The Netherlands' Climate Paradox: The Cloned Bananas of Europe



Scientific Climate Ratings
An EDHEC Venture

October 2026

How to Assess Structural Risk in a Climatically Uniform Nation

- **The Netherlands' physical consistency makes it uniquely vulnerable to the challenges of climate change.**
- **Scientific Climate Ratings' ratings cast a light on the weaknesses – and strengths – that this uniformity creates.**
- **Canny investors will want to price these risks before spreads adjust.**
- **The question is not whether climate risk will be priced; the question is who will price it first.**

By Alice James, Investment Content Writer and Editor, EDHEC Business School, Direction du Business Development

The homogeneous geography and climate of the Netherlands make it uniquely vulnerable to the challenges of climate change (Dutch Climate Risk Assessment, 2026; World Bank, 2021). In this note, we use our Sovereign Climate Risk Rating for the nation, and our Climate Exposure Ratings on some of its key infrastructure assets, to cast a light on the weaknesses – and strengths – that this uniformity creates.

The Geography of Impossibility

The Netherlands is perhaps Europe's most climatically uniform nation: a single, consistently temperate maritime zone draped over relentlessly flat terrain, where a 322-meter-high point represents the extreme (World Bank, 2021). The country experiences the same rainfall and temperature gradient across its entire 42,000 km^2 landmass. As a consequence, when climate change brings compound stress, an entire nation of 18 million shares identical vulnerability.

A quarter of the Netherlands lies below sea level (Dutch Climate Risk Assessment, 2026), with vast swathes reclaimed from the sea and protected by dikes – engineered into existence across a climate zone that has remained stable for centuries. Thousands of kilometers of engineered polders represent humanity's defiance of physics. That uniformity has been a Dutch triumph: perfect optimization for predictability. But climate change has moved the goalposts and stolen that predictability away.

Climate change is accelerating the rise of sea levels and salting groundwater; for a nation where agriculture represents 100 billion euros annually in exports and bulb-growing, market gardening, and drinking water supply are climate-sensitive, this is an existential threat (Netherlands Environmental Assessment Agency, 2023). At the same time, it is intensifying both droughts and rainfall (Climate Change Post, 2024). And when the nation's rivers flood, they flood simultaneously; the entire nation faces identical shock (Climate Change Post, 2024). Like cloned bananas – which dominated global markets until a single fungal disease wiped out the entire Gros Michel variety in the 1950s because genetic uniformity meant zero resistance – the engineered efficiency of the Netherlands is now its greatest fragility in the face of climate change (Agronomy Science, 2022). When

the baseline conditions shift, it has zero internal diversity baked into the mix to absorb the blow.

By 2050, sea levels could rise 19–39cm; by 2100, up to 2m in high-emissions scenarios (Dutch Climate Risk Assessment, 2026; World Economic Forum, 2023). The country's challenge is to implement adaptations that can outrun the structural vulnerabilities hardwired into the nation's very existence. Its 17,691km of flood defenses (Asterra, 2024) face surging flood risks from both land and sea perimeters, as well as new challenges such as drought-related cracking and peat oxidation (Alliance4Water, 2024).

These evolving threats present investors with valuation challenges. Assessments of sovereign spreads, infrastructure bonds, or regional development projects can no longer rely on historical precedents; they need forward-looking frameworks that price structural exposure. The Netherlands' very uniformity – an absence of geographic or climatic refugia – means that climate risk is not diffuse or regional; it is nationwide.

Every dike reinforcement, every water-management project, every infrastructure adaptation to the warmer weather hinges on accurate pricing of long-term macroeconomic exposure. This is where Scientific Climate Ratings, with applied research borne of our the EDHEC Climate Institute, is filling the gap: by quantifying the expected GDP impact of chronic physical climate risk at subregional granularity (and translating predicted economic losses into an A-G risk rating) (Scientific Climate Ratings, 2026), Scientific Climate Ratings and its SovCRR product identify how an evolving climate is likely to impact economic productivity curves under warming scenarios. And by providing in depth analysis of the risks to its infrastructure network, asset by asset, we build a bottom-up assessment of the nation's vulnerability to climate change.

