

**Nature as a Defense from Disasters:
Natural Capital and Municipal Bond Yields**

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I. Summary

Climate change affects people worldwide and it will be a challenge for decades to come even if decisive policies are implemented tempestively. Environmental studies have cemented our understanding of the connection between human activity, global warming, and the increase in natural disasters' strength and frequency (Van Aalst (2006)). For this reason, mitigation strategies are crucial to diminish economic losses due to climate change.

A particular mitigation strategy that has been proposed by many conservation scientists and economists entails letting nature do its job ¹. Specifically, one of the most efficient and powerful technologies available today to fight global warming is nature conservation. In fact, increasing protected areas (PAs) would significantly decrease global temperatures and limit weather events' damages (Narayan et al. (2017), Johansson (1994), Renaud et al. (2016)).

In this paper, I quantify the economic value of natural capital and local natural areas focusing on their mitigation role for weather damages. Specifically, I utilize extreme weather exposure to compare the differences in economic damages, municipal bond yields, and population growth between counties that experienced a negative shock to their local natural capital and those that did not. In other words, the quasi-experiment set up can be described by the following example. County A and county B have similar characteristics and a similar natural capital stock. At time t , county B experiences a loss in natural capital and at time $t+1$ the two counties experience a hurricane.

In light of the evidence from environmental research studies on protected areas, I hypothesize that counties impacted by natural capital loss experience more significant weather damages compared to counties that did not. Consequently, more significant weather damages result in higher borrowing costs for the county. The increased cost of debt could also be due to the increased saliency of climate risk. To test this hypothesis, I study the im-

¹Claes et al. (2020), Ferrario et al. (2014), Glick et al. (2014), Temmerman et al. (2013), and Tercek and Adams (2013) are a few of the many studies on this topic

portance of natural capital with respect to weather damages using a difference-in-difference model and matching techniques that exploit the exogenous shock to the county's protected areas. This analysis shows that counties that experience these shocks report more extensive weather damages of at least \$9.41 million in the post-period.

Next, I analyze the relationship between nature conservation and municipalities cost of debt using two empirical approaches. Initially, I utilize extreme weather events as exogenous shocks and compare counties that experienced a loss in natural capital and those that did not. The results show that the difference in municipal bond yields before and after a disaster can be as large as 33 basis points. I explore further the aforementioned relationship by examining the direct effects of natural capital loss on municipal bonds. The results show a sharp increase in municipal bond yields after the event without reversal for at least nine years.

Lastly, I study one of the social costs related to nature capital loss. Specifically, I hypothesize that climate risk awareness increases in the residents of counties affected by a natural capital loss. This increased climate risk perception could be due to the increased damages from weather events. The increase in climate risk could incentivize the residents to move to more "secure" locations. Alternatively, the partial destruction of a PA could also be a reason for population migration due to the loss of natural beauty. For these reasons, I test if population growth is affected by these events. The results show that population outflow is at least 1.21% higher in treated counties compared to the control group.

This study is the first to quantify the economic value of natural capital on municipal bond markets. Overall, the results provide exciting insights regarding the value of PAs as a mitigating green infrastructure and nature's economic value for the fight against global warming. I show that nature protects counties from more severe weather damages, translating to a lower cost of debt and lower population outflow. This analysis has clear policy implications for local and state governments as it pertains to the importance of nature conservation.

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