

Estimate of Regional Impacts of Adaptation Policies and Sand erosion Damage by Climate Change

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Background

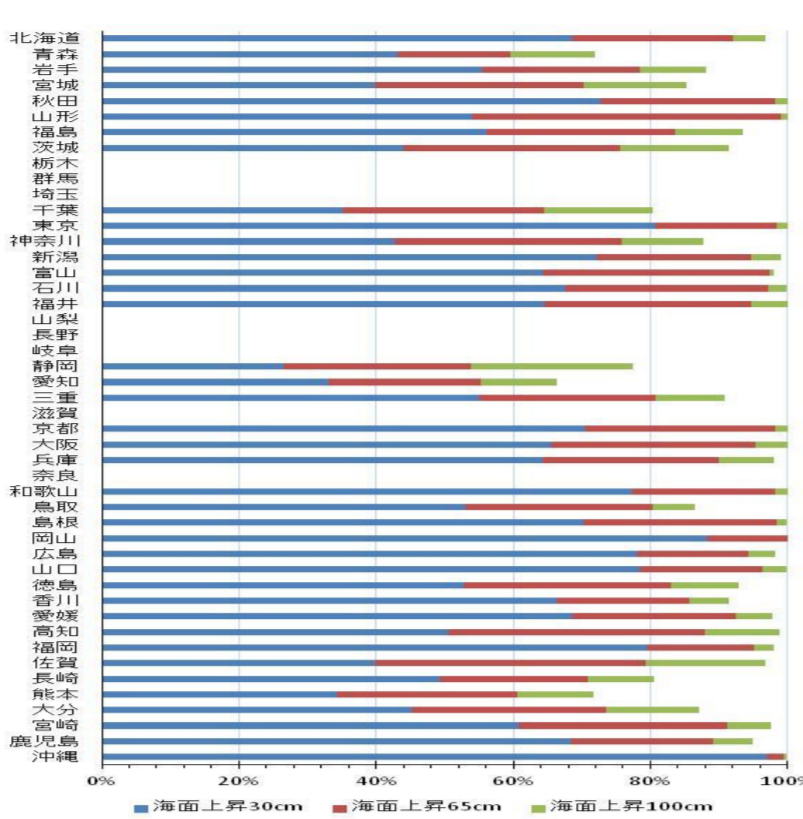
existing research

Mimura et.al.(1993,1994) forecasted the erosion rate of sandy beaches in all prefectures.



However, we have not calculated how much economic damage will be caused by the sand beach erosion.

Sand beach erosion



Sea level rise 30cm : 56.6 %
Sea level rise 65cm : 81.7 %
Sea level rise 100cm : 90.3 %

Mimura et. al.(1993, 1994)

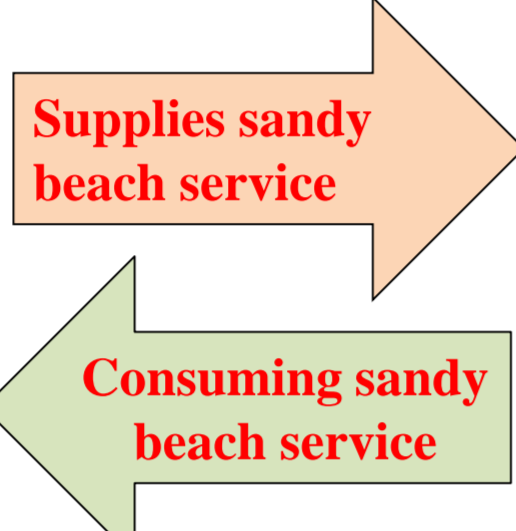
Purpose of this study

- Evaluation of regional economic damage caused by sand beach erosion
Target Area : all Prefectures
Sand beach erosion scenarios : Sea level rise 30cm, 65cm
by Mimura et.al. (1993, 1994)
- Evaluation of adaptation policy
Adaptation policy : Set virtual adaptation policy as an example of past public project
Evaluation : Calculate cost effectiveness of the policy implementation

Model and Scenario

Overview of the Model

Households pay money for consuming goods related with sea bathing (gas & toll road for visiting the sea).