For the Netherlands, a nation where adaptation is not optional but existential, early identification of climate risk translates directly into capital allocation decisions and competitive advantage for those who understand it first.

The objective of this article is to show how Scientific Climate Ratings' sovereign and infrastructure climate-risk analytics can translate the Netherlands' distinctive physical exposure into financially material signals for investors. Using the Netherlands as a case study, the paper highlights how the country's particularly geography and climatic uniformity creates systemic vulnerability to chronic physical risks, while also examining how Scientific Climate Ratings' approach, born out of research from the EDHEC Climate Institute, can quantify these risks through (i) sovereign ratings, (ii) asset-level exposure metrics, and (iii) scenario-consistent estimates of long-term economic and credit impacts.

The Polder Paradox: When the Climate Shifts the 2,000 Year-Old Goalposts

The low-lying tracts created when dikes reclaim land from a body of water are termed **polders.** However, reclamation is not a one-and-done process. The land typically requires continuous pumping and dike vigilance to avoid waterlogging and floods. The Dutch have been doing this for millennia (the oldest dike in the country is a post-and-wickerwork structure uncovered at Vlaardingen, near Rotterdam, dating to the 2nd century BC) perfecting a system of monitoring and maintenance that is an engineering and administrational masterpiece[1]. However, a changing climate means every aspect of this tried-and-tested methodology is being challenged – and for the first time in many centuries, Dutch engineers need to reinvent the wheel.

Translating Vulnerability into Financial Risk: The EDHEC Climate Institute's Foundation

Understanding how these physical vulnerabilities translate into asset- and sovereign-level financial risk requires a two-stage analytical pipeline, grounded in the EDHEC Climate Institute's base CLIRMAP (Climate-Induced Regional Macroimpacts Projector) structural model and extended developments (Schneider 2026a, 2026b).

Stage 1: Predicting long-term economic shocks induced by physical risk

The Sovereign Climate Risk Rating is built through a four-stage pipeline.

First, historical GRP per capita data from the MCC-PIK subnational database are matched with local temperature and precipitation observations from NASA GLDAS to estimate how regional growth has responded to climate conditions over time. The estimated relationship is non-linear: warming has limited or sometimes positive effects in cooler regions, but increasingly negative effects in already-warm regions, with shocks accumulating into persistent output losses.

Second, this response function is applied to future local climate projections from NEX-GDDP-CMIP6 from NASA, covering more than 3,400 sub-national regions across 191 sovereign economies. Future temperature changes are translated into regional productivity growth shocks, then compounded over time to estimate permanent GRP per capita losses relative to a no-additional-warming counterfactual.

This research is directly drawn from the econometric architecture underlying EDHEC-CLIRMAP. While the standard CLIRMAP outputs rely on one specification of this framework, the SovCRR methodology uses a closely related variant tailored to the needs of sovereign risk assessment.

[1] https://www.vestigia.nl/en/possibly-the-oldest-dike-in-the-netherlands-discovered-in-vlaardingen/

Third, these SSP-RCP-based damage paths are translated into the NGFS scenario architecture. For each region, SovCRR estimates a non-linear damage function linking projected GRP per capita losses to MAGICC-emulated global temperature changes. This creates region-specific parameters that can be applied consistently across NGFS scenarios, IAMs and years.

Fourth, regional damages are re-projected under seven NGFS Phase V scenarios plus two higher-warming extensions, then aggregated to the sovereign level using population-density weights. Scenario-specific results remain available for stress testing, while probability-weighted scenario impacts are used to calculate the unconditional expected loss that underpins the sovereign climate risk rating.

The methodology uses econometrically estimated temperature–output response functions, grounded in peer-reviewed research (Schneider 2026a, 2026b).

