

# Financial Capacity Building for Transformational Adaptation

**Examples from the Jucar River Basin (Spain)**

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(UPV)



Funded by  
the European Union



UK Research  
and Innovation

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# The Jucar River Basin

- ❑ Unstable balance between water resources and demands
- ❑ Agriculture, main user (80% water use)
- ❑ Upper-lower basin conflicts for water
- ❑ Long severe droughts, to be exacerbated by climate change



Droughts

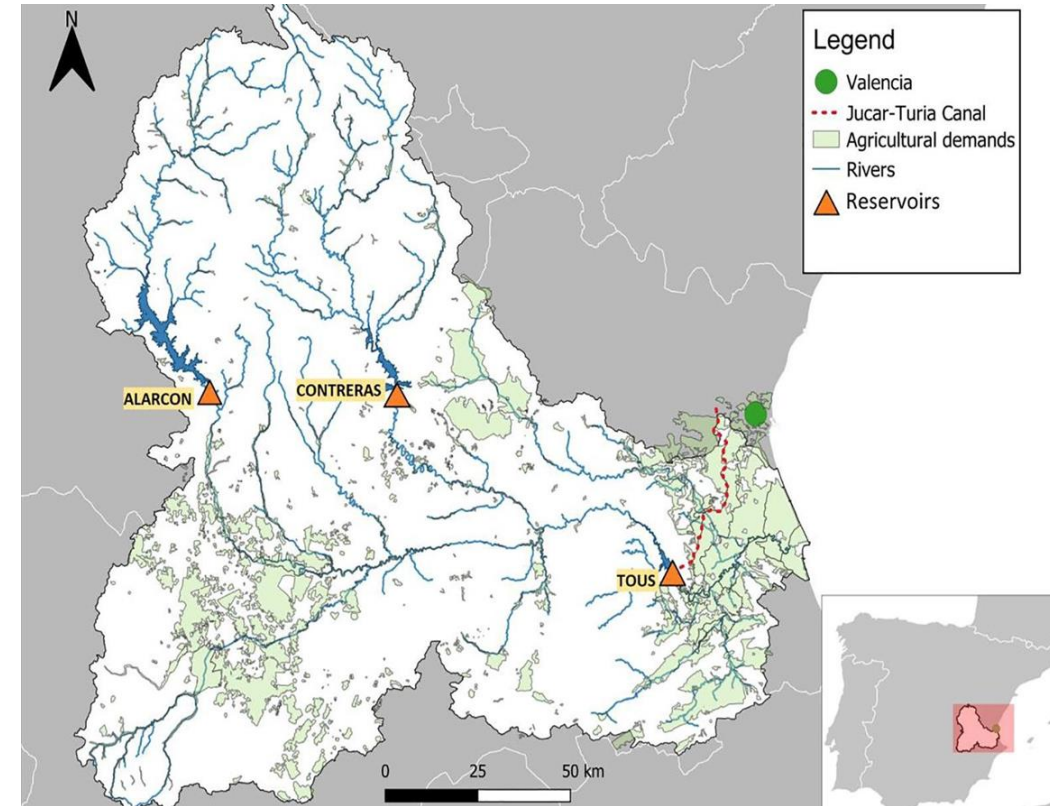


Floods



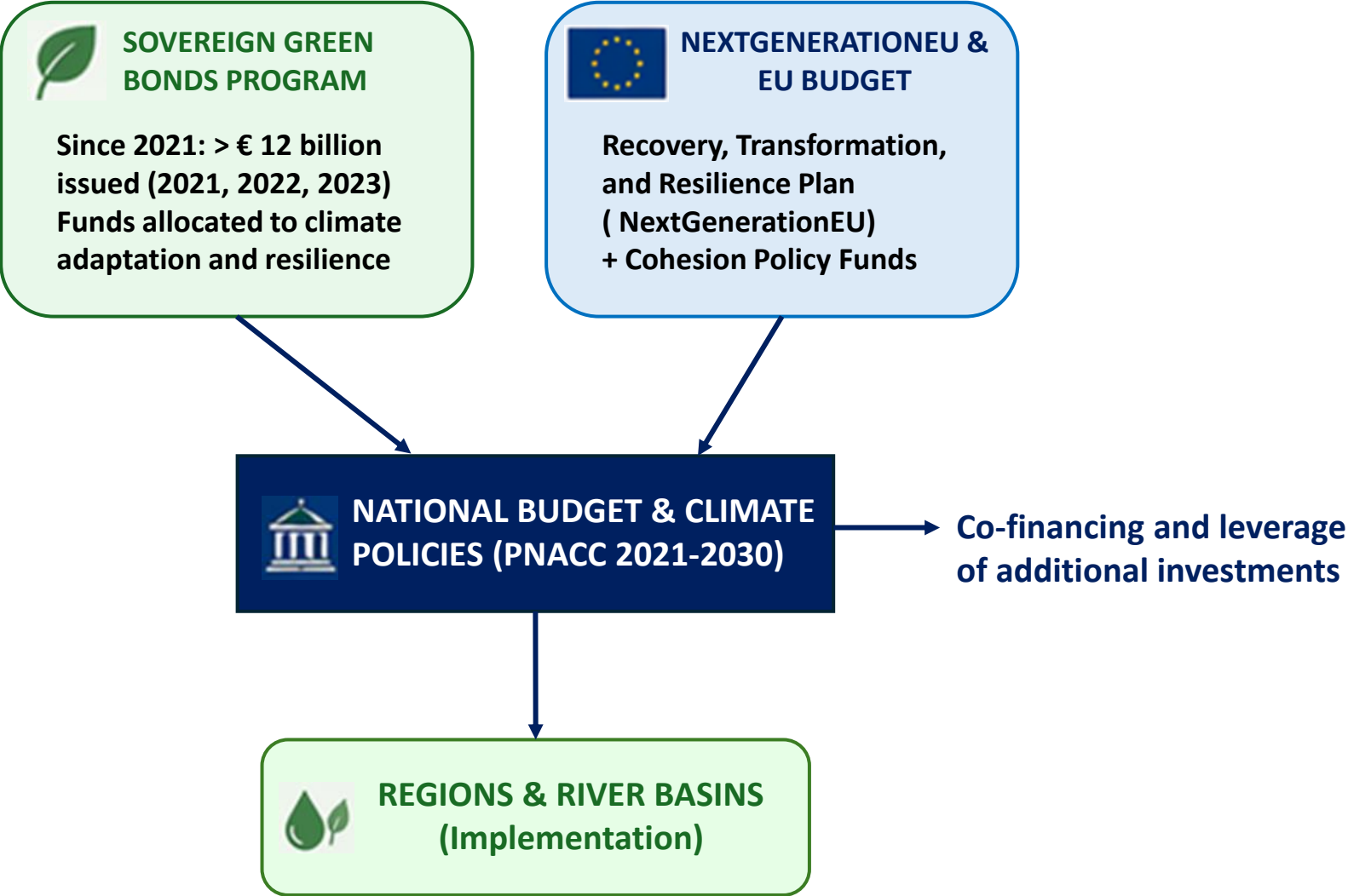
Rising  
temperatures

**Financing today,  
Resilience for tomorrow**

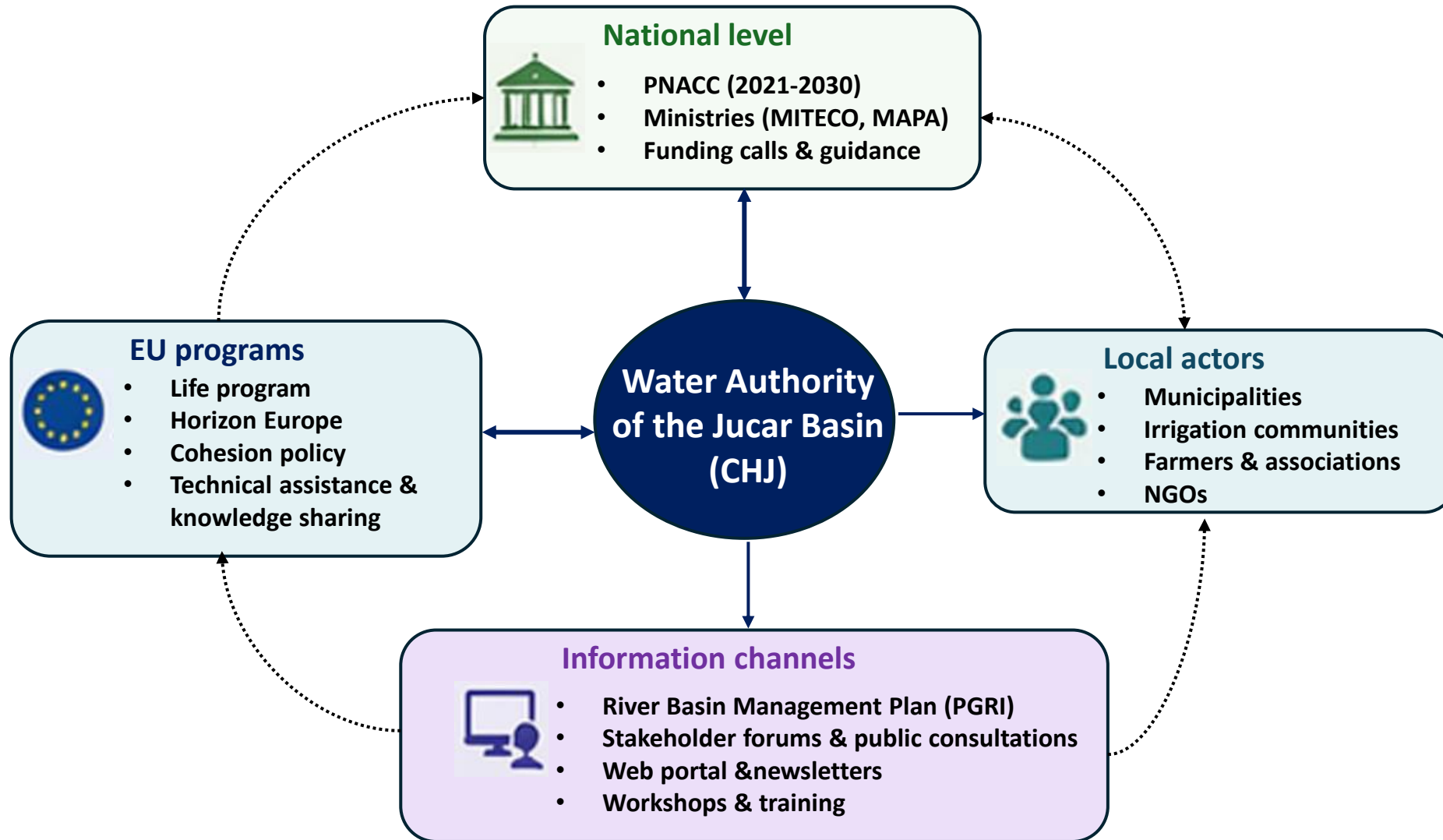


|                     |                          |
|---------------------|--------------------------|
| Av surf resources   | 1,605 Mm3/year           |
| Urban demands       | 190 Mm3/year             |
| Agric Demands       | 1,403 Mm3/year           |
| Industrial demands  | 32 Mm3/year              |
| Hydropower capacity | 2,373 MW + 1,092 nuclear |
| Environ flows       | 104 of 143 water bodies  |
| Reservoir capacity  | 2,627 Mm3                |

