Bilbao flood proof district

Public-private partnership for urban redevelopment

CLIMATEFIT International best practice factsheet

Case ID: 19

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Summary

The Zorrotzaurre redevelopment project in Bilbao, Spain, aims to manage flood risks through a Public-Private Partnership (PPP). Initiated in 2012, this PPP seeks to convert an industrial peninsula into a residential area capable of withstanding severe flood events. The financial structure of the project is a blend of public and private investments, with costs shared according to land ownership proportions, integrating 51% public and 49% private contributions.

The City of Bilbao and regional government entities have contributed significantly, with initial investments focusing on infrastructure critical for flood management, such as the opening of the Deusto Canal and the construction of floodwalls and stormwater systems. Private developers have invested in raising land levels and developing green spaces that contribute to the area's sustainability and flood resilience. The project was designed by the renowned architect Zaha Hadid. The project demonstrates the effectiveness of combining public resources and private sector efficiency to address complex urban challenges like climate change and urban flooding, setting a precedent for future PPPs in urban redevelopment.

Keywords: Bilbao, flood proof, Duesto, PPP, Zorrotzaurre

Disclaimer: data and information found about this best practice is limited, particularly about the current status and outcomes.

Cover photos: Yves Alarie at Unsplash (top photo), Comisión Gestora de Zorrotzaurre (middle photo)

Further reading: Zorrotzaurre Flood Proof district

Suggested citation: Srivastava, V. (2024). *Bilbao flood proof district. Public-private partnership for urban redevelopment*. University of Antwerp for CLIMATEFIT.

Best practice information card

Table 1. Zorrotzaurre Flood Proof District. Information card

Location	Bilbao, Spain
Population size	345,821 (2018)
Project area size	41.6 km²
Area type	Urban
Climate challenge	Urban flooding, often intensified by the increased frequency and severity of climate change-driven disasters, causes significant harm to both life and property.
Key Community System(s)	Water management, critical infrastructure
Objectives	The objective of the redevelopment project is to turn Zorrotzaurre from an industrial site to a residential area. This requires adequate protection from flooding. Objectives with regards to flooding have been defined as: existing houses in Zorrotzaurre should be well protected for one in 100 year flood. T=100 rainfall events: new buildings/housing should withstand one in 500 year flood.
Climate challenge solution	The Master plan for Zorrotzaurre involves the following 5 steps: • Opening the Duesto Canal to turn the peninsula into an island • Elevation of the ground level • Construction of flood protection wall • Provision of storm water tanks • Green and open space
Key benefits	The Bilbao City Council gains reduced flood risk and potentially higher tax revenue from a revitalized district. Landowners benefit from increased property values and development opportunities. Bilbao residents will get new homes and improved flood protection and new public spaces. The coordinating body (Junta de Concertación) sets a positive example for future PPPs. A public land management agency like Surbisa could see efficient land use and economic gains from the project.
Implementation status	2012 to present
Investment volume (€)	30 million EUR in 2012 for the entire project (investment volume into the PPP is unknown)
Key financing barriers	NA
Financial model	The Zorrotzaurre PPP is a flood protection project in Bilbao, Spain which involves public and private entities to finance and build flood walls, raise land levels and manage storm water systems.
Financial sources	Public- Regional and subnational government entities (Local Municipalities) Private- Project developers
Financial instruments	Blended finance: Public Private Partnership

Overview and timeline

The city of Bilbao is located on the banks of the Nerbioi River in the Basque region in the north of Spain. The city is also influenced by tides since it is located quite close to the ocean. River flooding is the most common threat in the valley due to increased runoff caused by land use changes in the region. Flooding is expected to increase due to extreme precipitation events and sea level rise, which will produce higher tides caused by climate change.

Currently, Bilbao's "Zorrotzaurre" district is a degraded, flood-prone industrial peninsula likely affected by both environmental degradation and disuse due to its former industrial activity. A significant urban regeneration project is currently underway to transform the Zorrotzaurre district into a new residential quarter that is flood-proof. This project is also necessary to accommodate the growing number of citizens in Bilbao.

