.
- b. Fish is one of food ingredients that can get easily rotten if not distributed immediately. This make the fishermen have to accept the price set by wholesaler.

The objective of this research is to analyze the vulnerability of fishermen who live in Northern and Southern Java coastal area, as well as trader in the same area, as a result of climate change.

## 2. Methodology

### 2.1. Location of the research

The location of research is a certain place where researcher collecting respondents' data needed. For the southern Java coastal area, Bantul Regency is chosen as the location of research. The data is collected from several beaches in this Regency such as Parangtritis, Depok, Kwaru, and Pantai Baru. Meanwhile, for the northern Java coastal area Demak Regency (Morosari Beach and Purworejo village coast) and Semarang City (Maron beach, Marina beach, Tambak Mulyo, and Tambak Rejo) are chosen for survey.

### 2.2. Research types

This research uses quantitative descriptive approach. This approach aims to describe the facts and the nature of the population in certain areas in a systematic, factual, and accurate manner.

### 2.3. Data Source

Data source refer to any source that can give the information about the data needed in this research. Data can be divided into two categories based on the source: primary data and secondary data. Primary data is the data collected directly as the result of observation, interview, or distributed questionnaire. Secondary data is the data collected from other parties (institution or organization) database.

The respondents in this research are traders and fishermen in northern and southern Java coastal area, specifically in Bantul Regency, Demak Regency, and Semarang City. The secondary data used in this research is average rainfall intensity in the three areas. The secondary data is obtained from BPS. The data of average air temperatures in three areas in five consecutive years is obtained from NCDC.

### 2.4. Methods and data analysis

#### 2.4.1. Vulnerability index.

##### 2.4.1.1. Livelihood Vulnerability Index (LVI) approach.

The Livelihood Vulnerability Index (LVI) in this research is developed by Hahn et al. (2009), which consist of seven main components, namely Social Demographic Profile (SDP), Livelihood Strategy (LS), Health (H), Social Network (SN), Food (F), Water (W), Natural Disaster (ND), and Climate Variability.

The LVI indicators as presented above are developed into several indicators or sub-components based on the literature review of its main component. LVI in this research is calculated using the balanced weighted average approach [4]. By using this measurement, each of the sub-components will have the same contribution to the overall index, even though each of the main component consist of a number of different sub-components.

Each sub-component is calculated using different scale, thus the result should be standardized to be converted into a more general index. By converting the result into an index, the overall result can be calculated. Therefore, to convert the scale of each sub-component obtained from the life expectancy index [5], a composite index approach is used with the following calculations:

$$Index Sb = \frac{Sb - Smin}{Smax - Smin} \quad (1)$$

Notes:  $S_b$

$S_b$  = the value of the sub component in the region of b,

15  
 $S_{min}$  = the minimum value of each sub-component, determined from the data of study sites.  
 $S_{max}$  = the maximum value of each sub-component, determined from the data of study sites - standardized.

The mean value of sub-components is calculated using the following equation. After that, the value of main components is calculated.

$$M_b = \frac{\sum_{i=1}^n indeks_{bi}}{n} \quad (2)$$

Notes:

$M_b$  = one of main component in the region of b (SDP, LS, H, F, W, SN, and ND).  
 Index  $b_i$  = value of sub-components indexed by i.

The value of LVI is obtained based on the equation as follow:

$$LVI_b = \frac{\sum_{i=1}^7 W_{M_i} M_b}{\sum_{i=1}^7 W_{M_i}} \quad (3)$$

The equation can be written as follows:

$$LVI_b = \frac{W_{SDP}SDP_b + W_{LS}LS_b + W_H H_b + W_F F_b + W_W W_b + W_{SN}SN_b + W_{ND}ND_b}{W_{SDP} + W_{LS} + W_H + W_F + W_W + W_{SN} + W_{ND}} \quad (4)$$

Source: Hahn et al. (2009) [6]

Notes:

$LVI_b$  = vulnerability index value for one of b region, weighted from seven main components.  
 $W_{M_i}$  = the amount of sub components that reflects all of the main component with the same contributor for the overall LVI [4].  
 The scale of LVI values ranges from:  
 a. 0 – 0.2 = Not vulnerable  
 b. 0.21 – 0.4 = Vulnerable/Moderate  
 c. 0.41 – 0.5 = Very vulnerable

#### 2.4.1.2. LVI – IPCC approach (Livelihood Vulnerability Index – Intergovernmental Panel of Climate Change).

LVI-IPCC index is an alternative option to calculate LVI by combining the definition of vulnerability according to IPCC. The exposure of this research population is measured using the number of flood occurred for the last five consecutive years. Climate variability is measured using the average of standard deviation of the maximum and minimum value of monthly air temperature for the last five years. The adaptive capacity is measured using demographic profile in each area such as number of female as the head of family, occupation, and social network (percentage of household that provide support to their neighbor). Sensitivity is measured using the status of food availability, water condition, and health level in a certain area. Table 1. Explains the method in computing LVI-IPCC.

