Science center

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The RECEIPT Storyline

Visualizer

Gijs van den Oord, Peter Kok, Jesus Garcia Gonzales, Sander van Rijn [1], Christophe Thevignot [2], Keren Bolter, Dana Stuparu, Bart van den Hurk [3]

The RECEIPT-Cascades joint conferece, Potsdam, 16-10-2023

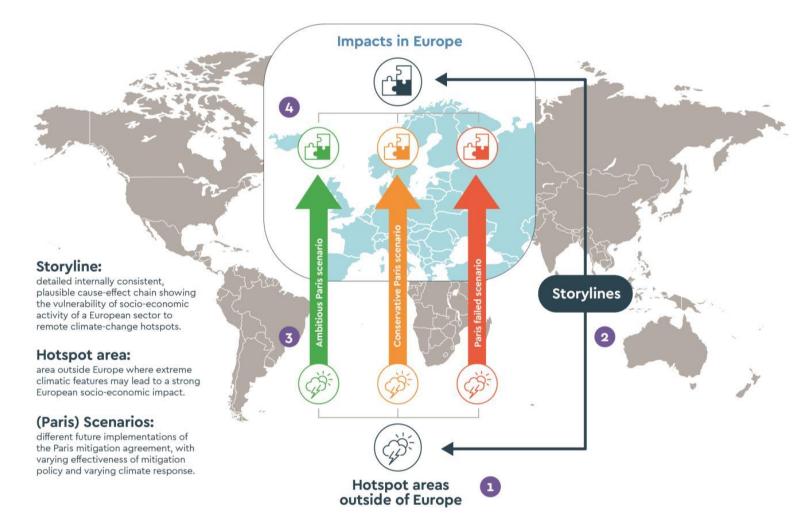
[1] Netherlands eScience Center[2] Arctik inc.[3] Deltares

climatestorylines.eu **PECEIPT_eu**



RECEIPT in a nutshell





The storyline method

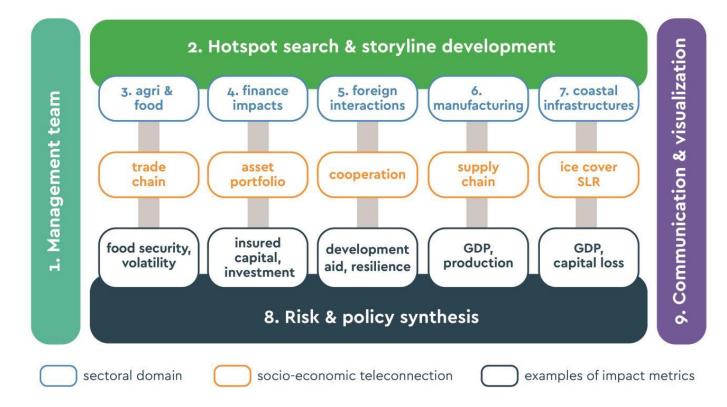
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Storylines = translating historical events to counterfactual futures

- Builds upon climate projection framework (RCP's and SSP's).
- Physically plausible translation.
- Incorporate future policies.
- Detailed impacts and cascading events
- Tangible result to **communicate**

RECEIPT storyline framework

- 1. Choose a scope
- 2. Describe remote climate impacts
- 3. Substantiate transmission to EU sectors
- 4. Describe EU impact
- 5. Describe climate scanarios
- 6. Describe socio-economic scenarios
- 7. Compare projected impacts & conclude



The storyline visualizer

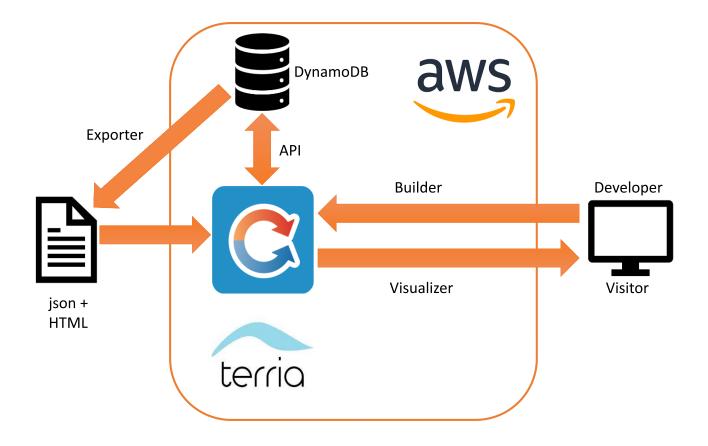
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Expected users (ordered)