The urban plan for Zorrotzaurre had been under discussion since the 1950s when urban planners suggested the opening of the canal to boost industrial activities through the building of a harbor. However, this never came to fruition. The new urban plan was only approved in 2007, and the implementation began in 2014. In response to the Basque Water Agency (URA)'s concerns about flooding in the area, the Management Commission of Zorrotzaurre had to find a way to lower flood risks to approve the project. At this point, the original proposal to reopen the Deusto Canal was reconsidered. This was supposed to finish in 2016 (it is unclear when the construction was finished).

Zorrotzaurre land users and public actors (Port, City, and Province) formed a public-private partnership (PPP) in 2012. To administer the PPP, the 'Comisión Gestora de Zorrotzaurre' was founded as a non-profit organization involving representatives of these actors. This Commission is not directly affiliated with the government, but it does not operate for private profit either. The Zorrotzaurre Master Plan, the comprehensive planning document for the area's redevelopment, outlines the initiatives that will be funded by the PPP.

The Zorrotzaurre redevelopment project is effectively integrated into the broader urban planning policies of the city of Bilbao. The "Master Plan for Urban Planning in Bilbao," introduced by the city in 1995 and revised in 2016, outlines Zorrotzaurre's land use changing from industrial to residential, with a 50% share of social housing and an abundance of public services (cultural, educational, and recreational). This plan was created by architect Zaha Hadid.

The first plans for "The Special Urban Plan for Zorrotzaurre" were created in 2004 and updated in 2008. The "Special Urban Plan for Zorrotzaurre" was adopted by the Bilbao City Council in 2012. The goals of the "Special Urban Plan for Zorrotzaurre" are in line with regional and national adaptation plans, such as the "Basque Climate Change Strategy 2050" and the "Spanish Strategy for Climate Change and Clean Energy," both of which encourage local climate action. The Master Plan sets the big picture for Bilbao's development, while the Special Urban Plan focuses on the implementation details for Zorrotzaurre.

The Special Urban Plan for Zorrotzaurre includes several measures to limit surface water flooding. These measures are less expensive than traditional flood protection methods, but they still require careful design.

- The ground level will be raised by 1.2 meters.
- A low platform will be created at 3.8 meters below the maximum level to provide space for flood water.
- Permeable pavements and trees will be used to improve water infiltration.
- Water harvesting may be implemented to reuse rainwater or irrigate green areas.

Through the PPP, the industrial site in Zorrotzaurre is being redeveloped into a residential neighborhood that is resistant to flooding. The site has a total surface area of 673,000 m^2. The proposal includes plans for constructing a transportation network, flood prevention measures, and cultural heritage restoration.

Five steps were included in flood protection:

- Opening of the Deusto Canal to make the peninsula into an island.
- Erecting a wall to prevent flooding.
- Raising the ground level for new construction by 1.5 meters.
- Installing storm water tanks.
- Creating green, public areas.

Creating green and public areas involved the creation of a pedestrian area along the river bank that can also be used as an overflow area. A 40,000 square meter linear park was built in the island's center. On the other side of the canal, the Botica Vieja gardens were expanded and made larger, and two new bridges connected them to the island's open spaces. Moreover, an island-wide network of "green fingers" covering more than 5,000 square meters was planned. These goals show how the redevelopment project built upon a combination of grey and green infrastructure to accomplish its overarching objective of creating a residential area that is safe from flooding.

The reopening of the Deusto Canal was budgeted at 20.9 million EUR (only the reopening and not the entire project) and the City Council agreed to cover this. The Basque regional government agreed to finance the

costs of the new bridge. As per the agreement with the SPV (Comisión Gestora de Zorrotzaurre), the City Council also paid for the building of the flood protection barriers at 5.1 million EUR, which also included the structural rehabilitation of the river bank and the storm water tanks. The costs of the further redevelopment activities were covered by the SPV, so the private and public owners of the land contributed according to their share of land ownership. This also comprised the costs for the ground level elevation and green spaces.