# Financial capacity building for adaptation



# Keeping the region informed about new opportunities



# From finance to action in the Jucar Basin



## Irrigation modernization



### **Project:** Modernizing irrigation at Acequia Real Del Jucar

- Conversion to drip irrigation
- Telemetry and digital control
- More efficient use of water

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**Impact:** 15,000 ha modernized  
Estimated water saving  $\approx$  180 hm<sup>3</sup>/year



## Flood protection



### **Project:** Jucar River Flood Risk Management Plan (PGRI)

- Dike improvement
- Floodplain restoration
- Early warning systems

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**Impact:** Better protection of dense urban settlements and peri-urban infrastructure.



## Ecosystem restoration



### **Project:** Albufera of Valencia Restoration Plan 💰 €56.3 million

- Wetland and habitats restoration
- Water quality improvement
- Biodiversity recovery

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**Impact:** 21,000 ha of natural park benefiting from restoration actions

**Implemented by:** CHJ with support from the Ministry for Ecological Transition and EU funds

# Financial resilience: Agricultural Insurance (Agroseguro)

Moving from traditional heavy infrastructure subsidies toward transformational finance that supports systemic shifts.



The Spanish agricultural insurance system



How it works:



**FARMER**  
pays premium



**AGROSEGURO**  
Managed by private  
insurers



**COMPENSATION**  
When a covered climate  
event occurs



Covers major climate risks  
(drought, frost, flood, wind, excess  
rain, etc.)



Strengthens the resilience of farmers and rural  
economies, reducing the financial impact of  
extreme events.

# From Research to Practice: Testing Financial Resilience

Our lab contributes by testing **risk-sharing pathways** under deep uncertainty through **serious games** and **stakeholder workshops**.

**How SG Works:** Every game year represents one real agricultural cycle. It includes two phases:

## September – Decision Phase

At the start of September, you will receive two key pieces of information that will guide your decisions. The Scarcity Index for September, a number indicating the level of water scarcity in that month, and uncertainty bars showing the expected scarcity level in April.

## Decisions you must make:

- **Do I buy insurance this year?** Costs 5-8 MU premium, depending on the crop selection. Insurance payout varies from 15 to 25 MU, depending on the crop selection and climate scenario
- **Do I switch to a different crop before planting?** Changing crops has an upfront cost of 10 MU.

## April – Insurance Payout and Outcome



Adrià Rubio Martín, Safa Baccout, Manuel Pulido Velázquez, Hector Maclean Sorribes, Camilo Gonzalez.

## Serious Game Concept

- A game designed primarily for purposes beyond entertainment (e.g., education, training, health)
- Uses engaging game mechanics to achieve real-world outcomes
- Combines learning objectives with interactive experiences