The main difference between LVI-IPCC and LVI is in the integration of its main component. Different from the separation of main component in LVI computation, in LVI IPCC, the components will be grouped based on the category of plans, thus the formula is as follows:

$$CF_d = \frac{\sum_{i=1}^n W_{M_i} M_{di}}{\sum_{i=1}^n W_{M_i}} \quad (5)$$

Notes:

$CF_d$  = definition of IPCC contributor factors (exposure, sensitivity or adaptive capacity) for region of d (the northern and southern coast of Java),  
 $M_{di}$  = main component of the d-region which indexed by i  
 $W_{M_i}$  = the weighted value of main components, and is the amount of each main components contributor factor.

The combination of the three contributor factors is calculated using the following equation:

$$LVI - IPCC_d = (e_d - a_d) * S_d \quad (6)$$

LVI-IPCC<sub>d</sub> is the index of LVI in the region of d, which reflected from vulnerability framework of IPCC.

Notes:

- e = score of d region (same as the main component in natural disaster and climate variability),  
 a = score of adaptive capacity in the region of d (weighted from average of main component in social-demography, livelihood strategy, and social network)  
 s = score of sensitivity in the region of d (weighted from of main component in health, food and water).

The scale of LVI-IPCC between -1 and (-0.4) refer to 'not vulnerable', -0.41 – 0.3 refer to 'moderate', and 0.31 - 1 which refer to 'very vulnerable'.

Main component and sub-component of Livelihood Vulnerability Index (LVI) design developed by Hahn *et al.* (2009) [6] are:

1. Socio Demographic : dependency ratio, percentage of female head of household, percentage of households where head of household never attended school, percentage of a household with family member need assistance
2. Livelihood : percentage of a households whose family members work outside the community/ outside the city, percentage of a households who depend on agriculture as their main source of income, average index of livelihood agricultural diversification
3. Health : percentage of a households whose have average time required to go to a health facility, percentage of a households with chronic illness in family members
4. Social network : the mean value of aids accepted : ratio of aids given (range : 0.5-2), Average debt: ratio of money lending (range 0.5-2), and percentage of a households whose did not go to the local government to ask for support in the last year
5. Food : percentage of families who depend on family farming for food, average of months households experienced food shortages, Percentage of households that do not store crops
6. Water : percentage of households using natural water sources, Average time required to go to natural water source (minutes), Percentage of households with no consistent water supply, inverse of average number (in liters) of water stored per household
7. Natural disasters and climate variability: average amount of flood, and hurricane in the last 5 years, percentage of households not receiving a climate warning, percentage of households suffers death and being victim due to the natural disaster in the last 5 years, Standard deviation of average monthly temperature based on daily maximum temperature, average standard deviation of monthly temperature based on daily minimum temperature, Standard deviation from the average monthly rainfall.

Table 1. Contributing factor of vulnerability in IPCC.

| Factor contributor of vulnerability | Main components  |
|-------------------------------------|--|
| Exposure                            | Natural disasters and climate Variability                          |
| Adaptive Capacity                   | Social-demography profile<br>Livelihood strategy<br>Social Network |
| Sensitivity                         | Health, Food, Water  |

Source: [6]

### 3. Result and Discussion

#### 3.1. LVI result for the southern coast of Java

The result of standardized sub-components and calculation of the LVI index on 114 respondents show that the vulnerability level of the respondent can be categorized as vulnerable in facing the climate change, the score for each component is shown in the table 2.