Stage 2: **From a predicted economic impact to an A-G risk rating**

Scientific Climate Ratings begins by translating predicted economic losses into an A-G risk rating.

The most important design choice is that the rating does not replace the economic metric. For every country, SovCRR first reports the expected cumulative impact on GDP per capita, in percentage terms, at the 2035 and 2050 horizons. Countries are ranked by that impact and placed into seven approximately equal rating bands from A to G, based on percentile scores ranging from 1 to 100. A denotes the least exposed part of the rated universe and G the most exposed. Horizon-specific thresholds for 2035 and 2050 are calibrated on the expected-scenario distribution and applied consistently to scenario-specific results at the same horizon. These thresholds are naturally versioned and will be recalculated whenever the universe or data change. Each rating is anchored to horizon-specific thresholds for the probability-weighted expected loss across nine scenarios.

Why the approach is distinctive for sovereign investors?

Our ratings provide a transparent, scenario-based alternative to traditional ratings, incorporating forward-looking physical risk expressed as an expected GDP per capita impact (Scientific Climate Ratings, 2026). Correlated physical shocks across multiple regions create systemic fiscal stress that cannot be diversified away (Dutch Climate Risk Assessment, 2026). The SovCRR provides information in the language that institutional investors speak: climate-conditioned sovereign credit scores, overlaying unconditionally expected loss from physical climate risk.

Applying Scientific Climate Ratings to the Netherlands

We rate 191 sovereigns on an A–G scale ratings anchored to expected GDP per capita damage under the most probable warming pathway by 2035 and 2050 (Scientific Climate Ratings, 2026).

The Netherlands, as a temperate-zone country, sits in a peer group of 47 nations sharing similar dominant climate characteristics (Scientific Climate Ratings, 2026). Within that peer group, it ranks in the top tier on climate risk – comparable to Denmark (A rating), the UK, and Ireland. And while the nation has proven adaptive capacity in the past – integrated water management, engineered flood defenses, systematic land reclamation, and policy coherence across sectors (World Bank, 2021) – past performance does not guarantee future outcomes when the climate regime itself is shifting.

Our infrastructure-level ratings reveal the true exposure. Figures 1 and 2 show a snapshot of our Sovereign ratings report for the country.