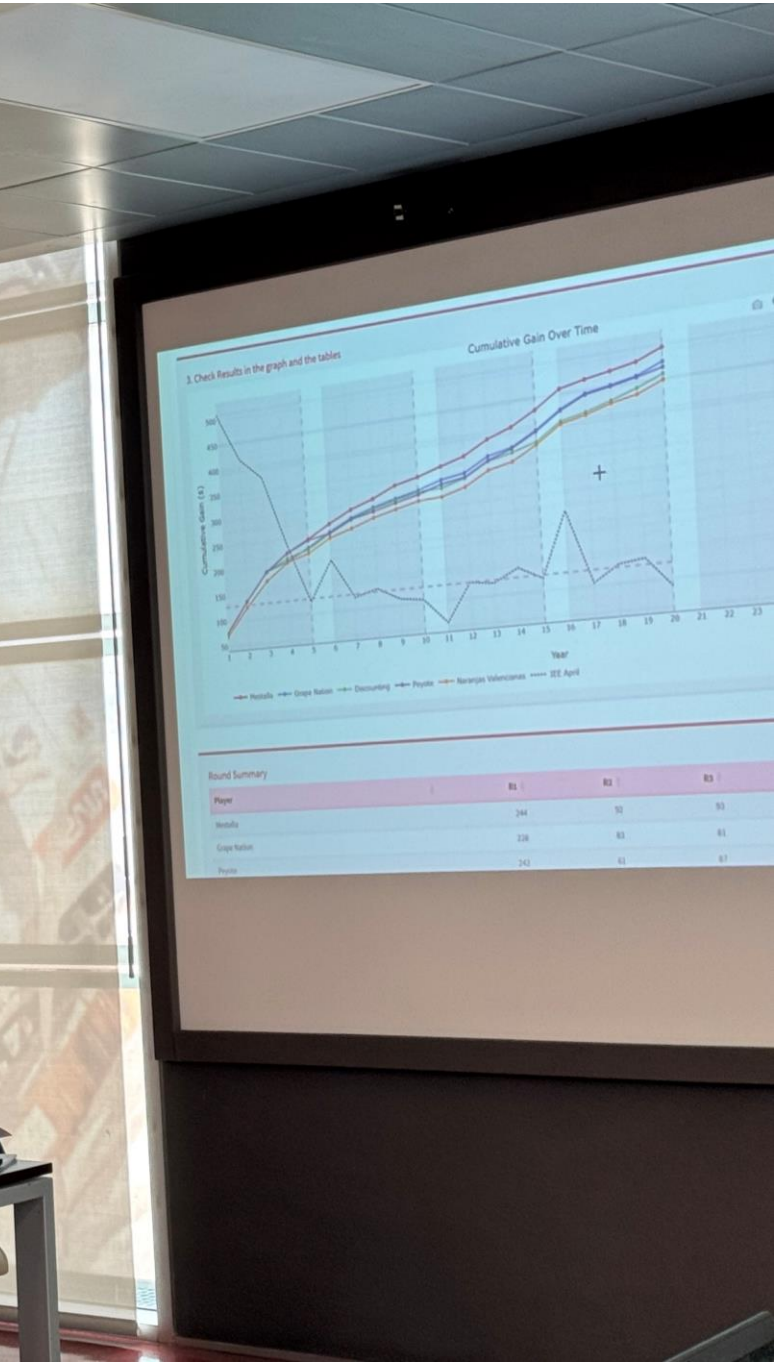


# Crop Performance and Insurance Parameters

| Crop Id | Crops          | Water Demand (m3/ha) | Base productivity (t/ha) | Insurance costs (MU) | Water productivity (MU) | Costs of crop change (MU) | Insurance claim |       |       | Crop profitability (%) |       |       |
|---------|----------------|----------------------|--------------------------|----------------------|-------------------------|---------------------------|-----------------|-------|-------|------------------------|-------|-------|
|         |                |                      |                          |                      |                         |                           | 1-2.6           | 3-7.0 | 5-8.5 | 1-2.6                  | 3-7.0 | 5-8.5 |
| 1       | Normal crop    | 5000                 | 6                        | 8                    | 100                     | 10                        | 15              | 18    | 20    | 95                     | 85    | 70    |
| 2       | Rainfed crop   | 1500                 | 4                        | 5                    | 80                      | 10                        | 18              | 20    | 25    | 90                     | 75    | 55    |
| 3       | Resilient crop | 4000                 | 5.5                      | 6                    | 95                      | 10                        | 15              | 18    | 20    | 100                    | 98    | 90    |

# Climate Scenarios

| Climate scenario | Interpretation                                     |
|------------------|----------------------------------------------------|
| 1-2.6            | Low scarcity – good water availability             |
| 3-7.0            | Moderate scarcity – reduced irrigation reliability |
| 5-8.5            | High scarcity – strong water limitations           |