Figure 1. Zorrotzaurre Flood Proof district. Source: Comisión Gestora de Zorrotzaurre

The members of Comisión Gestora de Zorrotzaurre contribute financially relative to the ownership of land (51% public, 49% private). From the data that is publically available, the PPP was initiatied by the landowners. In other words, without this initiative from the landowners, the project would have not started. Due to the importance of the project and the amount of land owned by public authorities (Port, City and Province), the public sector joined the 'Comisión Gestora'. The 'Comisión Gestora' is a union of owners with no special legal status. The 'Junta de Concertación' was created to develop the first phase of the project. It is an organisation defined in the Basque law for urbanism. Both are not-for-profit, since the final objective is to balance the costs with investments made by the owners to increase the area's sustainability and flood resilience.

Current status of the project:

- Opening of the Duesto canal: Completed (in October 2018)
- Erecting a flood wall: Under Construction (started August 2023)
- Raising ground level for new construction: Ongoing
- Putting in storm water tanks: Information not publicly available
- Creating green, public areas: Information not publicly available, but likely part of future development plans

There are limited data available publicly on the implementation status and progress of the project.

Table 2. Bilbao Flood Proof District. Timeline with key moments

Date	Key moment
1995	The "Master Plan for Urban Planning in Bilbao," was introduced by the city and revised in 2016
2008	Declaration of the existing neighbourhood as a Protected Rehabilitation Area
2012	Special Urban Plan of Zorrotzaurre adopted by the Bilbao City Council
2015	Estrategia de Desarrollo Urbano Sostenible e Integrado (EDUSI), the Sustainable Urban Development Strategy of Bilbao with a focus on Zorrotzaurre
2015-2022	Limit of the Basque Flooding Risk Prevention Plan (developed by the regional public water agency, URA)
2018	Opening of the Duesto Canal

2023	Construction of the flood wall started in August 2023

Governance and key stakeholders

Because of the nature of this PPP, both public and private players were integral to the project's creation. Although they are not allowed to contribute directly to the project's implementation and development, **Zorrotzaurre homeowners** have collaborated with the neighborhood association to create and develop ideas. A program by the municipally owned **"Society for Community Restoration" (Surbisa)** was created to provide financial assistance to current owners and tenants for building restoration, focusing on energy conservation and accessibility enhancements. The rebuilding plan was shown to the public twice and received complaints from the citizens. Because of these complaints, changes were made to the original concept, such as the decision to preserve a former industrial building on the river bank and transform it into a cultural center.

Specific governance institutions have been set up to steer the implementation process of this project. The **"Comisión Gestora de Zorrotzaurre"**, or Management Commission of Zorrotzaurre, is the most important of the institutions present, as it gives private landowners and public officials opportunities to convene and discuss urgent matters. The collaboration was started by the private sector, and as a result of the project's significance and the quantity of land held by the Port, City, and Province, the public sector joined the "Comisión Gestora." This Commission is a Special Purpose Vehicle (SPV). An SPV, a private or hybrid entity created for a project, manages a complex web of contracts assigning risks, duties, and finances to various public and private actors involved.

The **public actors** in the Commission include the Port Authority of Bilbao, the City Council of Bilbao, the Department of Territorial Planning, Housing, and Transport (through Visesa, a publicly owned company), the Regional Basque Government, and the private organizations Sociedad Promotora Inmobiliaria Margen Derecha S.A. and Vicinay Cadenas S.A. The Zorrotzaurre Special Urban Plan, or redevelopment plan, is overseen by the Comisión Gestora de Zorrotzaurre.

The Commission oversees moving the project forward, achieving the goals of the plan, and resolving any issues that may arise during its implementation. The Management Board members, who are the property owners' representatives, make the executive decisions. On the other hand, the Coordination Board of the Commission is in charge of day-to-day operations and submits reports to the Management Board regularly. The Zorrotzaurre Special Urban Plan was divided into two spatial plans with specific activities because of the project's complexity and the difficulties posed by the economic crisis during its early phase of implementation.