Household

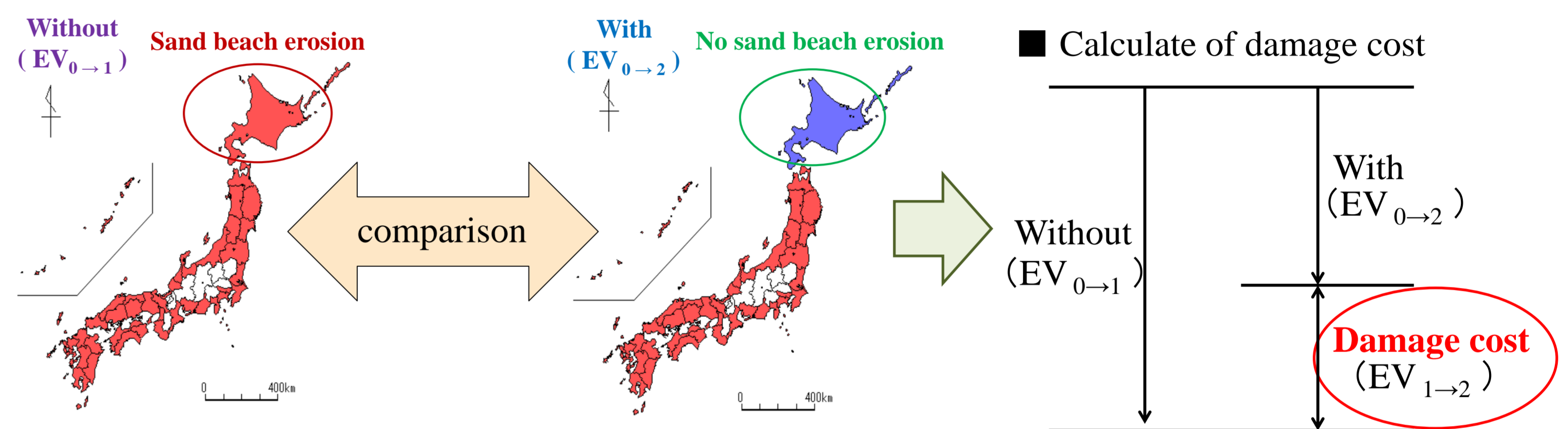
- #### Household behavior
- Households lend labor and capital to companies and earn income.
 - Households get utility by consuming the company's production goods.

Product goods of sectors

- #### Goods to consume when going to the sand beach
- Gasoline goods for sand beach visit
 - Toll road goods for sand beach visit
- #### Goods to consume outside to sand beach
- Other goods