## Standard

| Round | SSP   | Year | IE - Oct | Uncertainty range |
|-------|-------|------|----------|-------------------|
| 1     | 1-2.6 | 1    | 0.41     | 0.21-0.96         |
|       | 1-2.6 | 2    | 0.45     | 0.23-0.77         |
|       | 1-2.6 | 3    | 0.34     | 0.17-0.58         |
|       | 1-2.6 | 4    | 0.28     | 0.14-0.41         |
|       | 1-2.6 | 5    | 0.24     | 0.08-0.38         |
| 2     | 1-2.6 | 6    | 0.25     | 0.13-0.32         |
|       | 1-2.6 | 7    | 0.17     | 0.08-0.27         |
|       | 1-2.6 | 8    | 0.29     | 0.1-0.46          |
|       | 1-2.6 | 9    | 0.38     | 0.07-0.61         |
|       | 1-2.6 | 10   | 0.59     | 0.07-0.71         |
| 3     | 3-7.0 | 11   | 0.57     | 0.02-0.68         |
|       | 3-7.0 | 12   | 0.36     | 0.09-0.43         |
|       | 3-7.0 | 13   | 0.2      | 0.08-0.32         |
|       | 3-7.0 | 14   | 0.22     | 0.11-0.35         |
|       | 3-7.0 | 15   | 0.29     | 0.08-0.46         |
| 4     | 3-7.0 | 16   | 0.5      | 0.2-0.6           |
|       | 3-7.0 | 17   | 0.41     | 0.07-0.49         |
|       | 3-7.0 | 18   | 0.28     | 0.1-0.34          |
|       | 3-7.0 | 19   | 0.24     | 0.1-0.38          |
|       | 3-7.0 | 20   | 0.14     | 0.05-0.25         |
| 5     | 5-8.5 | 21   | 0.08     | 0.02-0.16         |
|       | 5-8.5 | 22   | 0.11     | 0.01-0.21         |
|       | 5-8.5 | 23   | 0.13     | 0.07-0.17         |
|       | 5-8.5 | 24   | 0.16     | 0.08-0.25         |
|       | 5-8.5 | 25   | 0.31     | 0.01-0.43         |
| 6     | 5-8.5 | 26   | 0.16     | 0.04-0.26         |
|       | 5-8.5 | 27   | 0.07     | 0.04-0.35         |
|       | 5-8.5 | 28   | 0.09     | 0.03-0.17         |
|       | 5-8.5 | 29   | 0.14     | 0.04-0.22         |
|       | 5-8.5 | 30   | 0.18     | 0.02-0.29         |

## Stress

| Round | SSP   | Year | IE - Oct | Uncertainty range |
|-------|-------|------|----------|-------------------|
| 1     | 1-2.6 | 1    | 0.7      | 0.25-1            |
|       | 1-2.6 | 2    | 0.56     | 0.04-0.9          |
|       | 1-2.6 | 3    | 0.83     | 0.04-1            |
|       | 1-2.6 | 4    | 0.28     | 0.14-0.47         |
|       | 1-2.6 | 5    | 0.7      | 0.33-1            |
| 2     | 3-7.0 | 6    | 0.38     | 0.07-0.61         |
|       | 3-7.0 | 7    | 0.59     | 0.07-0.94         |
|       | 3-7.0 | 8    | 0.57     | 0.02-0.91         |
|       | 3-7.0 | 9    | 0.36     | 0.09-0.58         |
|       | 3-7.0 | 10   | 0.2      | 0.1-0.24          |
| 3     | 3-7.0 | 11   | 0.22     | 0.11-0.26         |
|       | 3-7.0 | 12   | 0.29     | 0.08-0.35         |
|       | 3-7.0 | 13   | 0.5      | 0.2-0.7           |
|       | 3-7.0 | 14   | 0.41     | 0.07-0.66         |
|       | 5-8.5 | 15   | 0.08     | 0.02-0.16         |
| 4     | 5-8.5 | 16   | 0.11     | 0.01-0.22         |
|       | 5-8.5 | 17   | 0.13     | 0.07-0.17         |
|       | 5-8.5 | 18   | 0.16     | 0.08-0.25         |
|       | 5-8.5 | 19   | 0.31     | 0.01-0.5          |
|       | 5-8.5 | 20   | 0.16     | 0.04-0.29         |
| 5     | 5-8.5 | 21   | 0.07     | 0.04-0.17         |
|       | 5-8.5 | 22   | 0.09     | 0.02-0.17         |
|       | 5-8.5 | 23   | 0.14     | 0.04-0.27         |
|       | 5-8.5 | 24   | 0.18     | 0.09-0.34         |
|       | 5-8.5 | 25   | 0.31     | 0.05-0.43         |
| 6     | 5-8.5 | 26   | 0.32     | 0.02-0.51         |
|       | 5-8.5 | 27   | 0.2      | 0.04-0.32         |
|       | 5-8.5 | 28   | 0.15     | 0.17-0.29         |
|       | 5-8.5 | 29   | 0.35     | 0.01-0.56         |
|       | 5-8.5 | 30   | 0.31     | 0.06-0.5          |