**Table 2.** Index of sub-component, main component, and total LVI.

| Sub-component   | Composite Index of Sub-component | Index of Main Component | Index of Main Component | Category        |
|---|----------------------------------|-------------------------|-------------------------|-----------------|
| Socio-demography  |                                  |                         |                         |                 |
| Number of dependency  | 0.252                            | profile                 | 0.242                   | Vulnerable      |
| Percentage of women as head of Household  | 0.088                            |                         |                         |                 |
| The average age of female head of household   | 0.766                            |                         |                         |                 |
| The head of household has no Education  | 0.096                            |                         |                         |                 |
| Households whose members need help  | 0.009                            |                         |                         |                 |
| Percentage of households with members working outside the City  | 0.158                            |                         |                         |                 |
| Percentage of households whose main sources of income still depend on the agricultural sector         | 0.684                            |                         |                         |                 |
| Average index of farm livelihood classification (range: 0.20 – 1)                                     | 0.310                            |                         |                         |                 |
| Average time required (minutes)   | 0.236                            | Health                  | 0.158                   | Not Vulnerable  |
| Percentage of households whose family members have chronic illness                                    | 0.079                            |                         |                         |                 |
| Percentage of households with the most food sources are from their own farmland                       | 0.816                            | Food                    | 0.459                   | Very Vulnerable |
| Average number of households in a month that has food shortage (range: 12 2)                          | 0.007                            |                         |                         |                 |
| Percentage of households that do not store or   | 0.553                            |                         |                         |                 |
| Percentage of households utilizing natural water resources  | 0.921                            | Water                   | 0.244                   | Vulnerable      |
| Average time required to go to water source (minutes)   | 0.025                            |                         |                         |                 |
| Percentage of households with consistent water supply   | 0.026                            |                         |                         |                 |
| The inverse to average amount of water (in litres) stored per household (range > 0-1)                 | 0.002                            |                         |                         |                 |
| Average receive: ratio of receiving (range: 0-15)   | 0.459                            | Social Network          | 0.599                   | Very vulnerable |
| Average borrow: ratio of money lending (range: 0.5 - 2)   | 0.409                            |                         |                         |                 |
| Percentage of households who have never gone to local government to seek for support in the past year | 0.930                            |                         |                         |                 |
| Natural disasters and climate   |                                  |                         |                         |                 |
| The average amount of flood   |                                  |                         |                         |                 |

| Sub-component   | Composite Index of |                | Index of Main Component | Category          |
|---|--------------------|----------------|-------------------------|-------------------|
|   | Sub-component      | Main Component |                         |                   |
| disaster over the last 5 years  | 0.391              | variability    | 0.353                   | Vulnerable        |
| Percentage of households who do not receive warnings about the arrival of flood disasters | 0.670              |                |                         |                   |
| Percentage of households suffering flood in the last 5 years                              | 0                  |                |                         |                   |
| Average standard deviation of monthly temperature based on daily maximum temperature      | 0.514              |                |                         |                   |
| Average standard deviation of monthly temperature based on daily minimum temperature      | 0.115              |                |                         |                   |
| The average value of standard deviation from the average rainfall per month               | 0.428              |                |                         |                   |
| <b>Value of LVI</b>   |                    |                | <b>0.348</b>            | <b>Vulnerable</b> |

Table 2 shows the result of LVI computation for all components (main components and sub-components). The LVI value for southern Java coastal area is 0.348, which shows that the fishermen and traders in the area is vulnerable to climate change. Moreover, we find that Bantul Regency is the most vulnerable area to tides flood because of climate change.

### 3.2. LVI-IPCC (*Livelihood Vulnerability Index-Intergovernmental of Climate Change*) approach

LVI-IPCC is an alternative method developed from LVI as the proxy of community livelihoods vulnerability caused by the climate change. The scale from -1 - (-0.4) which refer to 'not vulnerable', -0.41 - 0.3 which refer to 'vulnerable/moderate', and 0.31 - 1 which refer to 'highly vulnerable'.

**Table 3.** The calculation of contributing factors in LVI-IPCC for Bantul Regency.

| Factor contributor of IPCC for vulnerability | Index of main component | Weight of sub-component | Value of factor contributor | Category              |
|--|-------------------------|-------------------------|-----------------------------|-----------------------|
| <b>Exposure</b>                              | <b>0.353</b>            | 6                       | <b>0.353</b>                | Very Vulnerable       |
| <b>Adaptive capacity</b>                     | <b>4.159</b>            | 11                      | <b>0.378</b>                | Very Vulnerable       |
| - Socio-demographic                          | 0.242                   | 5                       |                             |                       |
| - Livelihood strategy                        | 0.384                   | 3                       |                             |                       |
| - Social network                             | 0.599                   | 3                       |                             |                       |
| <b>Sensitivity</b>                           | <b>2.669</b>            | 9                       | <b>0.296</b>                | Vulnerable            |
| - Health                                     | 0.158                   | 2                       |                             |                       |
| - Food                                       | 0.459                   | 3                       |                             |                       |
| - Water                                      | 0.244                   | 4                       |                             |                       |
| <b>LVI-IPCC Index Value</b>                  |                         |                         | <b>-0.007</b>               | <b>Not Vulnerable</b> |

The overall value of LVI-IPCC is -0.007. This value indicates that fishermen and traders livelihood in southern Yogyakarta is not vulnerable to sea tides flood, which caused by climate change. This result is differing from the LVI result because in LVI-IPCC there is an integration of several components into one formula. The exposure index for natural disaster is lower than adaptation capacity index (social-demographic, living strategy, and social network), thus the result of LVI-IPCC has a negative value and not vulnerable.