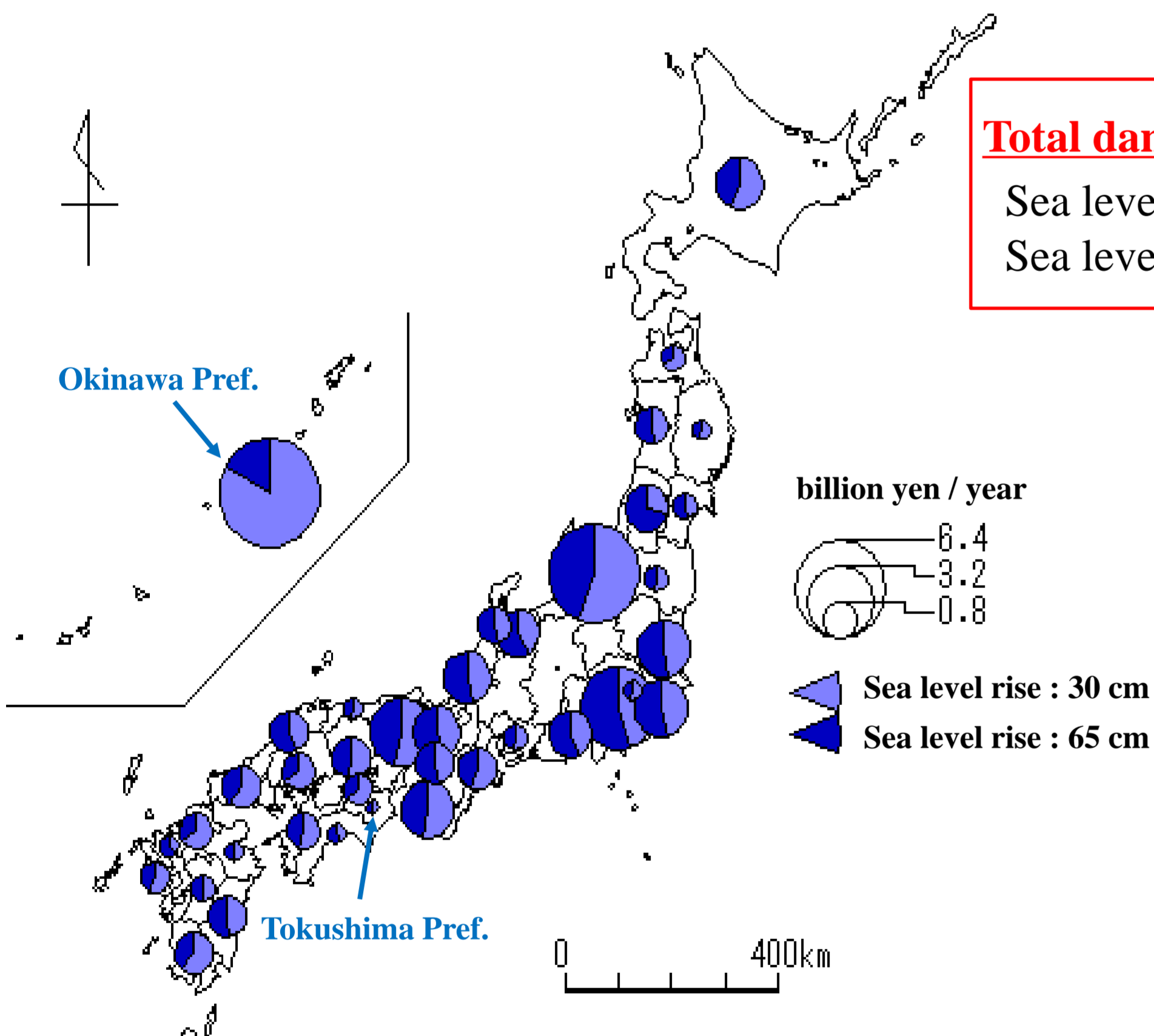
Sand beach damage scenario

- Without** : Calculate the total damage amount in case where sand beach erosion occurs in all prefectures.
With : In any arbitrary prefecture there is no sand beach erosion, and in other prefectures the total damage amount in the case of erosion of sand beach is calculated.