Figure 1: A snapshot of our Sovereign ratings report for the Netherlands

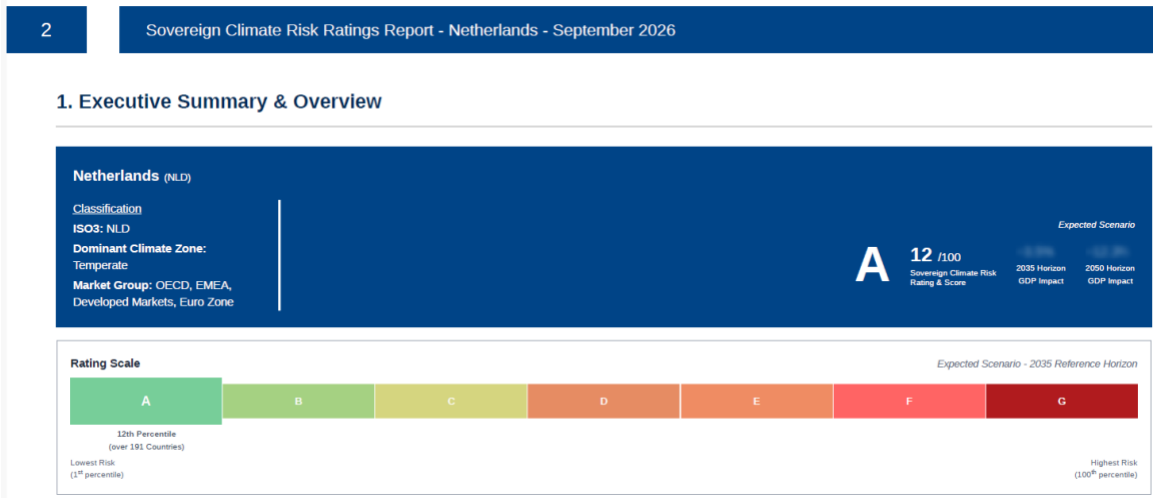
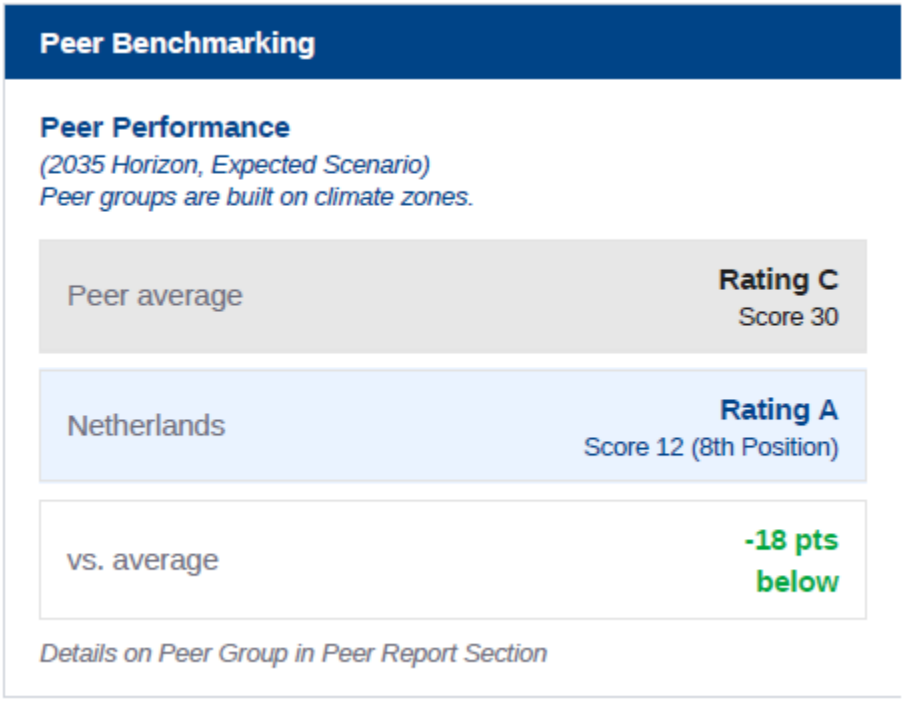


Figure 2: A snapshot of our Sovereign ratings peer ranking for the Netherlands



Infrastructure Risk: Where Uniform Vulnerability Becomes Visible

Scientific Climate Ratings' Climate Exposure Rating (CER) assesses infrastructure assets' exposure to future climate risks under a continuity scenario – the most likely pathway based on today's global policies (Scientific Climate Ratings, 2026). The rating integrates both physical risks (floods, storms, heat, wildfire) and transition risks (demand shifts as the economy decarbonizes, carbon pricing, policy restrictions).

Four Dutch infrastructure assets illustrate the nation's exposure profile:

TMA Logistics (Port, G/98) – Worst-Case Physical Risk

TMA Logistics, a major port facility, carries the worst climate exposure rating in its peer group: G, with a score of 98/100 (Scientific Climate Ratings, 2026). It's location holds the key: storm exposure accounts for 95% of the impact. The facility faces a probable maximum loss (PML) of -30.4% of asset value in a single worst-case storm year, and a cumulative discounted loss of -18.2% of asset value by 2035 – the most severe impact among the four assets surveyed. This is pure cloned banana risk: a port in the Rhine delta, built on flat terrain, with nowhere to relocate and no geographic refuge (see Figures 3-6 for the top level snapshot of Scientific Climate Ratings' assessment of this asset).