- 1. Informed stakeholders (policy advisors, NGO's, insurance sector, infrastructure organizations, etc.)
- 2. Peer researchers
- 3. General public

Requirements

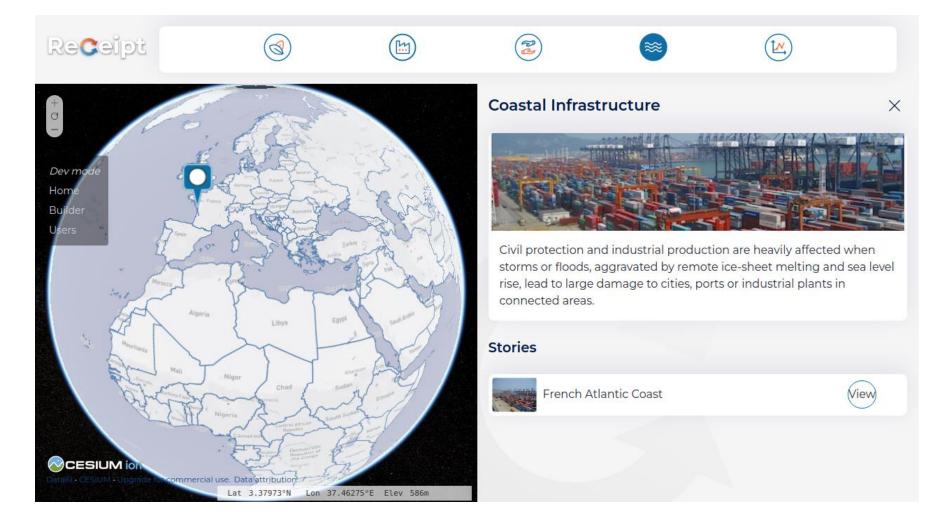
- Generally accessible (online)
- Catalogue of storylines developed within RECEIPT
- Interactive.
- Informative and correct, but more concise than a science paper.
- Visually appealing, smooth user experience. Mainly designed for laptop screen size.
- Sustainable design.
- Open data policy.



Storyline navigation



https://www.climateimpactstories.eu



Storyline navigation

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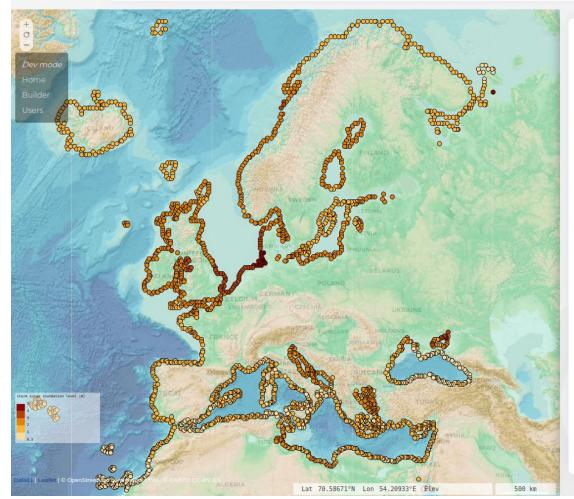
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Coastal flood risks are increasing - Critical infrastructure damages cascade to impact other systems



Sea level rise (SLR) and coastal flooding can affect critical infrastructure (CI) in the EU. This is illustrated by a storyline of the 2010 storm Xynthia (Northern France), showing the connections between the storm, coastal damages and impacts elsewhere. We sketch how such a storm may unfold under future climatic and socio-economic conditions. The storyline shows how storm surge (increased by local SLR) impacts critical infrastructure, and how flood damages can be reduced with long term adaptation strategies.

The longer the CI networks are not functioning after a flooding, the larger the impacts on health, finances, communication, transportation, and vulnerable populations. How can we assess the ways in which CI may be impacted by future climate extremes, and how to reduce these impacts?