Results

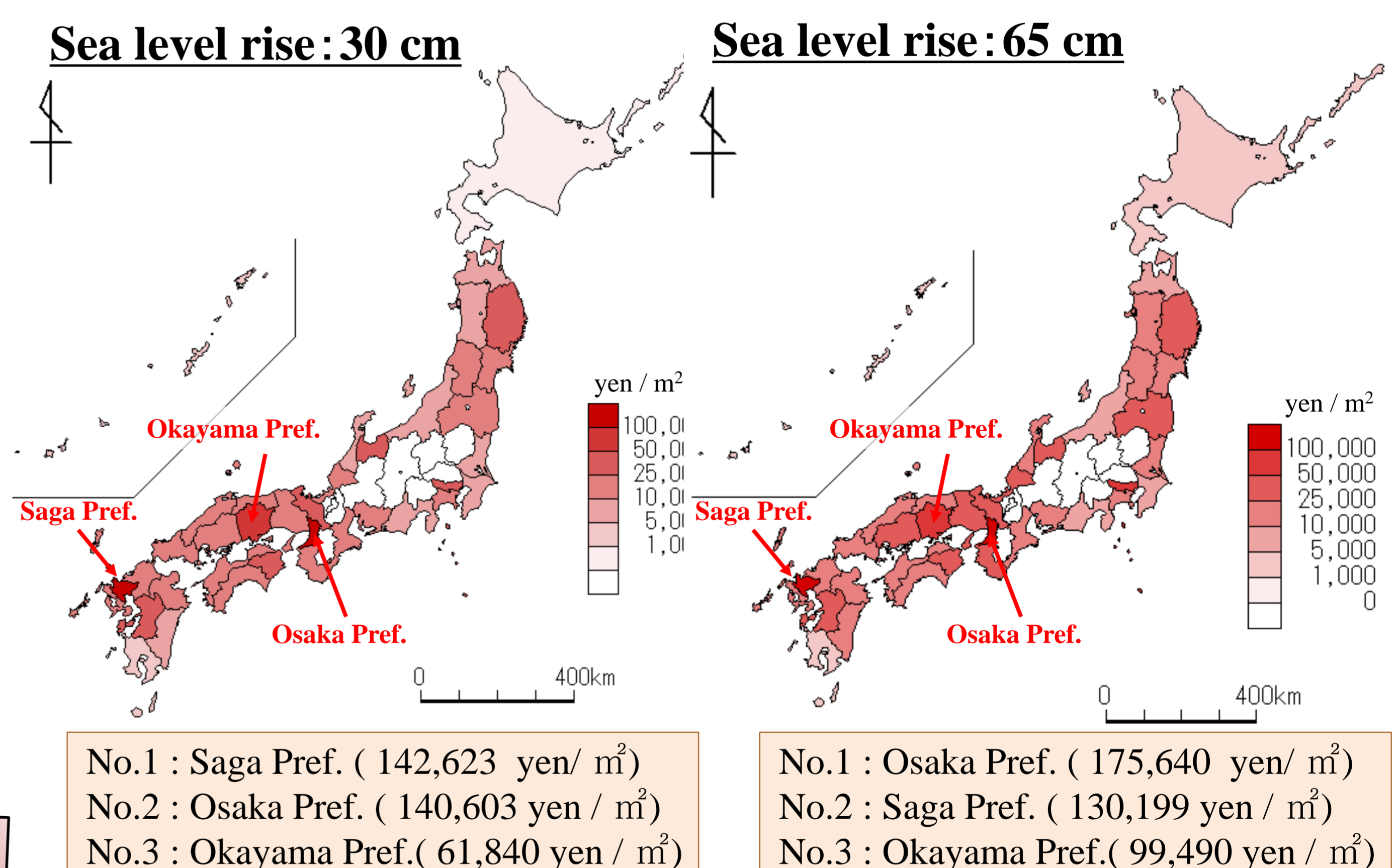
Damage cost by sea level rise



Total damage cost in Japan
Sea level rise 30 cm : about **29 billion yen / year**
Sea level rise 65 cm : about **53 billion yen / year**

Damage cost for each Prefecture
✓ Sea level rise 30 cm
about **0.08 ~ 6 billion yen / year**
(Tokushima pref.) (Okinawa Pref.)
✓ Sea level rise 65 cm
about **0.16 ~ 7.25 billion yen / year**
(Tokushima pref.) (Okinawa Pref.)

