

Public-private investments for flood risk management and climate adaptation

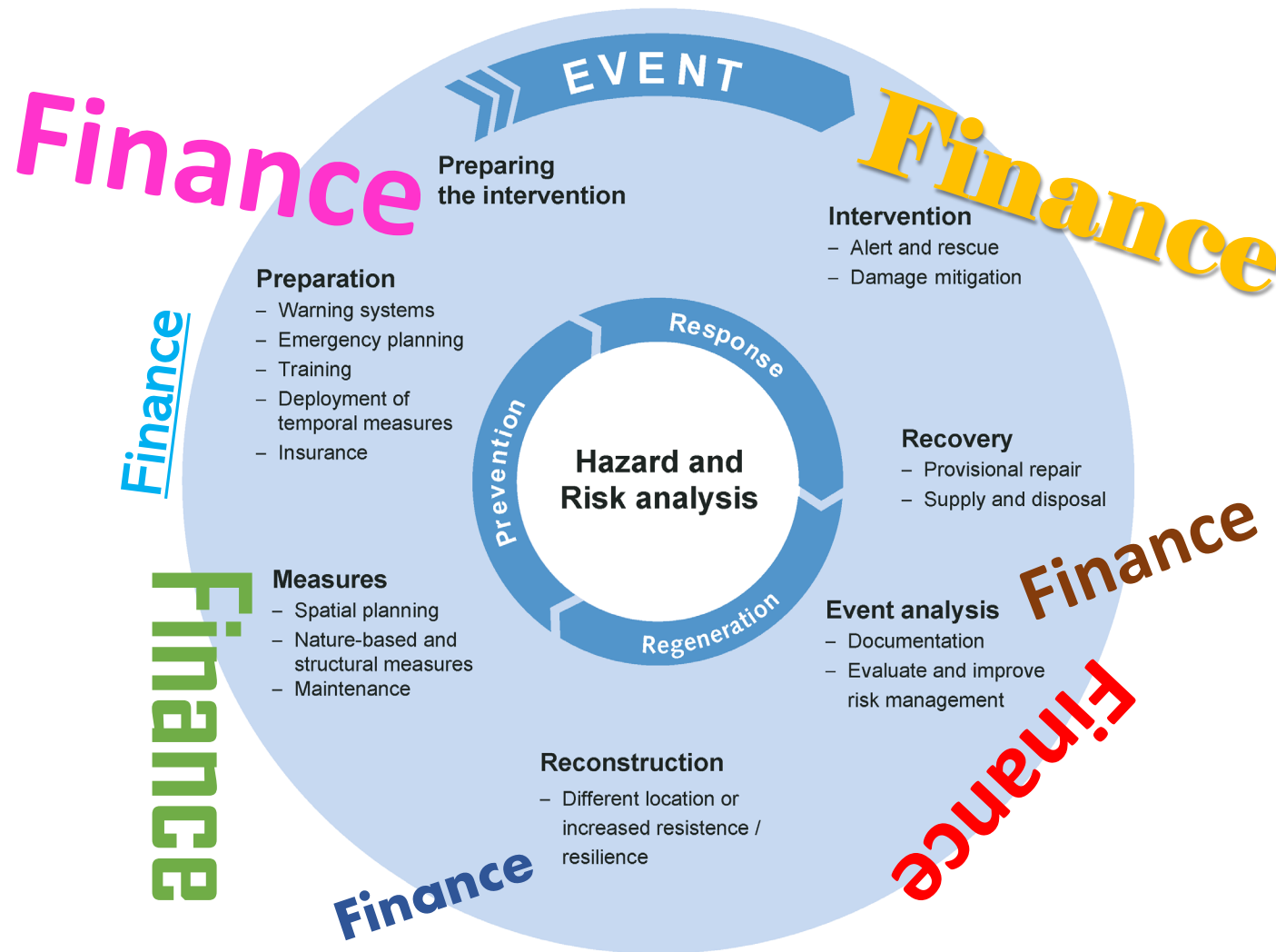
Dr Ger Bergkamp, ARCOWA SA, Switzerland

An aerial photograph showing a large industrial area, including a Honda dealership, completely inundated with floodwater. The water is murky and reflects the sky. In the background, other industrial buildings and a distant city skyline are visible under a clear sky.

Main questions

- Why private financing for flood risk management?
- How to privately finance interventions that reduce flood risks and costs?
- What is the relevance for your work on flood management?