Figure 3: Live maps pinpoint global location



Figure 4: Key climate exposure metrics, grade and peer rankings

TMA Logistics

IC603040 - Other Port

Peer Group: Other Port
Asset ID: NLD_00125
Country: NLD
Rating Updated: 2026-08
Scenario: Expected

CLIMATE EXPOSURE RATING
(2035 Horizon)

G **98** /100

Peer Ranking: **Top 76%**
Peer Median: **G Rating**

PHYSICAL EXPOSURE 95% CER Weight
(2035 Horizon)

G **97** /100

Peer Ranking: **Top 76%**
Peer Median: **G Rating**

TRANSITION EXPOSURE 5% CER Weight
(2035 Horizon)

D **57** /100

Peer Ranking: **Top 6%**
Peer Median: **F Rating**

Figure 5: A summary of climate risk exposures

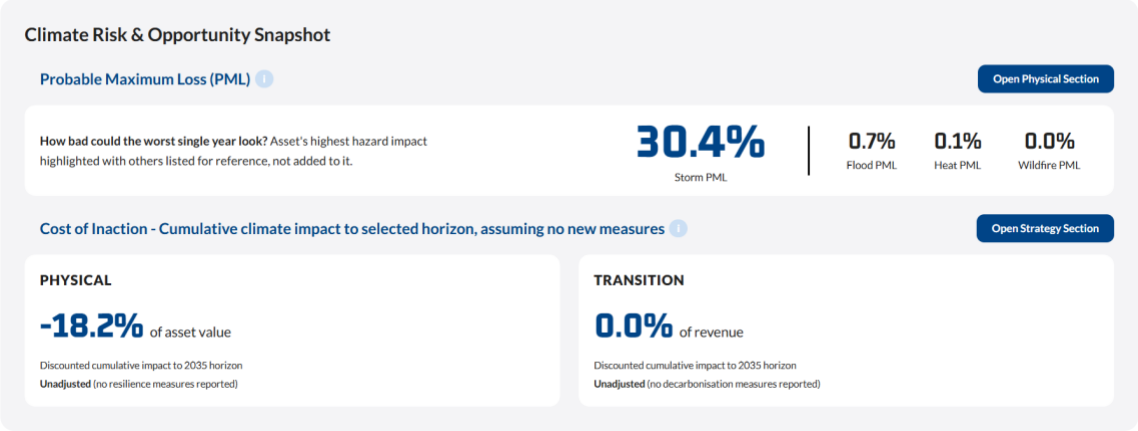
Top 3 Climate Drivers, Expected Scenario

Rank	Driver	Category	CER Contribution[1]
1	Storm	Physical	95%
2	Market Demand Shifts	Transition	3%
3	Flood	Physical	2%

Climate Exposure Evolution, Expected Scenario

	2035	2050
Score	98/100	98/100 ↑
Peer Ranking	Top 76%	Top 73% ↓

Figure 6: A snapshot of risks and opportunities



The rating worsens by 2050, with peer ranking declining to the bottom 27%. For bond investors, this could signal deteriorating collateral quality and rising refinancing risk within the next decade.

Maastricht Aachen Airport (G/87) – Storm Vulnerability in Transition

Maastricht Aachen Airport, serving the Dutch-German border region, rates G/87, with 95% of exposure driven by storm risk (Scientific Climate Ratings, 2026). Storm PML is -17.5%, and cumulative asset value impact is -10.4% by 2035. The airport ranks in the top 35% of

airport peers on exposure, meaning two-thirds of the world's airports face worse climate risk – but for temperate-zone airports, this is a poor ranking.

The Data Center Group (F/79) – Critical Infrastructure Under Pressure

The Data Center Group, a major Dutch digital infrastructure operator, rates F/79 (Scientific Climate Ratings, 2026), bridging the gap between worst-case airport/port exposure and better-performing assets. Physical exposure dominates (95% weight), driven by storm (91%) and flood (5%) risk. Probable maximum loss is -11.9% in a single worst year, with cumulative asset value impact of -6.6% by 2035.