The **landowners in Zorrotzaurre** are also participants in the redevelopment project through active participation in the Comisión Gestora de Zorrotzaurre. In addition to this commission, the **"Junta de Concertación"**, an organization outlined in the Basque statute for urbanism, was established to carry out the project's initial phase. Since balancing expenses with owner investments is the ultimate goal, neither the Comisión Gestora nor the Junta de Concertación are for-profit organizations.

Zorrotzaurre's residents are not eligible for membership since they are not expected to cover any project expenses. Nonetheless, through their many meetings with the project managers, they have collaborated with the neighborhood organization to design and develop the plans. As a result of these exchanges, the "Society for Municipal Restoration," or Surbisa, has created a program with a ring-fenced budget (donated 50% by the general project developers and 50% by the municipality) to support and assist current owners and tenants in restoring their buildings, focusing on energy efficiency and accessibility. Surbisa is a municipal initiative that the City owns in its entirety.

Throughout the two public comment periods for the redevelopment proposal, the **Bilbao residents** participated actively, though they were not directly involved in the PPP. Many changes were made to the original planning strategy in response to the claims. For instance, the historic "Papelera," a former industrial structure on the Deusto riverfront, was preserved because the locals specifically desired to preserve it as a university.

In addition to the PPP, the **European Regional Development Fund (ERDF)** has also supported the development of the project. **Horizon Europe projects** have also supported the implementation and research into the Master Plan. Examples include Decarb City Pipes 2050, Atelier H2020 project, and brownfield decontamination (POSIDON and BRODISE H2020 projects).

The **Basque Water Agency (URA)** defined the limits for the canal according to flooding and also ensured that the Zorrotzaurre plan was in compliance with the regional urbanization guidelines as established by the URA.

Table 3. Bilbao Flood Proof District. Key stakeholders and their responsibilities or roles

Stakeholder	Type	Role and responsibilities

Basque Water Agency (URA)	Public	Defined the limits of the Duesto Canal and ensured the master plan was within regulations
Bilbao City Council	Local	Provides funding for some aspects of the Urban Master plan, approves project plans and ensures that the project aligns with the city's development goals
Comisión Gestora (SPV)	Hybrid	Special SPV established for managing and coordinating the PPP, the members include both public authorities and private actors
Surbisa	Local/Private	Neighbourhood association that involves citizens and enables them to be a part of the PPP
Citizens of Bilbao	Local	Do not contribute financially to the project, but are involved in the PPP through conducting frequent dialogue with the city council and raising concerns
European Regional Development Fund	Public	Has provided some additional funding for the Master plan
Junta de Concertación		Not-for profit organization that brings together various stakeholders for coordination purposes
Horizon Europe	Public	Various Horizon Europe projects have supported the implementation and conceptualization of the Master plan

Business model & financial model

Business model

The Coordination Board of the "Comisión Gestora de Zorrotzaurre," which is accountable to the Management Board, conducts regular financial monitoring according to the Special Urban Plan of Zorrotzaurre. Approximately 202,129 square meters of new construction—or 25% of the overall surface area—will be used for economic activities and 5,473 new homes. This means that sufficient protection against the rising risk of flooding brought on by climate change is necessary. In relation to flooding, the following objectives have been identified:

- Zorrotzaurre's current homes should be well secured against T100 rainfall events, or catastrophic flooding that is estimated to occur once every 100 years.
- New construction should be able to withstand T500 occurrences, which are more catastrophic events that occur once every 500 years but are even less common.

These goals align with the Zorrotzaurre Master Plan, the Bilbao Adaptation Plan, and the Master Plan for Urban Planning in Bilbao.