Flood risk management & finance



- An optimum between the demands on the level of security and **financial sustainability**
- Integral risk management create and maintain sustainable and comparable security for people, high tangible assets and natural livelihoods in the **long term**
- Requires an intensive **stakeholder dialogue**

| Global flood losses

2021:

- **Disasters** - Total Economic Loss: USD 280 billion
- **Floods** - Total Economic Loss: **USD 86 billion** (estimate) (31% of disasters)
 - Larger than annual GDP of Sri Lanka (USD 81 bln)
 - Larger than annual GDP of 67% of countries

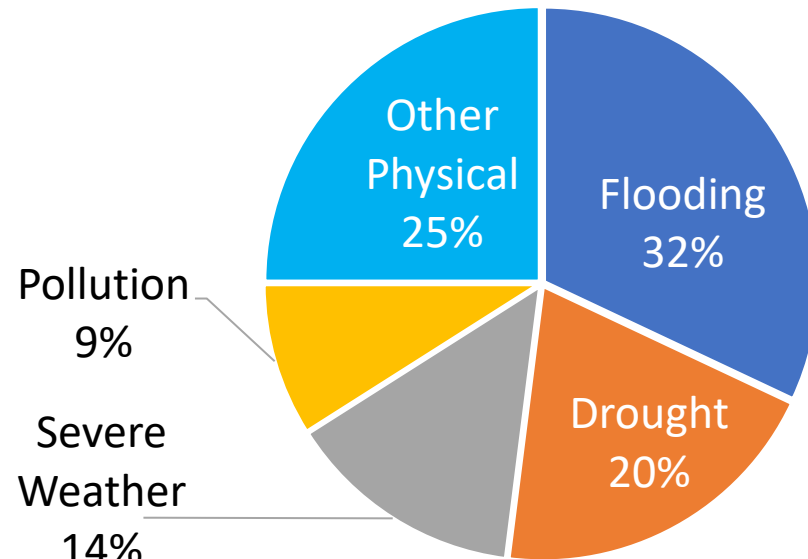
Trend:

- 5-7% per year increase



Private sector impacted by floods

Private Sector Water Risks: 78% are physical risks



**Flood Risk :
25% of
Total Water Risk**

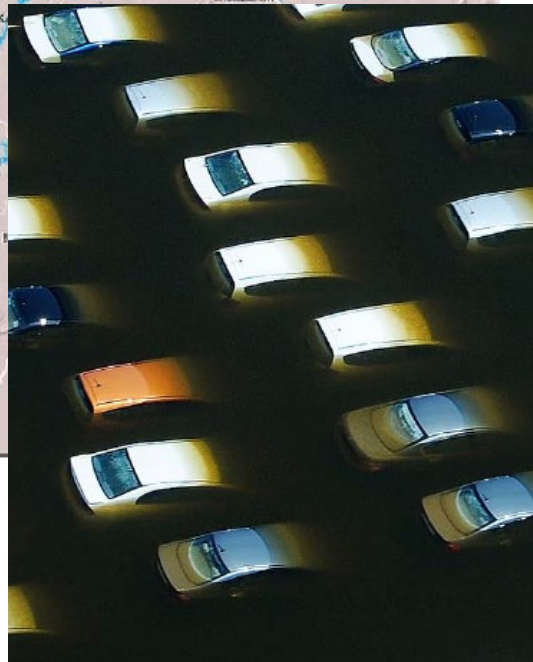
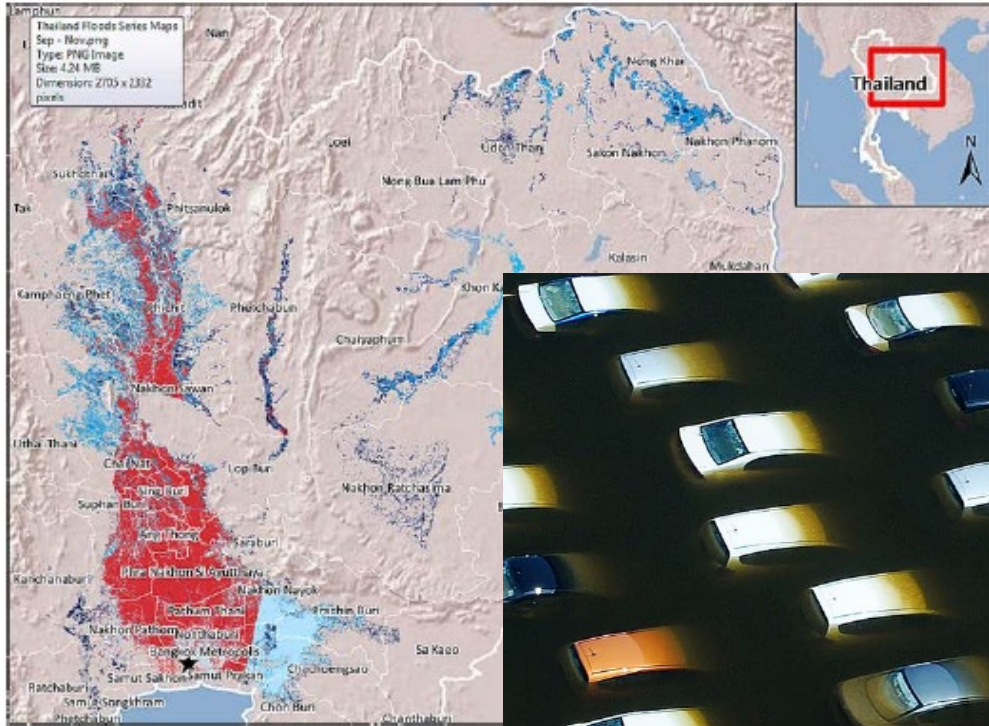
Business impact from water risks:

- Production capacity reduction
- Supply chain disruption
- Operational costs increase

Future Water Risk - Direct impact:
USD 126 billion / year
(global estimate)

Future Water Risk - Business impact :
USD 336 billion / year
(global estimate)

Private sector impacted by floods



Example: Thailand 2011 (mid-OCT to NOV)

Total Damage: USD 46.5 billion

Impact: Private Sector carried 90 % of the damage and losses borne 70% manufacturing sector – 6 industrial estates

Total insured losses: USD 15-18 billion

Rehabilitation and reconstruction estimated: USD 50 billion

Who Paid?

75% borne by the private sector of which 80% by manufacturing industry

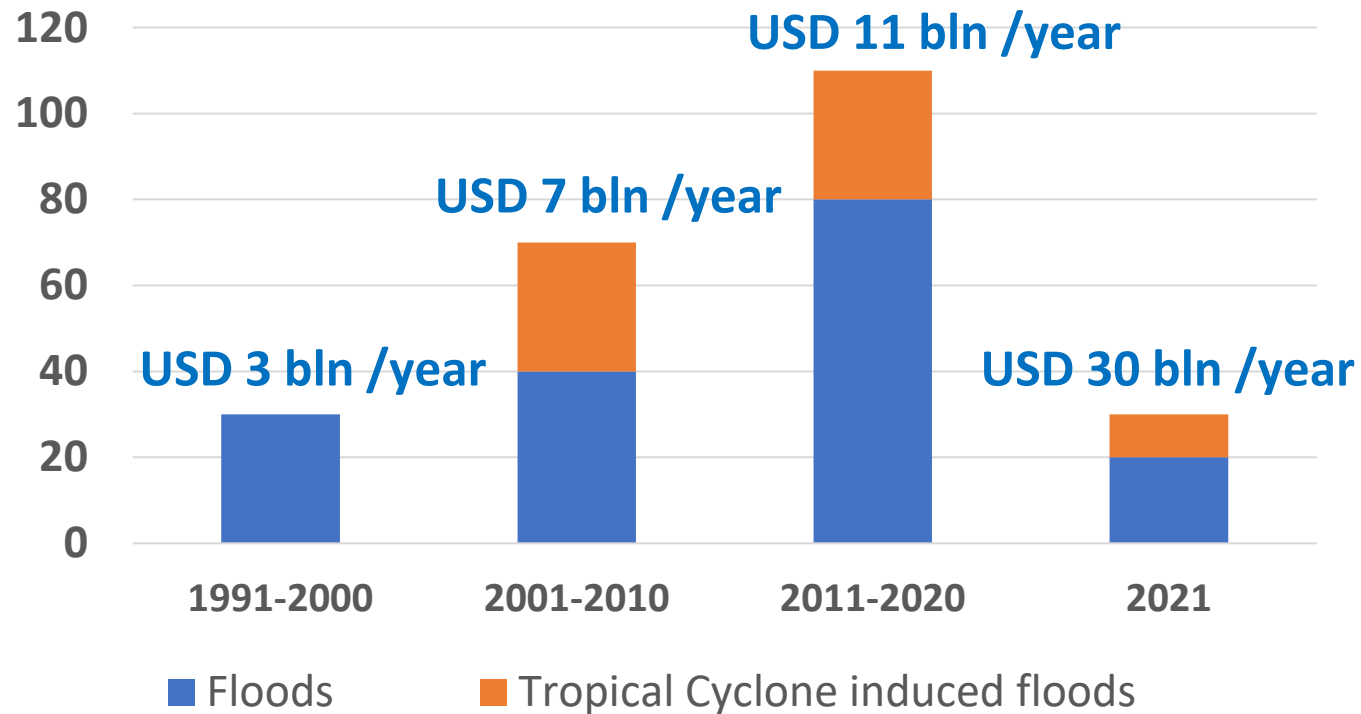
|Types of private finance for flood management

Managing Flood Costs = Minimising public fiscal costs and private damages

- Flood insurance
- Catchment investments
- Alternative 1: Bond market
- Alternative 2: Carbon market

Flood insurance: How much is insured?