Data centers are critical infrastructure, without which the likes of financial systems, e-commerce, cloud services and even traffic control cannot function. Yet this facility, like most Dutch infrastructure, sits in the path of compound flooding risk (Climate Change Post, 2024). A single event combining heavy rainfall and the resulting river floods along with a coastal surge could simultaneously damage this asset whilst increasing the costs for its reconstruction.

Enecogen Power Station (F/81) – The Stranding Paradox

The most instructive case is Enecogen, a gas-fired power station (Scientific Climate Ratings, 2026). Its overall rating is F/81, but the composition tells the true story:

- Physical Risk Rating: A/11 (top 4% of gas-fired plants globally – nearly immune to direct climate damage)
- Transition Risk Rating: G/99 (top 90% most exposed to market demand shifts)

Storm and flood PML are negligible, rounding down to zero combined; the facility will not be destroyed by climate hazards. But it faces existential economic risk as the global economy decarbonizes. By 2035, shifts in market demand account for 92% of Enecogen's climate exposure rating. This is not physical vulnerability; it is stranding risk.

The paradox is revealing for investors. Traditional climate risk frameworks focus on physical damage – floods, heat stress, supply chain disruption. But Enecogen illustrates a subtler risk: an asset perfectly adapted to its physical climate but at risk of becoming economically obsolete in a decarbonized world. Bond investors holding Enecogen debt do not need to fear physical asset damage, but collateral that generates no revenue because the market for its output has vanished.

From Scenarios to Spreads: the Mispricing Window

Sovereign spreads for the Netherlands reflect traditional credit analysis: low debt-to-GDP, strong institutions, OECD membership, and precious AAA-equivalent credit quality. They do not yet reflect the potential structural, permanent GDP losses threatened by chronic climate warming (and implied debt implications) under warming scenarios.

SCR's ratings address questions that traditional analysis does not: what are the long-term productivity trajectories under a 2°C warming scenario? How does permanent regional productivity loss erode tax capacity? At what point do debt sustainability ratios become concerning (Dutch Climate Risk Assessment, 2026)?

Similarly, when infrastructure investors assess TMA Logistics or Maastricht Aachen bonds, they can see the -18.2% and -10.4% cumulative asset value impacts by 2035 (Scientific Climate Ratings, 2026). These are measurable, scenario-consistent damage projections. Traditional ESG scores offer rankings; Scientific Climate Ratings offers financial quantification.

For investors who price these risks before spreads adjust, the window is narrow but valuable. With access to climate-adjusted credit analytics, they can:

- Identify which sovereigns' spreads are lagging their climate fundamentals;
- Reweight sovereign bond portfolios to reflect unpriced climate damages;
- Stress-test infrastructure portfolios against NGFS-aligned scenarios; and
- Price bond duration differently based on climate-adjusted long-term growth expectations.

Policy Response: From Crisis to Opportunity

The Netherlands is not passive in the face of this exposure. The government has launched multiple initiatives, from the Room for the River program (Utrecht Law Review, 2021) (which strategically floods designated areas to manage water) to ambitious heat transition targets (gas-free new buildings since 2018, retrofitting upward of a million homes by 2030) (Netherlands Environmental Assessment Agency, 2023). One initiative exemplifies the integration of climate adaptation into civic culture is the nation's Tegelwippen ('Tile Flipping') competition (see Box 1).

Box 1: GREEN CITIES FROM THE GROUND UP – NETHERLANDS TEGELWIPPEN COMPETITION

Since 2021, the annual 'Tile Flipping' competition has mobilized Dutch municipalities to remove paving slabs from gardens, streets, and public spaces, replacing them with trees, grass, and green infrastructure. In 2025 alone, 328 municipalities participated, with 5.9 million tiles removed – the largest result in the competition's history (Alliance4Water, 2024).