## Severe

| Round | SSP   | Year | IE - Oct | Uncertainty range |
|-------|-------|------|----------|-------------------|
| 1     | 1-2.6 | 1    | 0.78     | 0.08-0.94         |
|       | 1-2.6 | 2    | 0.58     | 0.25-0.93         |
|       | 3-7.0 | 3    | 0.25     | 0.13-0.47         |
|       | 3-7.0 | 4    | 0.33     | 0.05-0.53         |
|       | 3-7.0 | 5    | 0.24     | 0.12-0.3          |
| 2     | 3-7.0 | 6    | 0.27     | 0.08-0.22         |
|       | 3-7.0 | 7    | 0.51     | 0.02-0.71         |
|       | 3-7.0 | 8    | 0.39     | 0.11-0.62         |
|       | 3-7.0 | 9    | 0.51     | 0.17-0.82         |
|       | 5-8.5 | 10   | 0.18     | 0.09-0.24         |
| 3     | 5-8.5 | 11   | 0.21     | 0.08-0.25         |
|       | 5-8.5 | 12   | 0.18     | 0.04-0.22         |
|       | 5-8.5 | 13   | 0.23     | 0.1-0.37          |
|       | 5-8.5 | 14   | 0.21     | 0.02-0.34         |
|       | 5-8.5 | 15   | 0.35     | 0.09-0.56         |
| 4     | 5-8.5 | 16   | 0.25     | 0.1-0.3           |
|       | 5-8.5 | 17   | 0.26     | 0.11-0.31         |
|       | 5-8.5 | 18   | 0.22     | 0.05-0.26         |
|       | 5-8.5 | 19   | 0.35     | 0.11-0.56         |
|       | 5-8.5 | 20   | 0.27     | 0.07-0.49         |
| 5     | 5-8.5 | 21   | 0.21     | 0.08-0.42         |
|       | 5-8.5 | 22   | 0.19     | 0.08-0.36         |
|       | 5-8.5 | 23   | 0.29     | 0.05-0.55         |
|       | 5-8.5 | 24   | 0.07     | 0.04-0.12         |
|       | 5-8.5 | 25   | 0.13     | 0.07-0.18         |
| 6     | 5-8.5 | 26   | 0.16     | 0.08-0.25         |
|       | 5-8.5 | 27   | 0.2      | 0.04-0.32         |
|       | 5-8.5 | 28   | 0.15     | 0.17-0.29         |
|       | 5-8.5 | 29   | 0.14     | 0.06-0.22         |
|       | 5-8.5 | 30   | 0.18     | 0.07-0.29         |





# **International workshop with stakeholders**

# Key takeaways



## **STRONG FINANCIAL BASE**

Green bonds, EU funds, and national budgets that mobilize large-scale resources for adaptation.



## **TARGETED IMPLEMENTATION**

Basin authorities turn funding into concrete projects that reduce risks and build resilience.