Therefore, it can be concluded that southern Java coastal communities' livelihood is vulnerable based on LVI result. However, based on LVI-IPCC southern Java coastal communities' livelihood is not vulnerable. This difference is due to some integration in the

components of LVI. Generally, LVI measures the average of each component, while in LVI-IPCC the components are integrated into three main components and measured using different formula (LVI-IPCC formula).

### 3.3. The Analysis of Livelihood Vulnerability Index (LVI) result in the northern coast of Java

The result of LVI computation on the survey data of northern Java coastal communities shows that the fishermen and traders livelihood is vulnerable to climate change. The value of each component is presented on the following table 4.

**Table 4.** Index of sub-component, main component, and total LVI.

| Sub-component   | Composite Index of Sub-component | Index of Main Component |           | Category        |
|---|----------------------------------|-------------------------|-----------|-----------------|
|   |                                  | Main Component          | Component |                 |
| Number of dependency  | 0.214                            | demographic Profile     | 0.213     | Vulnerable      |
| Percentage of female head of household  | 0.029                            |                         |           |                 |
| The average age of female head of household   | 0.559                            |                         |           |                 |
| The head of household has no education  | 0.108                            |                         |           |                 |
| Households whose members need help  | 0.157                            | Livelihood              |           |                 |
| Percentage of households with members working outside the city                                | 0.314                            | strategy                | 0.390     |                 |
| Percentage of households whose main sources of income still depend on the agricultural sector | 0.578                            |                         |           | Not vulnerable  |
| Average index of farm livelihood classification (range: 0.20 - 1)                             | 0.278                            |                         |           |                 |
| Average time required (minutes)   | 0.250                            | Health                  | 0.199     |                 |
| Percentage of households whose family members have chronic illness                            | 0.147                            |                         |           |                 |
| Percentage of households with the most food sources are from their own farmland               | 0.892                            | Food                    | 0.474     |                 |
| Average number of households in a month that has a difficulty to eat (range: 0-12)            | 0.002                            |                         |           |                 |
| Percentage of households that do not store crops  | 0.529                            |                         |           | Very vulnerable |
| Percentage of households utilizing natural water resources                                    | 0.892                            | Water                   | 0.236     |                 |

|   |       |   |              |                   |
|---|-------|---|--------------|-------------------|
| Average time required to go to water source (minutes)   | 0.039 |   |              |                   |
| Percentage of households with consistent water supply   | 0.00  |   |              |                   |
| The inverse of average amount of water (in litres) stored per household (range > 0-1)                 | 0.011 |   |              |                   |
| Average receive: ratio of receiving (range: 0-15)   | 0.389 | Social network                            | 0.563        | Very vulnerable   |
| Average borrow: ratio of money lending (range: 0.5 - 2)   | 0.428 |   |              |                   |
| Percentage of households who have never gone to local government to seek for support in the past year | 0.873 | Natural disasters and climate variability |              |                   |
| The average amount of flood disaster in the last 5 years  | 0.121 |   | 0.436        | Very vulnerable   |
| Percentage of households who do not receive warnings about the arrival of flood disasters             | 0.922 |   |              |                   |
| Percentage of households suffering flood disaster over the last 5 years                               | 0.147 |   |              |                   |
| Average standard deviation of monthly temperature based on daily maximum temperature                  | 0.552 |   |              |                   |
| Average standard deviation of monthly temperature based on daily minimum temperature                  | 0.421 |   |              |                   |
| The average value of standard deviation from the average rainfall per month                           | 0.455 |   |              |                   |
| <b>Value of LVI</b>   |       |   | <b>0.359</b> | <b>Vulnerable</b> |

The calculation of LVI, including its main components and sub-components is presented in Table 4. The overall LVI index for the northern Java coast area is 0.359. This result indicates that fisherman trader in the northern Java coast area, especially Demak Regency and Semarang City is vulnerable to climate change.

### 3.4. LVI-IPCC approach

LVI-IPCC is an alternative method developed from the Livelihood Vulnerability Index (LVI) to make the proxy of community livelihoods vulnerability on the effects of climate change. The scale of LVI-IPCC is ranged from -1 - (-0.4) as not vulnerable, -0.41 - 0.3 as vulnerable or moderate, and 0.31 - 1 as very vulnerable.