The storyline steps are presented in tabs:

- Remote Impacts -- Retreating land ice in Greenland and Antarctica leads to SLR, which increases storm surge levels of Xynthia.
- Connection to EU -- A chain of cause-and-effect relationships leading to flooding, damage and CI disruptions.
- EU Impact Xynthia caused physical damage to CI exceeding €10 million; indirect impacts are challenging to quantify.
- Climate Scenarios -- How would Xynthia's CI damages change under future climate conditions (particularly SLR)?
- Socio-economic Scenarios -- How would Xynthia's CI damages be different with urban development and small- or large-scale adaptation actions?

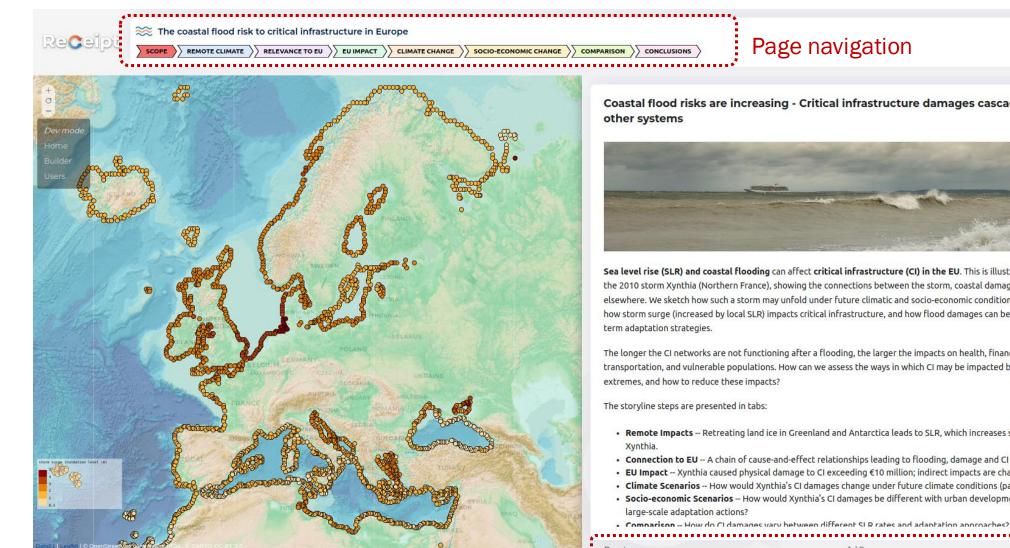
. Comparison -- How do CI damages vary between different SI B rates and adaptation approaches?

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500 km

Lat 70.58671°N Lon 54.20933°E (Elev

Coastal flood risks are increasing - Critical infrastructure damages cascade to impact