This project offers a range of benefits to several key stakeholders:

- **Bilbao City Council:** The plan prioritizes flood protection measures, minimizing future flood damage to public infrastructure and reducing associated costs. Successful implementation of the plan using a PPP model also sets a positive example for future infrastructure projects involving collaboration between public and private entities.
- **Landowners:** Flood protection can create opportunities for landowners to participate in profitable development projects on the protected lands. Additionally, businesses benefit from a lower risk of flood damage, improving operational stability.
- **Citizens of Bilbao:** The reduced flood risk benefits the citizens the most. In addition, the plan also promotes the creation of green spaces within Zorrotzaurre, enhancing the quality of life.

Financial model

The sources of funding in the Zorrotzaurre project include:

- Public regional budget
- Public local authority's budget
- Corporate investment (from project developers)
- Funds provided by non-governmental organizations

The budget for the Deusto canal's opening was €20.9 million. These funds were paid by the City Council, and the Basque regional government agreed to pay for the construction of a new bridge. The City Council also contributed €5.1 million toward the flood protection barrier, which comprised stormwater tanks and structural restoration of the river bank, in accordance with the terms of the agreement with the "Comisión Gestora de Zorrotzaurre." The "Comisión Gestora de Zorrotzaurre," or the private and public owners of the land, will pay

the costs of any additional specialized redevelopment projects in accordance with their respective ownership shares. These include the costs for the green areas and ground level elevation.

Though the PPP of Zorrotzaurre was initiated by private actors, PPPs are generally initiated when governments and state-owned utility service providers do not have enough financial resources or are under financial pressure as the demand for public infrastructure exceeds public finance. PPPs offer strong incentives for private actors to optimize capital and operational investments, reinforced by lender oversight. While the specifics of this case are not public, typically lenders in PPPs have oversight over financial performance (revenue, cash flows, costs, budget, etc.), project delivery and management (operational quality and efficiency), and compliance (environmental regulations, contractual obligations, etc.).

PPPs are designed around efficiency, benefiting both public and private actors. PPPs can take multiple forms, such as improving operational performance of publicly run utilities, mobilizing the technological expertise of the private sector, and combining it with the managerial expertise of public actors.

Overview of Public Private Partnerships (PPPs)

The following section includes an overview on the functioning of PPPs in general, since there is little public information available on the Zorrotzaurre PPP. The information included in the following sections has been derived from the Knowledge Module on PPPs for Climate-Resilient Infrastructure by the Global Centre on Adaptation (2021).

Public-Private Partnerships (PPPs) bring together public sector needs with private sector resources. They are long-term agreements where private companies finance, build, and potentially manage public infrastructure projects. This can involve entirely new construction (known as the greenfield market) or improvements to existing infrastructure (known as the brownfield market). While the exact structure of PPPs varies depending on location, they generally involve private firms taking on risk and responsibility for managing the project, with their payment tied to performance.

PPPs are often categorized based on how the private partner recovers their investment and earns a profit.

1. **User-Pays PPPs:** In this model, the private partner generates revenue by charging users directly for the service provided by the infrastructure project. Examples of this model can include toll roads or water utilities. Drivers pay tolls to use the road, which helps the private company recoup construction and maintenance costs. Users pay water bills to the private company managing the system.
2. **Government-Pays PPPs:** Here, the government is the primary source of revenue for the private partner. Government-funded PPPs are a type of contractual arrangement where the public partner pays the private partner for the infrastructure's availability and associated services, therefore covering the private partner's earnings. The government makes payments to the private company based on the project agreement. For example, the government pays the private company a fixed fee for designing, building, and maintaining green roofs on public buildings.

PPPs can also combine elements of both user-pays and government-pays models. Another way in which PPPs are categorized is through contract type, which looks at the specific responsibilities allocated to the private partner: Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), Rehabilitate-Operate-Transfer (ROT), etc. It is important to note that a PPP's payment system varies depending on the jurisdiction. For instance, in Brazil and France, user-pays contracts are known as concessions, whereas government-pays contracts are known as PPPs. The legal framework for each form of contract is different and depends on the legislation and jurisdiction of the country in which it is operating. **There is limited data available publicly on the Zorrotzaurre model, but most sources refer to it as a combination of government-pays and user-pays PPP.**

The PPP agreement, or PPP contract, between the public partner (sometimes referred to as the "procuring authority") and the private partner is the primary relationship and fundamental component of the project structure. The PPP contract, which is created by the public partner, specifies the duties and rights of the private partner to whom the infrastructure's development and management will be assigned (Refer to Figure 2). The contracts often go through lengthy negotiation processes.