**Table 5.** The calculation of contributing factors in LVI-IPCC for Semarang City and Demak Regency.

| Factor contributor of IPCC for sub-vulnerability | Index of main component | Weight of sub-Component | Value of factor contributor | Category               |
|--|-------------------------|-------------------------|-----------------------------|------------------------|
| <b>Exposure</b>                                  | <b>0.436</b>            | 6                       | <b>0.436</b>                | <b>Very vulnerable</b> |

|                                |              |   |              |                        |
|--------------------------------|--------------|---|--------------|------------------------|
| <b>Adaptive capacity</b>       |              |   |              | <b>Very vulnerable</b> |
| - Social-demography            | 0.213        | 5 |              |                        |
| - Livelihood strategy          | 0.390        | 3 |              |                        |
| - Social network               | 0.563        | 3 |              |                        |
| <b>Sensitivity</b>             | <b>2.776</b> | 9 | <b>0.308</b> | <b>Very vulnerable</b> |
| - Health                       | 0.199        | 2 |              |                        |
| - Food                         | 0.474        | 3 |              |                        |
| - Water                        | 0.236        | 4 |              |                        |
| <b>Index value of LVI-IPCC</b> |              |   | <b>0.024</b> | <b>Vulnerable</b>      |

The overall value generated from the calculation of LVI-IPCC method is 0.024. This value indicates that fishermen and traders livelihood, in northern Java coast area, who suffer abrasion due to the climate change, is vulnerable.

2

#### 4. Conclusion

The objective of this research is to identify the regions in northern and southern coast zone of Java that suffer abrasion, due to the climate change and to calculate the social-economy vulnerability of the society who lives in the northern or southern coast zone of Java. The conclusions drawn based on the result of calculations in the study are stated as follows:

- Based on the analysis of LVI result, traders' and fishermen livelihood vulnerability level can be categorized as 'vulnerable' with an index value of 0.348 while based on the LVI-IPCC it can be categorized as 'not vulnerable' with an index value of -.007
- Based on the analysis of traders and fishermen livelihood vulnerability, using LVI, it shows that the vulnerability level of traders and fishermen in northern coast of Java can be categorized as 'vulnerable' with index value of 0.359 while based on LVI-IPCC it can be categorized as 'not vulnerable' with index value of 0.024

#### 5. References

- DKP 2008 *Urgensi RUU Pengelolaan Wilayah Pesisir dan Pulau-Pulau Kecil* (On-line article: Dinas Kelautan Perikanan)
- IPCC (Intergovernmental Panel of Climate Change) 2007 *Synthesis Report. An assessment of the Intergovernmental Panel of Climate Change* (Geneva: IPCC)
- Atmodjo, B 1999 *Teknik Pantai* (Yogyakarta: Beta Offset)
- Sullivan C, Meigh J.R, Fediw, T.S 2002 *Derivational Testing of the Water Poverty Index Phase I* (UK: Final Report Department for International Development)
- UNDP 2007 *Human Development Report 2007/2008: Climate Change and the Right to Development. Himalayan Glacial Melting and the Future of Development on the Tibetan Plateau* (New York: UNDP)
- Hahn, M.B, Riederer A.M, Foster 2009 *The Livelihood Vulnerability Index: A Pragmatic Approach to Assessing Risks from Climate Variability and Change – A Case Study in Mozambique* *Journal Global Environmental Change* **19** 74-88.
- IPCC 2007 Fourth Assessment Report (AR4) of IPCC (2007) on climate change: The Physical Science Basis. From Heuristic and Supporting Decision Making to Understanding Genetic Regulation and Aiding Crop Improvement. *Europe.J. Agronomy* 15-31

# Community Livelihood Vulnerability

---

## ORIGINALITY REPORT

---

**23%**

SIMILARITY INDEX

**16%**

INTERNET SOURCES

**21%**

PUBLICATIONS

**17%**

STUDENT PAPERS

---

## PRIMARY SOURCES

---

**1**

[www.sage.wisc.edu](http://www.sage.wisc.edu)

Internet Source

**4%**

**2**

[digilib.unimed.ac.id](http://digilib.unimed.ac.id)

Internet Source

**1%**

**3**

144.92.10.170

Internet Source

**1%**

**4**

"Climate Change Adaptation in Africa", Springer  
Science and Business Media LLC, 2017

Publication

**1%**

**5**

Submitted to London School of Economics and  
Political Science

Student Paper

**1%**

**6**

Submitted to Sophia University

Student Paper

**1%**

**7**

[www.omicsonline.org](http://www.omicsonline.org)