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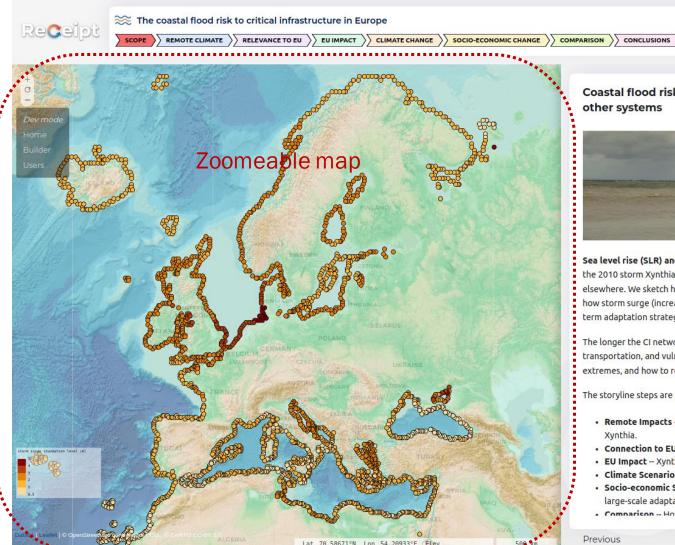
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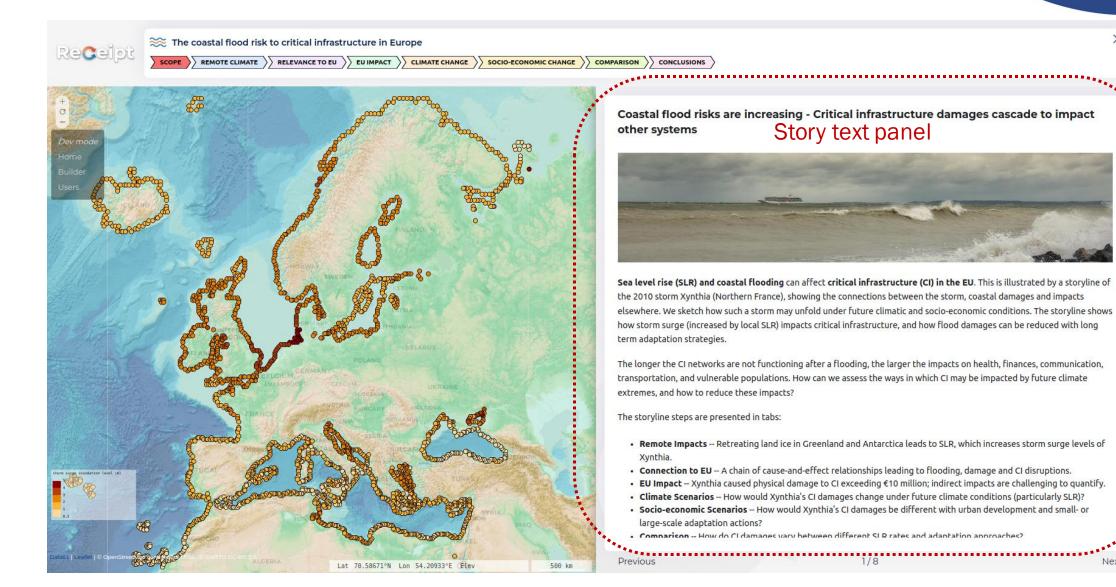
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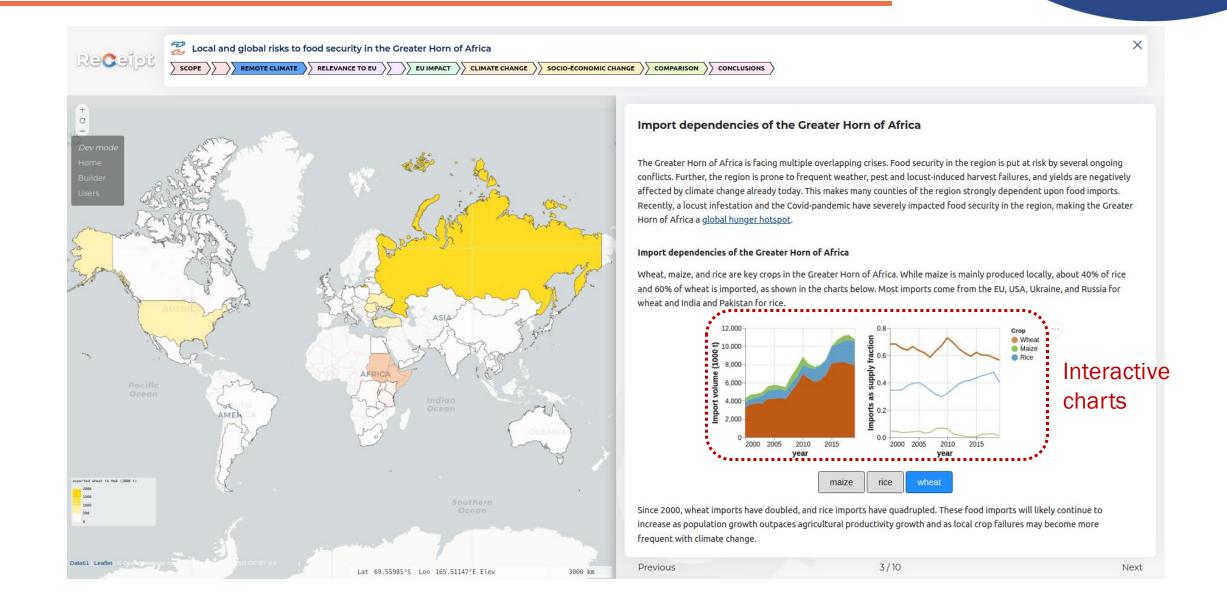
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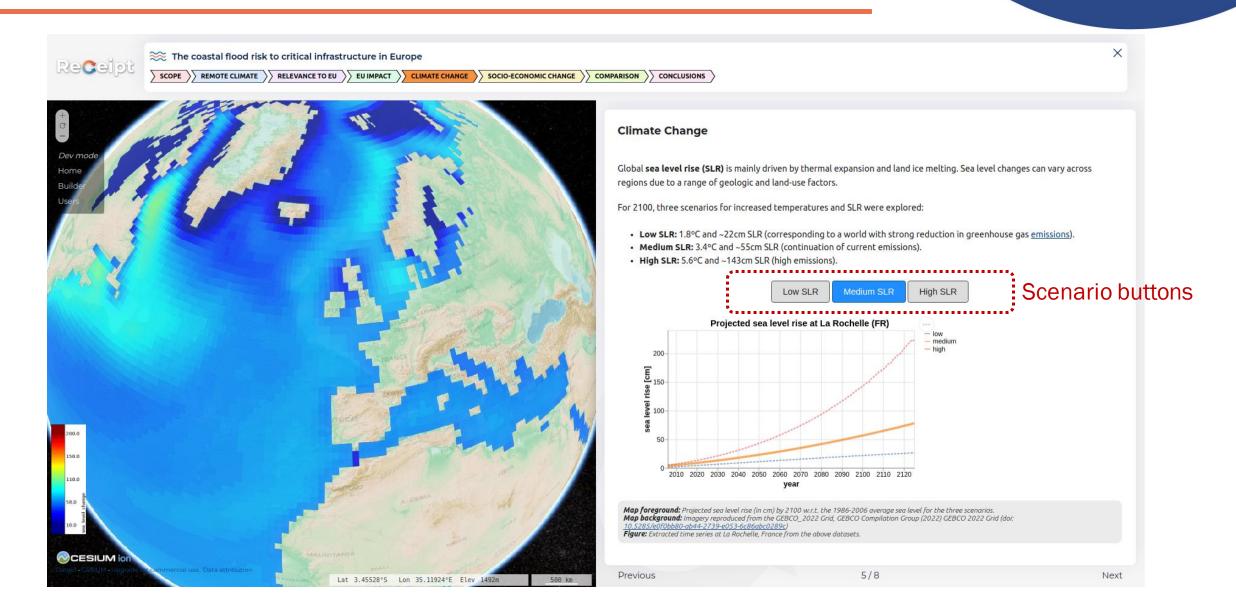
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Storyline features