Damage cost per unit area by sea level rise



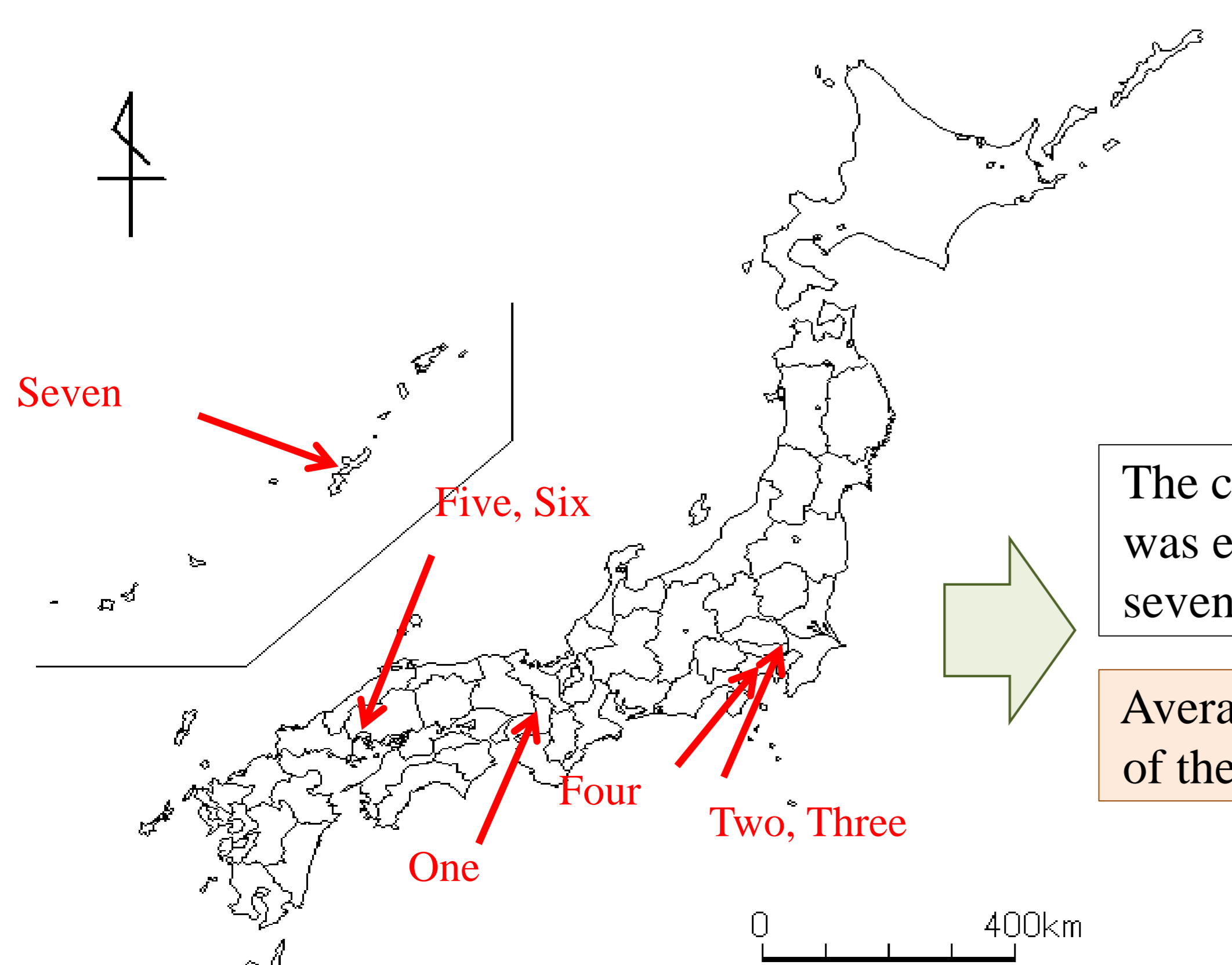
No.1 : Saga Pref. (142,623 yen / m²)
No.2 : Osaka Pref. (140,603 yen / m²)
No.3 : Okayama Pref. (61,840 yen / m²)

No.1 : Osaka Pref. (175,640 yen / m²)
No.2 : Saga Pref. (130,199 yen / m²)
No.3 : Okayama Pref. (99,490 yen / m²)

Virtual adaptation policy for sand beach preservation

Definition
It is assumed that the virtual adaptation policy for sand beach preservation can maintain to the sand beach area before erosion.