Internet Source

**1%**

**8**

[es.scribd.com](http://es.scribd.com)

Internet Source

**1%**

---

9

G Aliyuddin, A Damayanti. "Coastline Changes in Serang City, Banten Province", IOP Conference Series: Earth and Environmental Science, 2019

Publication

1%

10

Ankita Paul, Jurishmita Deka, Nihal Gujre, Latha Rangan, Sudip Mitra. "Does nature of livelihood regulate the urban community's vulnerability to climate change? Guwahati city, a case study from North East India", Journal of Environmental Management, 2019

Publication

1%

11

Zelalem Dendir, Belay Simane. "Livelihood vulnerability to climate variability and change in different agroecological zones of Gurage Administrative Zone, Ethiopia", Progress in Disaster Science, 2019

Publication

1%

12

Derick T. Adu, John K.M. Kuwornu, Henry Anim-Somuah, Nophea Sasaki. "Application of livelihood vulnerability index in assessing smallholder maize farming households' vulnerability to climate change in Brong-Ahafo region of Ghana", Kasetsart Journal of Social Sciences, 2018

Publication

1%

13

Submitted to CSU, San Jose State University

1%

---

14

Submitted to University of Oklahoma

Student Paper

1%

---

15

Jangkung Handoyo Mulyo, Arif Wahyu Widada, Sugiyarto, Masyhuri. "Assessing the Vulnerability of Farm Households in Yogyakarta to Risks Associated with Climate Change", E3S Web of Conferences, 2020

Publication

1%

---

16

Submitted to University of Nottingham

Student Paper

1%

---

17

[m.scirp.org](http://m.scirp.org)

Internet Source

<1%

---

18

Kazi Ali Toufique, Anisul Islam. "Assessing risks from climate variability and change for disaster-prone zones in Bangladesh", International Journal of Disaster Risk Reduction, 2014

Publication

<1%

---

19

Micah B. Hahn, Anne M. Riederer, Stanley O. Foster. "The Livelihood Vulnerability Index: A pragmatic approach to assessing risks from climate variability and change—A case study in Mozambique", Global Environmental Change, 2009

Publication

<1%

---



20

L SHAHZAD. "DOES LIVELIHOOD VULNERABILITY INDEX JUSTIFY THE SOCIO-ECONOMIC STATUS OF MOUNTAINOUS COMMUNITY? A CASE STUDY OF POST-EARTHQUAKE ECOLOGICAL ADAPTATION OF BALAKOT POPULATION", Applied Ecology and Environmental Research, 2019

Publication

<1%

21

[www.rspnbhutan.org](http://www.rspnbhutan.org)

Internet Source

<1%

22

Submitted to Asian Institute of Technology

Student Paper

<1%

23

[www.nature.com](http://www.nature.com)

Internet Source

<1%

24

[www.bundesumweltministerium.de](http://www.bundesumweltministerium.de)

Internet Source

<1%

25

[link.springer.com](http://link.springer.com)

Internet Source

<1%

26

Suhyini I. Alhassan, John K.M. Kuwornu, Yaw B. Osei-Asare. "Gender dimension of vulnerability to climate change and variability", International Journal of Climate Change Strategies and Management, 2019

Publication

<1%

[usir.salford.ac.uk](http://usir.salford.ac.uk)

27

Internet Source

&lt;1%

28

Evi Gravitiani, Suryanto, Ernoiz Antriyandari. "Willingness to Pay for Climate Change Mitigation: Application on Big Cities in Central Java, Indonesia", *Procedia - Social and Behavioral Sciences*, 2016

Publication

&lt;1%

29

Muhammad Irshad Ahmad, Hengyun Ma. "Climate Change and Livelihood Vulnerability in Mixed Crop–Livestock Areas: The Case of Province Punjab, Pakistan", *Sustainability*, 2020

Publication

&lt;1%

30

Nuriah Abd Majid, Nurafiqah Muhamad Nazi, Nor Diana Mohd Idris, Mohd. Raihan Taha. "GIS-Based Livelihood Vulnerability Index Mapping of the Socioeconomy of the Pekan Community", *Sustainability*, 2019

Publication

&lt;1%

31

Evi Sukmayeti. "A Social Mapping of Fishermen Resource and Accessibility for Coastal Tourism Development Policy", *Society*, 2019

Publication

&lt;1%

32

Nabanita Mukherjee, Giyasuddin Siddique, Aritra Basak, Arindam Roy, Mehedi Hasan Mandal. "Climate Change and Livelihood Vulnerability of the Local Population on Sagar

&lt;1%

# Island, India", Chinese Geographical Science, 2019

Publication

---

33

Arini W. Utami, Jangkung H. Mulyo, Fatkhiyah Rohmah. "How Vulnerable is Rural Community towards Climate Change? A Case Study of Yogyakarta, Indonesia", Asia-Pacific Journal of Rural Development, 2019

Publication

---

<1%

34

Submitted to London School of Marketing

Student Paper

---

<1%

35

[etheses.whiterose.ac.uk](http://etheses.whiterose.ac.uk)

Internet Source

---

<1%

36

Environmental Science and Engineering, 2016.