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Storyline features



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Storylines: Food Security (C. Otto, P. Kubiczek, J. Schewe)

SCOPE CEIDER SCOPE REMOTE CLIMATE CLIMATE CLIMATE CLIMATE CHANGE SOCIO-ECONOMIC CHANGE COMPARISON

 $\overset{\frown}{\sim}$ Local and global risks to food security in the Greater Horn of Africa



Locust infestations at the Greater Horn of Africa combined with global food crisis



- Local crisis: The 2020/21 locust infestation In 2020/21, the Greater Horn of Africa food insecurity deteriorated due a locust infestation.
- Global crisis: The 2007/08 world food crisis In 2007/08, there was similar food insecurity when a
 global <u>maize/rice/wheat</u> food price crisis coincided with harvest failures in several main producing regions
 (breadbaskets) and low grain stocks. This crisis was amplified by <u>uncoordinated export restrictions</u> leading
 to a spike in global food prices.

If these local and global crises had have overlapped, the resulting emergency would be highly concerning. The storyline illustrating how this was simulated is presented in tabs:

- **REMOTE CLIMATE** Overview of 2020/21 local food security threats from the locust infestation in the Greater Horn of Africa.
- RELEVANCE TO EU The Greater Horn of Africa depends on grain imports from "breadbasket" regions; among them, wheat imports from the EU are prominent.
- EU IMPACT The Greater Horn of Africa region is highly vulnerable during global food crises, and the EU is one of the main providers of humanitarian aid to the region.