The initiative addresses three climate vulnerabilities simultaneously:

- First, concrete and paved surfaces absorb and retain heat, exacerbating urban heat islands (Global Commission on Adaptation, 2019); green spaces cool cities naturally.
- Second, paved surfaces prevent rainwater infiltration, overloading drainage systems and increasing flood risk during heavy rainfall (Global Commission on Adaptation, 2019); soil and plants absorb precipitation naturally.
- Third, gardens support biodiversity and ecosystem services.

Many participating towns run a free 'tile taxi,' collecting removed paving from residents' homes, removing barriers to participation. The competition's success shows that when local organizations make climate adaptation easy and celebratory – rather than punitive – behavior follows.

The program is now spreading: Flanders has adapted the model, and from 2026, two environmental organizations will oversee expanded efforts. For policymakers, it demonstrates that climate adaptation can be simultaneously beautiful, measurable, and community-driven.

Why This Matters: The Stranding Argument Revisited

The Netherlands is absorbing real economic costs now – retrofitting buildings, upgrading dikes, investing in green infrastructure. And in a decarbonized economy (2040+), these costs are sunk, and the competitive advantage is locked in. Meanwhile, nations delaying transition will transition anyway, but later, at higher cost, with weaker positioning (Climate Change Post, 2024).

Consider infrastructure investors with exposure to both Enecogen (stranded gas plant) and Dutch renewable energy projects. Our ratings reveal the divergence (Scientific Climate Ratings, 2026): transition risk makes fossil fuel assets economically obsolete, whilst climate-resilient renewable and adaptation infrastructure holds value. Awareness of this dichotomy can inform investment decisions.

For sovereigns, the dynamic is similar. The Netherlands already spends around €11 billion a year – roughly 1% of GDP – on flood defenses, fresh water and climate-proofing, and the Delta Commissioner has warned that this needs to at least double, to 2% of GDP. Yes, this is expensive; failure would be far more so. A nation that absorbs these costs early can potentially emerge from the transition with proven adaptive capacity, climate-hardened infrastructure, and intellectual property (vertical farming technology, water management expertise, cycling infrastructure) that is now globally exportable (World Bank, 2021). These structural issues will feed into bond spreads; knowing this will differentiate savvy investors from those late movers who only recognize the shift after Dutch bonds reprice and asset values have already adjusted.

Why Scientific Climate Ratings is Vital

Traditional sovereign credit ratings and financial analysis cannot capture what SCR reveals (Scientific Climate Ratings, 2026):

- **Granularity:** Scientific Climate Ratings disaggregates climate risk to 3,400+ sub-national regions, identifying which parts of which countries face the steepest economic damage curves (Scientific Climate Ratings, 2026). The Netherlands' temperate zone ranking masks intra-country variation: coastal regions face different risks than inland regions; Rotterdam faces different risks than the eastern provinces.

- **Transparency:** Scientific Climate Ratings publishes its methodology and provides full access to underlying regional-level damage projections (Scientific Climate Ratings, 2026). Users can see exactly what assumptions drive each rating. Traditional ESG scores are opaque; SCIENTIFIC CLIMATE RATINGS is auditable.

- **Scenario Consistency:** Scientific Climate Ratings ratings are anchored to nine NGFS-aligned climate pathways (EDHEC Climate Institute, 2026), enabling investors to build climate scenarios into their own risk models, stress tests, and long-term asset allocation decisions. This is not a single opinion; it is a probability-weighted range of outcomes.

- **Financial Materiality:** Unlike climate vulnerability scores (which rank exposure without quantifying economic impact), Scientific Climate Ratings translates climate risk into expected GDP loss and asset-level collateral deterioration (Scientific Climate Ratings, 2026). This is the language investors actually use.

- **Forward-Looking:** Historical default probabilities and credit spreads are poor predictors of future risk when climate regime is shifting. Scientific Climate Ratings projects damage under different warming pathways, allowing investors to price risks before credit markets fully reprice them (Dutch Climate Risk Assessment, 2026).