Publication

---

<1%

37

Submitted to Indian Institute of Technology,  
Bombay

Student Paper

---

<1%

38

"The Monsoons and Climate Change", Springer  
Science and Business Media LLC, 2016

Publication

---

<1%

39

Submitted to Universitas Diponegoro

Student Paper

---

<1%

---

Exclude quotes Off

Exclude bibliography Off

Exclude matches Off

# Community Livelihood Vulnerability

---

## GRADEMARK REPORT

---

FINAL GRADE

**/0**

GENERAL COMMENTS

**Instructor**

---

PAGE 1

---

PAGE 2

---

PAGE 3

---

PAGE 4

---

PAGE 5

---

PAGE 6

---

PAGE 7

---

PAGE 8

---

PAGE 9

---

PAGE 10

---

LEMBAR  
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*  
KARYA ILMIAH : **PROSIDING** \*

Judul Karya Ilmiah (paper) : Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia  
 Jumlah Penulis : 3 Orang (Evi Gravitiani, SN Fitriana, **Suryanto**)  
 Status Pengusul : ~~Penulis pertama~~ / penulis ke 3/ ~~penulis korespondensi~~\*\*  
 Identitas Prosiding : a. Nama Prosiding : Disampaikan Pada : **CITIES 2017**  
 b. ISBN/ISSN : -  
 c. Tahun Terbit, Tempat Pelaksanaan : **Surabaya, 18 Oktober 2017**  
 d. Penerbit/organiser : **IOP Publishing**  
 e. Alamat repository PT/web : <https://iopscience.iop.org/article/10.1088/1755-1315/202/1/012050/pdf>  
 f. Terindeks di (jika ada) :

Kategori Publikasi Makalah :  Prosiding Forum Ilmiah Internasional .....  
 (beri ~ pada kategori yang tepat)  Prosiding Forum Ilmiah Nasional .....


Hasil Penilaian *Peer Review* :

| Komponen Yang Dinilai   | Nilai Maksimal <b>Prosiding 15</b>     |                                   | Nilai Akhir Yang Diperoleh |
|---|--|-----------------------------------|----------------------------|
|   | Internasional <input type="checkbox"/> | Nasional <input type="checkbox"/> |                            |
| a. Kelengkapan unsur isi paper (10%)                              | 1.5                                    |                                   | 1                          |
| b. Ruang lingkup dan kedalaman pembahasan (30%)                   | 4.5                                    |                                   | 3                          |
| c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%) | 4.5                                    |                                   | 4                          |
| d. Kelengkapan unsur dan kualitas terbitan/prosiding (30%)        | 4.5                                    |                                   | 4                          |
| <b>Total = (100%)</b>   | <b>15</b>                              |                                   | <b>12</b>                  |
| <b>Nilai Pengusul = (40% x 12) / 2 = 2,4 (Penulis Ketiga)</b>     |  |                                   |                            |

**Catatan Penilaian artikel oleh Reviewer :**

- a. Kelengkapan dan kesesuaian unsur isi artikel :  
 Cukup lengkap hanya perlu penambahan rekomendasi, isi telah sesuai dengan kaidah ilmiah
- b. Ruang lingkup dan kedalaman pembahasan :  
 Ruang lingkup mengenai tingkat kerentanan sosial masyarakat yang tinggal di wilayah banjir, kedalaman pembahasan masih terbatas pada aspek-aspek yang digunakan untuk mengukur LVI.
- c. Kecukupan dan pemutakhiran data/informasi dan metodologi :  
 Data yang dipergunakan mengandalkan data primer meski untuk menggambarkan tingkat kerentanan social diperlukan sampel yang lebih besar.
- d. Kelengkapan unsur dan kualitas terbitan :  
 Unsur dalam terbitan telah memadai dan lengkap. Kualitas terbitan termasuk baik.
- e. Indikasi Plagiat :  
 Tidak ada indikasi plagiarisme
- f. Kesesuaian bidang ilmu :  
 Sesuai dengan bidang ilmu yang bersangkutan