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How will multi-breadbasket failures impact food supply to the HOA region?

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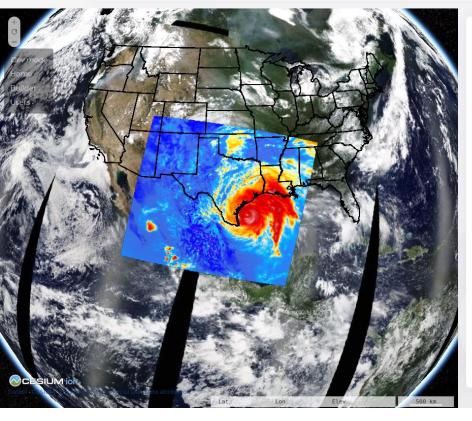
- What could happen when global food crises coincide with local harvest failures?
- How do gobal export restrictions affect the HOA food supply?

https://www.climateimpactstories.eu/#/sector/internationalCooperationAndDevelopment/story/5/page/0

Storylines: Future hurricane Harvey (R. Middelanis)

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Global production shifts after a major hurricane in the US



Global production shifts after a major hurricane in the US

Tropical Cyclones range among the most catastrophic natural disasters. However, resulting damages and economic losses may propagate through the dense global economic supply chain network, affecting also other regions. Reduced production in the directly affected area can cause shortage of goods in other parts of the world or, conversely, can result in less demand for imported goods and thus a surplus in other parts of the world. This way, also economies like the European Union may be affected by Tropical Cyclones even if the latter occur in remote regions geographically far from the EU. In this storyline, we look into the case of Hurricane Harvey (2017) and possible global production shifts it could result in under further global warming.



How will future massive hurricanes hitting the US gulf coast impact local industrial production?

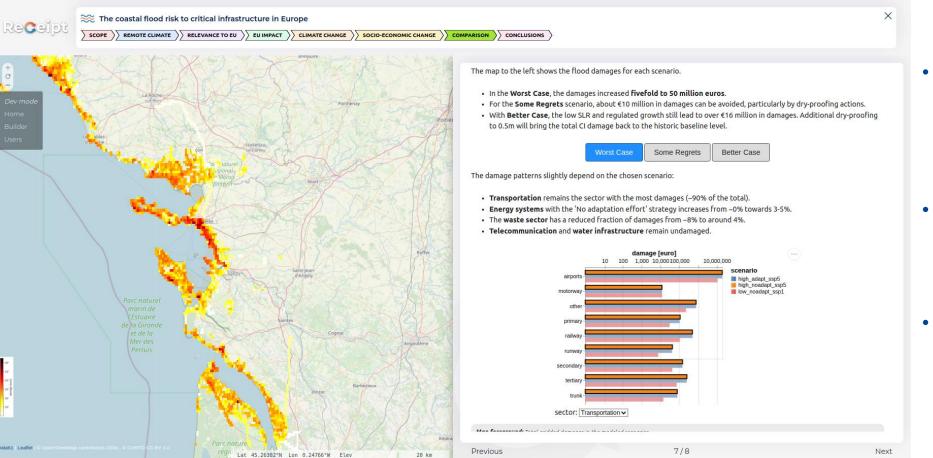
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How do resulting shifts in manufacturing chains affect European industry?

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https://www.climateimpactstories.eu/#/sector/manufacturing/story/7/page/0

Storylines: Future storm Xynthia (E. Koks)



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- How will sea level rise increase the hazard of storm surges at the French atlantic coast?
- How do SSP's translate to damages to critical infrastructure?
- How can improved coastal defenses mitigate effects?