The contract reflects the risk structure of the PPP (i.e., how the scope of responsibilities is distributed in terms of risks and how those are allocated between the public and private partners), the financial structure (i.e., how the private party will be compensated or paid for the works and services), and other provisions. The public sector defines, measures, and retains risk, or it is transferred to the private partner through precise contractual conditions and a suitable payment method. Risk should be assigned to where it can be managed the best. Value for Money (VfM) of government spending in PPP projects is ensured through the criteria of economy, efficacy, and efficiency of the private sector, as well as by properly allocating risks for public sector procurement.

A Project Company or Special Purpose Vehicle (SPV) is established expressly to accomplish the project's goals. It is generally a private or hybrid entity. Most of the rights and obligations will be transferred by the SPV to a downstream structure of contracts, which will then assign duties, liabilities, risks, and cash flows from the SPV to various private and public actors through agreements. These include:

- Shareholder's agreements (especially with financial investors)
- Financial or debt agreements
- Construction/Engineering, Procurement and Construction (EPC) contracts and the like
- Operation and Maintenance (O&M) contracts
- Insurance contracts and guarantees.

Like any private investment opportunity, the project will often be financed with a combination of debt and equity, which offers tax efficiency by forming a "tax shield." Project finance is typically the method used by PPPs to secure debt financing from lending organizations. Lending institutions that provide project finance typically consider the projected project revenue stream as the only source of funding available for paying interest and repaying outstanding debt. In essence, PPPs are a derivative of project finance, which is normally provided by public sector-backed banks and lenders.

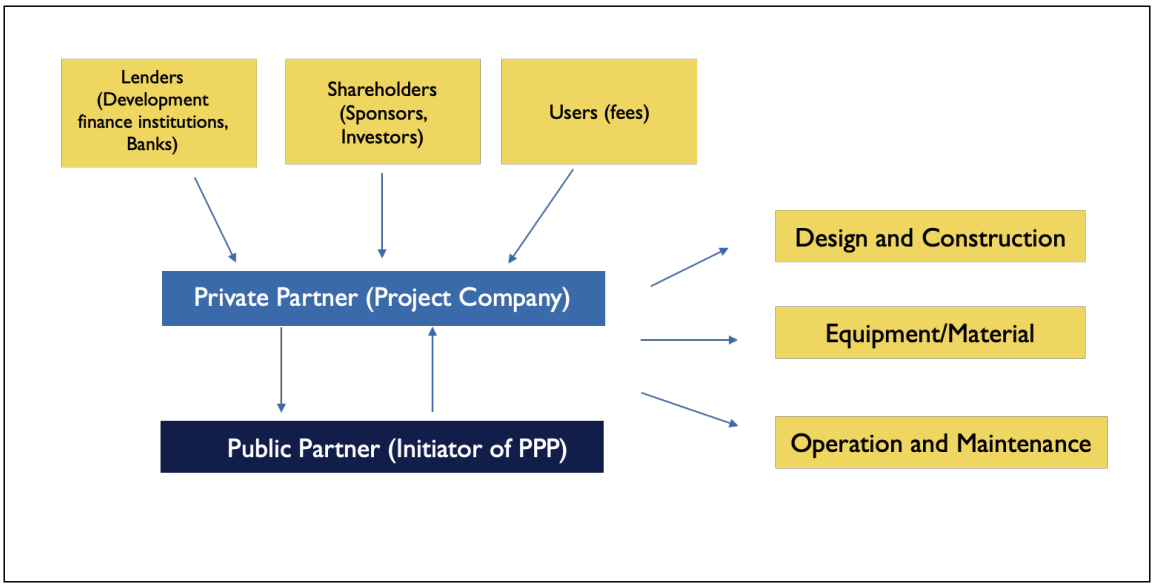

Figure 2. General organisational structure of a PPP. Source: Image adapted from Knowledge Module on PPPs for Climate-Resilient Infrastructure (2021)