Surakarta, 2 Juni, 2020

  
 Prof. Dr. Yunastiti Purwaningsih, M.P  
 NIP 19590613 198403 2 001  
 Jabatan : Guru Besar  
 Pangkat, Gol Ruang : Pembina Utama Madya/IVD  
 Unit Kerja : Fakultas Ekonomi UNS  
 Bidang Ilmu : Ekonomi Pertanian

\*Dinilai oleh dua Reviewer secara terpisah

\*\*Coret yang tidak perlu

LEMBAR  
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*  
KARYA ILMIAH : **PROSIDING** \*

Judul Karya Ilmiah (paper) : Community livelihood vulnerability level in northern and southern coastal area of Java, Indonesia  
 Jumlah Penulis : 3 Orang (Evi Gravitaniani, SN Fitriana, **Suryanto**)  
 Status Pengusul : ~~Penulis pertama~~ / penulis ke 3/ ~~penulis korespondensi~~ \*\*  
 Identitas Prosiding : a. Nama Prosiding : Disampaikan Pada : **CITIES 2017**  
 b. ISBN/ISSN : -  
 c. Tahun Terbit, Tempat Pelaksanaan : **Surabaya, 18 Oktober 2017**  
 d. Penerbit/organiser : **IOP Publishing**  
 e. Alamat repository PT/web prosiding : <https://iopscience.iop.org/article/10.1088/1755-1315/202/1/012050/pdf>  
 f. Terindeks di (jika ada) :

Kategori Publikasi Makalah :  Prosiding Forum Ilmiah Internasional .....  
 (beri ~ pada kategori yang tepat)  Prosiding Forum Ilmiah Nasional .....

Hasil Penilaian *Peer Review* :

| Komponen Yang Dinilai   | Nilai Maksimal Prosiding 15            |                                   | Nilai Akhir Yang Diperoleh |
|---|--|-----------------------------------|----------------------------|
|   | Internasional <input type="checkbox"/> | Nasional <input type="checkbox"/> |                            |
| a. Kelengkapan unsur isi paper (10%)                              | 1.5                                    |                                   | 1.5                        |
| b. Ruang lingkup dan kedalaman pembahasan (30%)                   | 4.5                                    |                                   | 4.5                        |
| c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%) | 4.5                                    |                                   | 4.5                        |
| d. Kelengkapan unsur dan kualitas terbitan/prosiding (30%)        | 4.5                                    |                                   | 4.5                        |
| <b>Total = (100%)</b>   | <b>15</b>                              |                                   | <b>15</b>                  |
| <b>Nilai Pengusul = (40% x 15.) / 2 = 3 (Penulis Ketiga)</b>      |  |                                   |                            |

**Catatan Penilaian artikel oleh Reviewer :**

- a. Kelengkapan dan kesesuaian unsur isi artikel :  
 Artikel ini ditulis dengan format yang sudah mengikuti guidelines dari panitia yaitu introduction, method and data analysis, result and conclusion. Isi artikel sesuai dengan judul dan materi yang di bahas cukup komprehensif
- b. Ruang lingkup dan kedalaman pembahasan :  
 Materi tentang kerentanan mata pencaharian khususnya di kawasan pesisir selalu menarik untuk dibahas dari berbagai aspek sehingga menjadi keterbaruan dalam artikel ini. Pembahasan dilakukan dengan cukup jelas dan dibuat mengikuti tujuan yang ditetapkan
- c. Kecukupan dan pemutakhiran data/informasi dan metodologi :  
 Alat analisis yang digunakan cukup bagus dan jarang digunakan khususnya untuk kerentanan dalam penghidupan di wilayah pesisir
- d. Kelengkapan unsur dan kualitas terbitan :  
 Proceeding ini terindeks scopus sehingga secara terbitan cukup bagus
- e. Indikasi Plagiat :  
 Tidak terdapat indikasi plagiarism yang ditunjukkan dengan nilai turn it in yang sebesar 23%
- f. Kesesuaian bidang ilmu :  
 Artikel dengan topic ekonomi lingkungan ini sesuai dengan ilmu ekonomi pembangunan

Surakarta, .....

10 JUN 2020

Reviewer 1/2 \*\*

**Dr. Izza Mafruhah, SE., M.Si**  
 NIP 197203232002122001

Jabatan : Lektor Kepala  
 Pangkat, Gol Ruang : Pembina Tk.I /IV/b  
 Unit Kerja : Fakultas Ekonomi dan Bisnis  
 Bidang Ilmu : Ekonomi Pembangunan

\*Dinilai oleh dua Reviewer secara terpisah  
 \*\*Coret yang tidak perlu