Vulnerability of the Municipal Government in Aquaculture due to Changes in Sea Surface Temperature – A Case of Tongyeong City -

Yeeun Lee[1], Yongwon Mo[1], Chan Park[2]

1. Department of Landscape architecture, College of Life and Applied Sciences, Yeungnam University, Gyeongsan, Republic of Korea
2. Department Of Landscape Architecture, College Of Urban Sciences, University Of Seoul, Seoul, Republic of Korea

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National Institute for Environmental Studies,Japan

Contact: lpms2213@yu.ac.kr

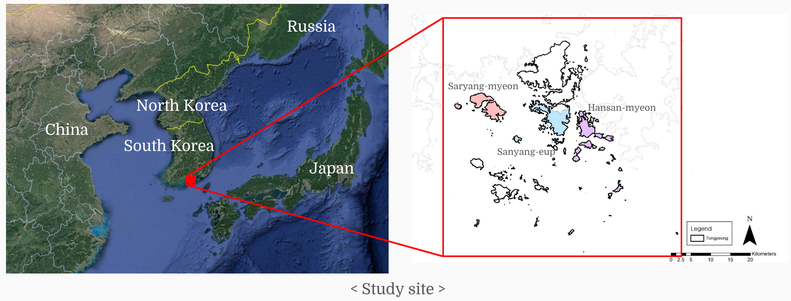
Background

- VESTAP is a Korean climate change vulnerability assessment tool to build climate change adaptation plan.
- Local governments establish climate change adaptation measures based on these results.
- The problem with the existing vulnerability assessment is that the reliability is lowered due to the same application of county level data.

Objectives

- We aim to propose alternative indicators that can be used to establish strategies for local governments to adapt to climate change.
- We also try to conduct a vulnerability assessment at the village level using VESTAP.

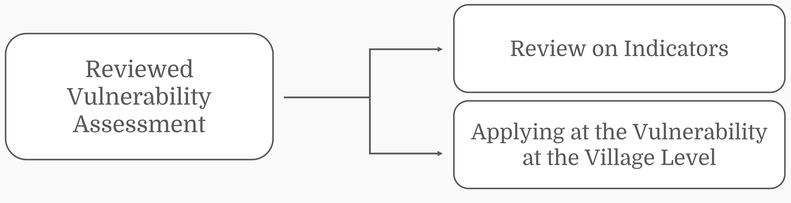
Study sites



< Study site >

- Tongyeong is geographically located in southern Gyeongsangnam-do.
- It is bordered by Geoje to the east and Namhae-gun to the west.
- It is also in contact with Goseong-gun to the north and Namhae Sea to the south.
- There is a ria coast where coastal islands are scattered widely.
- Due to rising sea levels, low-lying coastal areas are affected by the supermoon, which causes damage such as road flooding.

Study flow



Methods

Review on Indicators

Climate Change	Sea Surface Temperature(˚C)
	Number of Jellyfish Damage
	The rate of sea-level rise(%)
	Number of days that Daily Precipitation above 80mm
	Number of days daily maximum temperature above 33˚C
	Number of days Average Daily Temperature below 0˚C

< VESTAP climate change indicators>

- We reviewed the indicators of VESTAP and proposed modifying the indicators through previous research.

Applying at the Vulnerability at the Village Level

- We carried out by using RCP4.5, MME3s (Ensemble Average), 2021~2030 at the village level according to a segmented aquaculture method.
- We compared the results of vulnerability assessment at the county level and in the village level using absolute values.
- We also selected representative regions and compared the values of vulnerability variables.

Results

Review on Indicators

Climate Change	Sea Surface Temperature(˚C)	
	Number of Jellyfish Damage	
	The rate of sea-level rise(%)	
	Number of days that Daily Precipitation above 80mm	
	Number of days daily maximum temperature above 33˚C	lacking evidence
	Number of days Average Daily Temperature below 0˚C	lacking evidence

< Indicator review >

- We assessed that the evidence for the highest temperature indicators was insufficient.

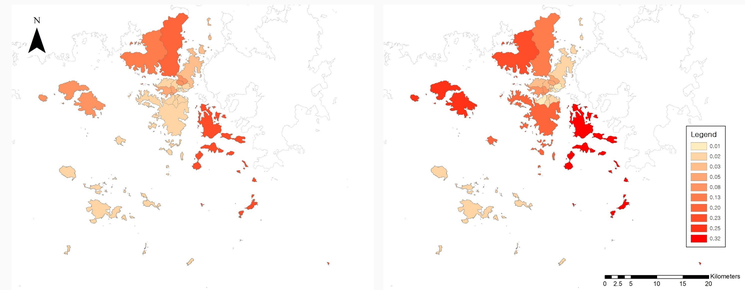
Climate Change	Physical Characteristics of the Ocean on Aquatic Organism	Variation of Sea Surface Temperature
		Variation of Salinity
		Variation of Dissolved Oxygen
	Physical Characteristics of Marine on Fishing and Settlement Environment	Waves/Swells/Winds
		Sea Level Rise
	Frequency of Harmful Organism Appearance	Red Tides
		Jellyfish

< The proxy variable that constitutes the vulnerability indicators of climate change in the fisheries sector (Park, 2015) >

- In addition to jellyfish, we decided that red tides should be considered. (Park, 2015)
- Red tides and sea surface temperature were closely related. (Lee and choi, 2009)
- Red tides occurred most frequently at 25-26°C. (Lee and Choi, 2009)

- The value of the overall vulnerability composite index has risen while using village level.
- Data on sea surface temperature have been established.
- Based on this, we suggested modifying the daily maximum temperature index to 26°C.

Applying at the Vulnerability at the Village Level

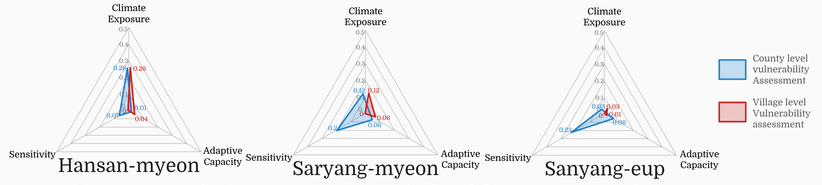


< County-level vulnerability assessment > < Village level vulnerability assessment >

Ranking	Name of the village	Composite Index		Subtraction (|(a)-(b)|)
		County level vulnerability assessment (a)	Village level vulnerability assessment (b)	
1	**Saryang-myeon**	**0.07**	**0.25**	**0.18**
1	**Sanyang-eup**	**0.02**	**0.20**	**0.18**
3	Dosan-myeon	0.13	0.23	0.10
3	**Hansan-myeon**	**0.22**	**0.32**	**0.10**
5	Docheon-dong	0.04	0.08	0.04
6	Gwangdo-myeon	0.16	0.13	0.03

< Ranking of vulnerability values changed >

- The value of the overall vulnerability composite index has risen while using village level.
- The vulnerability assessment value of Saryang-myeon increased by 0.18 at village level to 0.25.
- The value of the Gwangdo-myeon decreased by 0.03 to 0.16 to 0.13.



< Comparison graphs in representative areas of vulnerability assessment results >

- Sensitivity values increased at the village level in all three regions.
- Adaptive capacity value of Hansan-myeon has rather decreased from 0.04 to 0.01.

Conclusion

- Modifying indicators can improve the reliability of vulnerability assessments.
- Utilizing smaller administrative units can be improve the effectiveness of VESTAP.