When determining whether to grant a loan, lending institutions typically do not consider the company's portfolio of assets and liabilities. Instead, they view a project as a separate business with its own project-related contracts, assets, and cash flows. Because of this, project finance is also referred to as "limited recourse" or "non-recourse" financing. This is because, if the project encounters difficulties repaying its debt, lenders typically have no recourse against the sponsors and shareholders who originally launched it.

Lenders consider a project's creditworthiness, technical viability, and financial viability in determining whether or not to grant a loan. This evaluation takes into account the project's ability to pay off the debt while accounting for a certain amount of potential negative cash flow.

The technical feasibility includes:

- The project can be constructed within the proposed schedule and budget.
- The project will be able to operate at the planned capacity and operating conditions.
- Construction cost estimates, along with the contingencies for various scenarios, will prove adequate for the completion of the project.

Project finance involves achieving a balance between providing funds for the project in its most risk-averse form and in its most cost-effective structure (also known as optimization). It is important that the project finance structure should be planned to minimize financing expenses. It should support the PPP contract's agreed-upon risk distribution between the public and private sectors. The project finance should guarantee that the private partner's financial and other risks are appropriately managed both inside and among the sponsors, financiers, and shareholders of the SPV. The project finance structure should, for the most part, make sure that the procurement authority's interests and those of the project's primary lenders are in line.

Project finance requires that the sponsors create a special organizational structure for the SPV. Depending on the functions (like DBFO) included in the PPP agreement, the SPV will enter into a PPP agreement with the procurement authority to design, build, finance, operate, and/or maintain the project. The duration of the PPP agreement is the finite life of this SPV. With certain exceptions in certain projects during the construction phase, the sponsors are among the principal shareholders of the project firm, and their exposure is capped at the

amount of equity invested in the project. PPPs allow building a long-term project structure with financing at the core, where the unique value is the cash flow that is allowed by the contract.

As previously mentioned, the information publicly available on the Zorrotzaurre PPP is limited. The analysis of literature on PPPs and Zorrotzaurre shows that the PPP was likely chosen as the financial instrument due to the following aspects:

- **High upfront costs:** Flood protection and land elevation are expensive. PPPs allow for the public sector to spread the financial burden across the public and private entities involved.
- **Technical expertise:** Private actors can provide specialized skills and expertise that the public entities lack.
- **Risk sharing:** A PPP allows for sharing risks between public and private partners.

Enabling conditions

The primary framework for disaster risk management in the Basque Country is the Flood Risk Management Plan (PGRI). The region's most significant climate threat is considered to be flooding. The plan highlights high-priority areas and possible actions, elaborating on preventative, protection, preparation, and recovery activities. Zorrotzaurre is a minor district of the municipality of Bilbao. In this context, the Special Urban Plan of Zorrotzaurre, which was created and authorized by the Bilbao City Council, and the Basque PGRI are essential building blocks for the execution of adaptation. These two plans are the primary information sources for Zorrotzaurre's flood risk reduction strategies, whether they are planned or already in place. The PGRI serves as the primary framework for flood event planning, recovery, and prevention in the Basque Autonomous Community. It will impact Zorrotzaurre's flood risk reduction through identified priority locations and normative developments.

Outcomes

On October 8, 2018, the canal was completed and formally opened as part of the reconstruction, turning the previous peninsula into an island. The Frank Gehry Bridge, which opened in 2015, and the San Ignacio Bridge, which was scheduled to open in 2020 (status not publicly available), connect the created island to the mainland.

We do not have information on the amount of private money raised so far in the developments.