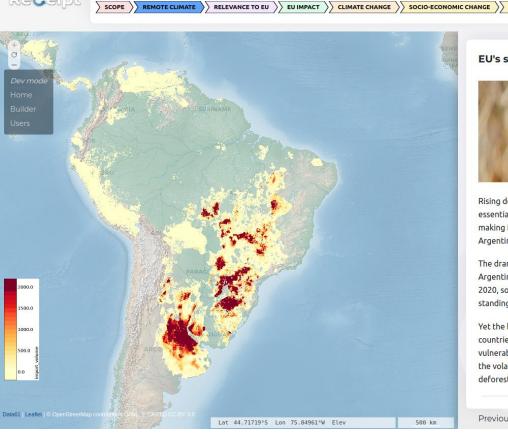
https://www.climateimpactstories.eu/#/sector/coastallnfrastructure/story/6/page/0

Storylines: Drought affecting soy yields

(E. Ercin, Ē. Boere, H. Moreno Goulart)

Orought affecting soy production

Receipt



EU's soybean imports and its main sourcing regions



Rising demand for meat and dairy products has led soy to rocket in popularity in the 21st Century. Today, it is essential for the EU's economy and food system. The EU imports 14 million tonnes of soybeans every year, making it the second biggest importer worldwide after China. Most of the soy comes from Brazil (47%), Argentina (32%) and the US (10%), and are imported as raw beans or ground meal.

The dramatic increase in demand for soybeans has led to significant socioeconomic benefits in Brazil and Argentina - their domestic livestock industries have become among the largest in the world. In September 2020, soybeans were the second most exported product from Brazil, after iron ore, with the value of exports standing at \$1.64B.

Yet the benefits have come with high costs and high risks. Today, large shares of agricultural land in both countries is used to produce this one crop. Their dependency on its success makes both countries highly vulnerable to changes in the weather, as well as to crop disease and soil degradation. It leaves them exposed to the volatility of commodity prices and puts them at risk of economic ruin. Furthermore, vast areas have been deforested to create space for soy production, leading to large environmental and biodiversity losses.

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Next

How will future droughts impact the yield of soy in the americas?

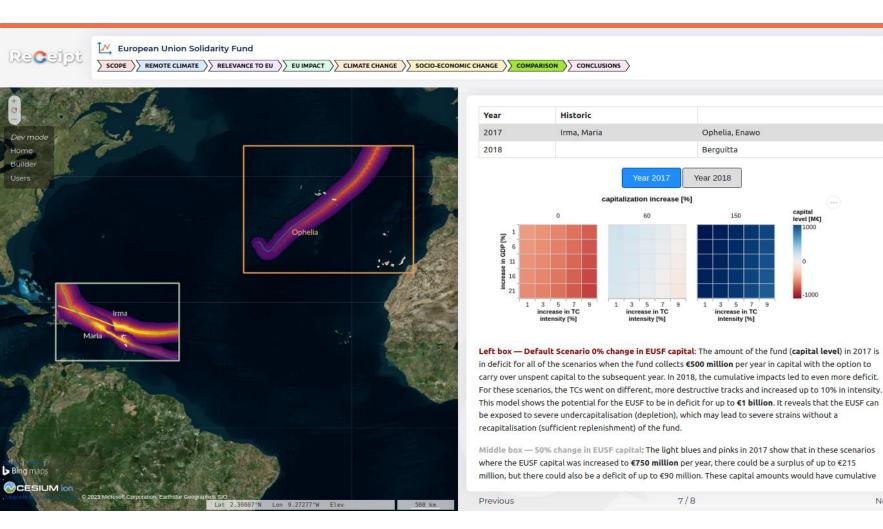
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- How do resulting price • increase affect European feedstock and consumption?
- How does EU import policy ٠ affect the impact?

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Storylines: EU solidarity fund (A. Ciullo)



Can future hurricanes hitting ٠ the EU overseas territories Ophelia, Enawo deplete the EU solidarity Berguitta fund? 150 •

Next

How do GDP growth and recapitalization affect the fund stability?

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https://www.climateimpactstories.eu/#/sector/finance/story/8/page/6

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increase in TC





- TerriaJS is a nice framework, but also limited and too geospatial data-oriented. Often, data manipulation is still needed.
- AWS seems too intricate for our needs
- Storyline rewrite to 'popular text' is a challenge and requires many reviews.
- Storyline progression structure doesn't always fit, but is better than no structure at all. Connecting subsequent pages or displaying relevant map data can be a challenge.
- Target audience needs to be consulted in demo sessions to gather feedback.
- Agile development in a team works well for this project. Expect changing requirements for a GUI.

Questions



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Backup slide: the storyline builder