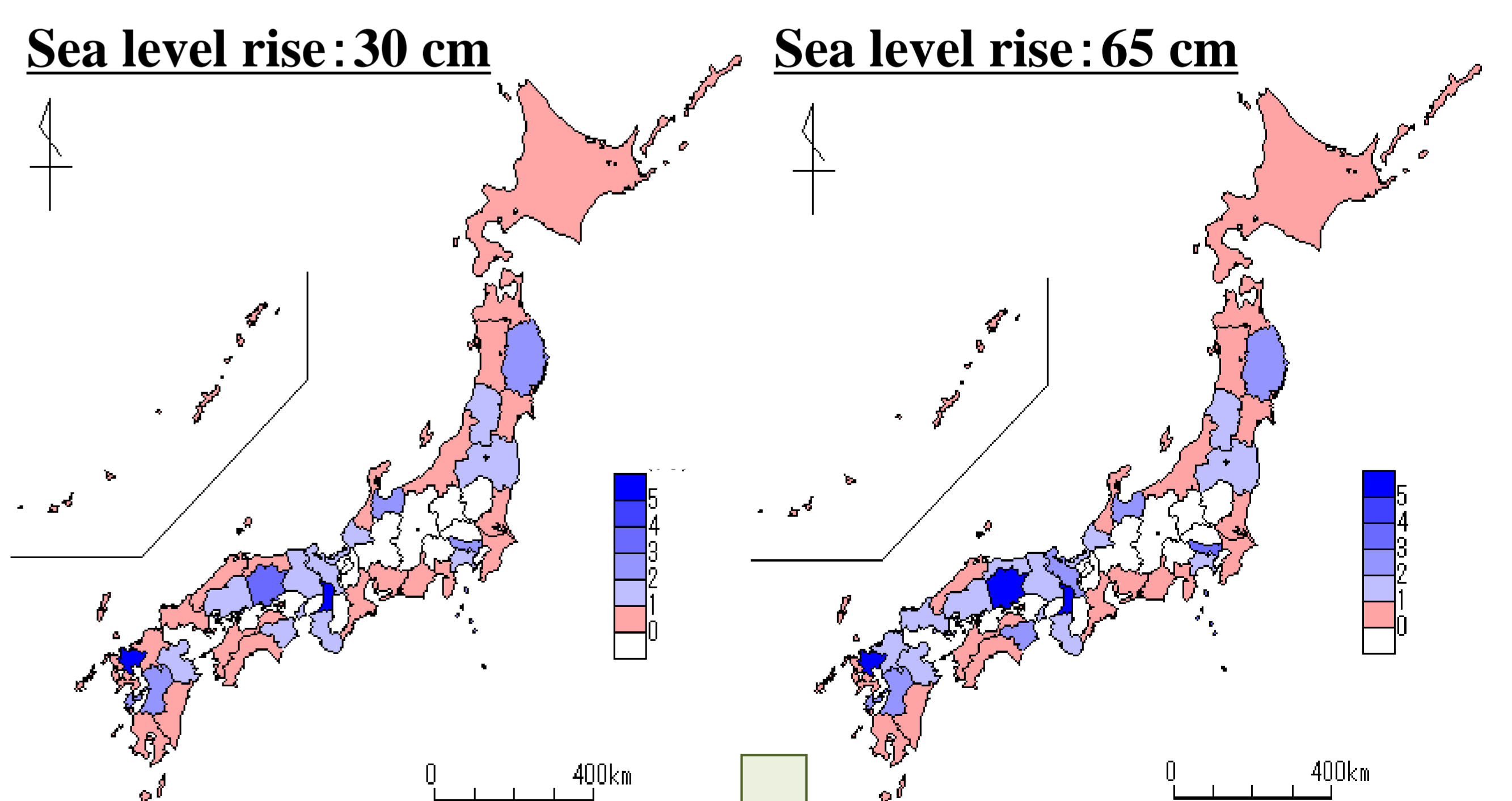
Past artificial nourishment project (seven project)



The cost for virtual adaptation policy was estimated based on the past seven artificial nourishment projects.

Average project cost per unit area of the seven projects: **18,276 yen / m²**

Cost Effectiveness



✓ Number of prefectures with the B/C higher than 1.0
Sea level rise 30 cm : 17 / 39 Prefectures
Sea level rise 65 cm : 20 / 39 Prefectures (add to Tottori, Yamaguchi, Fukuoka Pref.)

Region	Cost Effectiveness is over 1
Tohoku	Iwate Pref., Yamagata Pref., Fukushima Pref.
Kanto	Tokyo, Kanagawa Pref.
Hokuriku	Toyama Pref., Fukui Pref.
Kansai	Kyoto Pref., Osaka Pref., Hyogo Pref., Wakayama Pref.
Chugoku	Tottori Pref., Okayama Pref., Hiroshima Pref., Yamaguchi Pref.
Shikoku	Tokushima Pref.
Kyusyu	Fukuoka Pref., Saga Pref., Kumamoto Pref., Oita Pref.