Lessons learned

Successes and limitations

The Duesto Canal was opened in 2018. The construction of the flood wall started in August 2023. Several other changes were recommended, but it is not clear which of these changes have been delivered. Climate change effects are not yet included in estimation of flood risks. Neither is it included in the budget for the next PGRI validity periods. Yet, taking climate change and/or uncertainties of climate change into account within planning is crucial, especially when infrastructural works lock in huge financial resources in the long term.

While the opening of the canal and ground level elevation are expected to significantly reduce damages compared to the no channel case by as much as 60%, sea level rise is a missing variable that could offset this gain. It is also unclear how sea level rise will be incorporated into hydrological and economic models. Additionally, by raising the island's inundation limit by more than 1 m above present ground levels, the project addresses protection. At the moment, the homes and structures that have been preserved as heritage are still in danger.

Project implementation has been slow. To date, Zorrotzaurre is an island, but several project components, including the residential development, remain unfinished, and flooding protection parameters are still being adjusted. Zorrotzaure is still a well-known example in Spain's context of adaptation policy, particularly considering PPPs to deliver adaptation alongside an urban regeneration project.

Transferability conditions and potential

Since flood proofing the Zorrotzaurre benefits both public and private actors, press releases on the PPP describe it as the ideal funding instrument It's interesting to note that, unlike in most other examples, the private sector, not the public sector, was the one to start the PPP. The Zorrotzaurre island's unique terrain and restricted space need the reconstruction project to incorporate both green and grey infrastructure in order to prevent flooding. There was involvement of multiple parties in the project's design and execution phases.

The following section talks about how PPPs in general can be transferred to different contexts, and how they can be made risk proof according to Knowledge Module on PPPs by the Global Centre on Adaptation (2021).

An unbiased evaluation of what best serves the public interest should serve as the basis for choosing between the financing and deployment of infrastructure services by the public and private sectors. The decision to go ahead with a PPP model should consider what is best for the public interest. Affordability for individuals and businesses, network coverage, operational effectiveness, long-term asset maintenance, social and environmental sustainability, and the state of assets are important factors. An evaluation of the relative long-term costs and advantages, as well as the accessibility and dependability of private or public financing choices is necessary before involving private actors. Furthermore, the decision to use a PPP is largely influenced by the evaluation of whether the public will benefit from Value for Money (VfM) when a PPP project is chosen over non-PPP options. It will take a long time and mutual trust amongst the parties for a PPP to be successful, which is typical in adaptation projects

Insurance plans are important for dispersing risk among different bearers as well as for educating the public about the dangers of climate change and extreme weather. Additionally, there are several advantages in terms of averting material and psychological harm. If properly constructed, insurance can be a powerful preventive strategy through risk transfer. Understanding uncertainty and how to manage it in the context of climate change is crucial for addressing climate risk in PPP projects. Decisions must be made even in the face of uncertainty. A PPP has more chances of success if they can effectively simulate climate scenarios and incorporate those simulations in strategizing. In making decisions, the public and commercial sectors must acknowledge the uncertainties surrounding climate risks, take future climate scenarios into consideration, and give priority to solutions that will lessen vulnerability and have beneficial effects.

Since every PPP project is unique, it will need specialized funding with the following common characteristics:

- Contracts to ensure and efficient allocation of responsibilities and sharing of risks
- Long-term, secured and reliable future cash-flows to secure the initial financing of the project

Lenders consider the predicted cash flows of the project as collateral rather than the project assets, which will not be worth much in the event of financial difficulty, because the SPV will not have any operating history. The lenders will also consider if the stakeholders are qualified to carry out the planned project and whether the SPV's component elements meet their requirements. Because of this, lenders need guarantees that the project will be completed on schedule and that it will be a financially feasible endeavour once it is operational.

Related factsheets

The PPP model of this case shares similarities with the Greater Cape Town Water Fund (GCTWF) (**ID01**) with the involvement of public and private stakeholders contributing financially.

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