Conclusion: The Competitive Edge of Foresight

The Netherlands is not simply a climate-vulnerable nation hoping to survive. It is a nation optimizing for a decarbonized, climate-adapted future, absorbing costs today to capture competitive advantage tomorrow (Netherlands Environmental Assessment Agency, 2023). That said, its uniform climate zones and vulnerability to rising sea levels and the twin challenge of heavier periodical rainfall alongside hotter, dryer periods mean it is overhung by unique challenges. Investors can use climate-adjusted credit analytics to assess these dynamics.

The cloned banana metaphor is not necessarily pessimistic. It is a call to action. The Netherlands has centuries of experience adapting to water (Climate Central, N.D.). How it adapts to a 2-meter sea level rise remains to be seen (World Economic Forum, 2023).

What is certain is this: investors and policymakers need to price that uncertainty, and recognize the structural climate risk now overhanging assets with historically stable spreads (Dutch Climate Risk Assessment, 2026). Scientific Climate Ratings exists precisely to translate climate science into financial precision at the moment when markets still have a window to reprice.

For the Netherlands, and for any nation facing similar compounded climate exposure, that window is closing. The question is not whether climate risk will be priced; the key question is who will price it first.

References

- Agronomy Science / Uniwersytet Przyrodniczy w Lublinie. (2022). “Panama Disease: History, Biology, and Prevention.” https://czasopisma.up.lublin.pl/as/article/download/4812/3258/18358
- Alliance4Water. (2024). Kingdom of the Netherlands: From Floods to Droughts. https://www.alliance4water.org/wr4er-cases/kingdom-of-the-netherlands-from-floods-to-droughts/
- Asterra. (2024). Netherlands Dikes and Levees. https://asterra.io/resources/netherlands-dikes-and-levees/
- Climate Central. (N.D.). The Dutch Have Mastered Water for a Millennium. https://www.climatecentral.org/partnership-journalism/
- Climate Change Post. (2024). Netherlands - Droughts and River Floods. https://www.climatechangepost.com/netherlands/
- Dutch Climate Risk Assessment (DCRA). (2026). Sea Level Rise. https://dutchclimaterisk.nl/hazards-data/water-related/chronic/sea-level-rise-0/
- EDHEC Climate Institute. (2026). Climate-Induced Regional Macroimpacts Projector (CLIRMAP). https://climateinstitute.edhec.edu/data-visualisations/edhec-clirmap
- Global Commission on Adaptation (GCA). (2019). Water-Smart Green Roofs and Plazas in Rotterdam. https://gca.org/water-smart-green-roofs-and-plazas-are-helping-rotterdam-adapt-to-climate-change/
- Netherlands Environmental Assessment Agency (PBL). (2023). Climate and Energy Outlook. https://www.pbl.nl/
- Scientific Climate Ratings. (2026). Sovereign Climate Risk Ratings: Methodology. https://scientificratings.com/sovereign-ratings/
- Scientific Climate Ratings. (2026). Infrastructure Climate Exposure Ratings: Methodology. https://scientificratings.com/climate-exposure-ratings/
- Schneider, N. (2026a). The global geography of long-term projected macroeconomic damages from chronic physical risk and the aggregation problem. Cambridge Elements in Quantitative Finance, *Forthcoming*.
- Schneider, N. (2026b). A method for reprojecting SSP-RCP damages under NGFS scenarios x IAM trajectories. EDHEC Climate Institute Technical Note.
- Utrecht Law Review. (2021). Managing Water Across the Flood-Drought Spectrum. Vol. 17, No. 1. https://utrechtlawreview.org/articles/10.36633/ulr.860
- World Bank. (2021). Climate Risk Country Profile: Netherlands. https://climateknowledgeportal.worldbank.org/country/nld
- World Economic Forum. (2023). How Sea Level Rise is Threatening Prepared Countries. https://www.weforum.org/stories/climate-action/