## **RISK SHARING THROUGH INSURANCE**

Agroesguro protects farmers and stabilizes rural economies amid climate shocks.



## **INFORMATION & COORDINATION**

Multi-level governance and knowledge sharing ensure access to opportunities and better decision-making.



**An integrated approach: Finance + projects + risk management + governance for a more climate-resilient Jucar Basin.**



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Examples from the Jucar River Basin (Spain)

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# Challenges and Opportunities Ahead

## CHALLENGES

-  Increasing drought frequency and severity
-  Water scarcity and competing uses
-  Extreme rainfall and flood risks
-  Need for continued investment and innovation



## OPPORTUNITIES

-  Scaling up nature-based solutions
-  Digitalization and smart water management
-  Leveraging private investment
-  Stronger collaboration for a resilient future

Working together today for a sustainable and resilient Júcar Basin tomorrow.

# National Sustainable Finance Plan: Spain's Sovereign Green Bond Program



Eligible **GREEN** project for climate adaptation



Renewable energy



Sustainable water Management  
Biodiversity conservation



Energy efficiency  
Eco-efficient products



Pollution prevention



Clean transportation



Sustainable management  
Climate change mitigation

SDGs

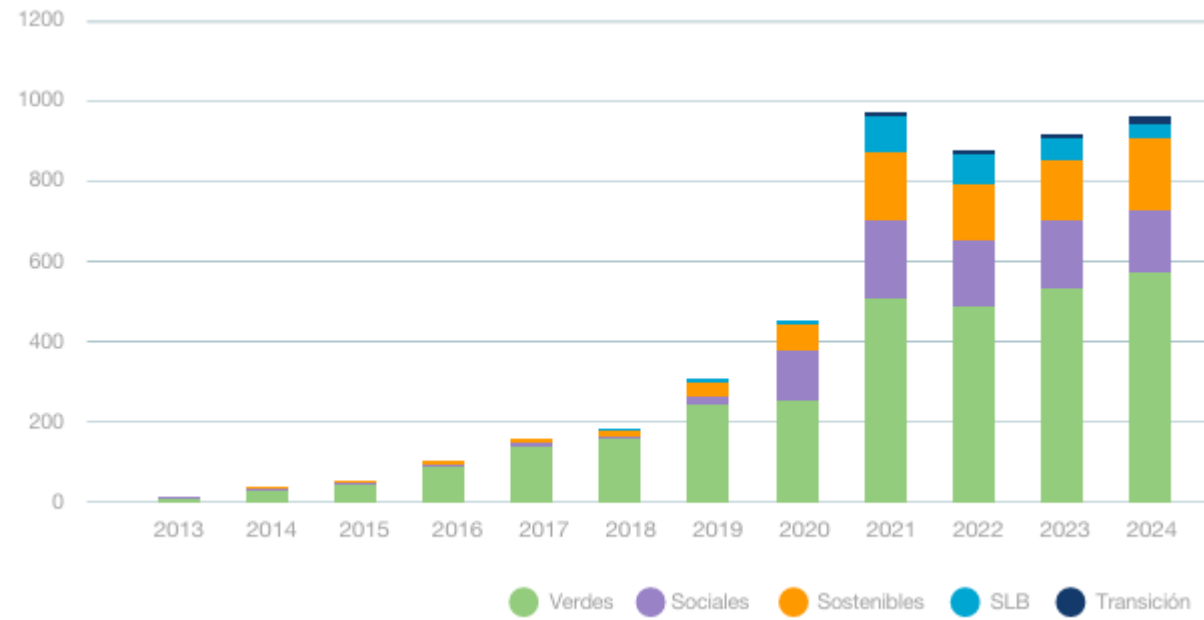


Amount of sustainable financing

Global vs Spain



Global Evolution by Bond Category (MME)



Source: OFISO (data from Bloomberg)