Insured losses (USD): world-wide



Large insurance gap:

- 5% of flood losses were insured in emerging markets
- 34% in advanced economies

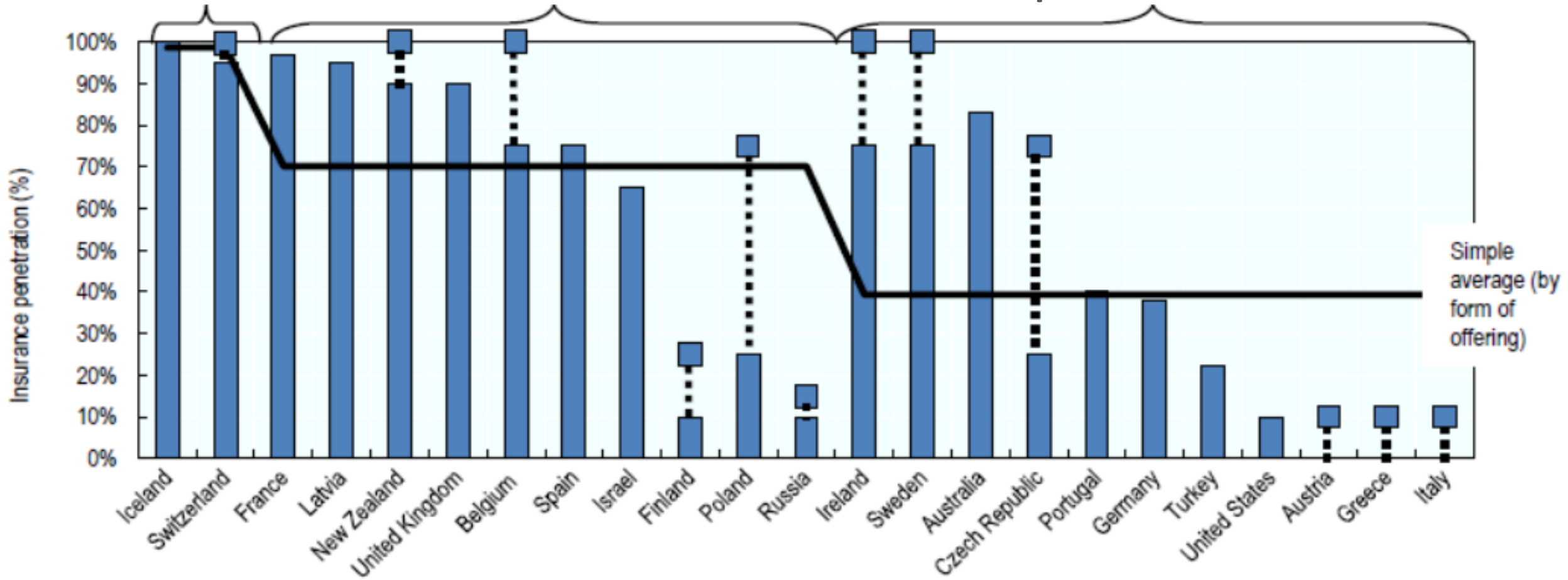
Source: SwissRE 2022

Flood insurance: penetration rate

Mandatory: 95%

Automatic Extension: 70%

Optional add-in: 35%



Flood insurance – only part of the solution

With climate change, environmental degradation, and more people concentrated in high-risk areas:

- impacts from natural catastrophes, incl floods will continue to grow, and
- protection gap will increase.

Insurance:

- can provide coverage for flood risk
- can steer developments away from high-risk areas
- can enable incentives for risk-reducing measures – such as green or hybrid solutions

Insurance gap has to be reduced: citizens and companies need to take more responsibility

Investments in protective measures such as green infrastructure **keeps assets insurable**

Catchment investments: Europe - public

- Public sector – transactions Europe :
EUR 5,6 billion per year (2014 – 2020)
Total: ca. EUR 35 - 40 billion
- Catchment investment by public sector 99% of spending (Europe)
- Funding from EU CAP's Pillar II
EU: EUR 3.5 bln / Countries: EUR 2.1 bln
- Main beneficiaries: private landowners and public land managers on 47 million ha (470,000 km²) (by 2020)
- Mainly through agri-environmental contracts for sustainable landscape and water management

	Total Value	Median Value	Total Area	Median Area
	mln EUR	mln EUR	m ha	ha
Public subsidies	5,668	77.6	47	417,020
User-driven investments	36.4	0.8	0.6	3,500
Total	5,704	-	47.6	-

Catchment investments: Europe – user driven

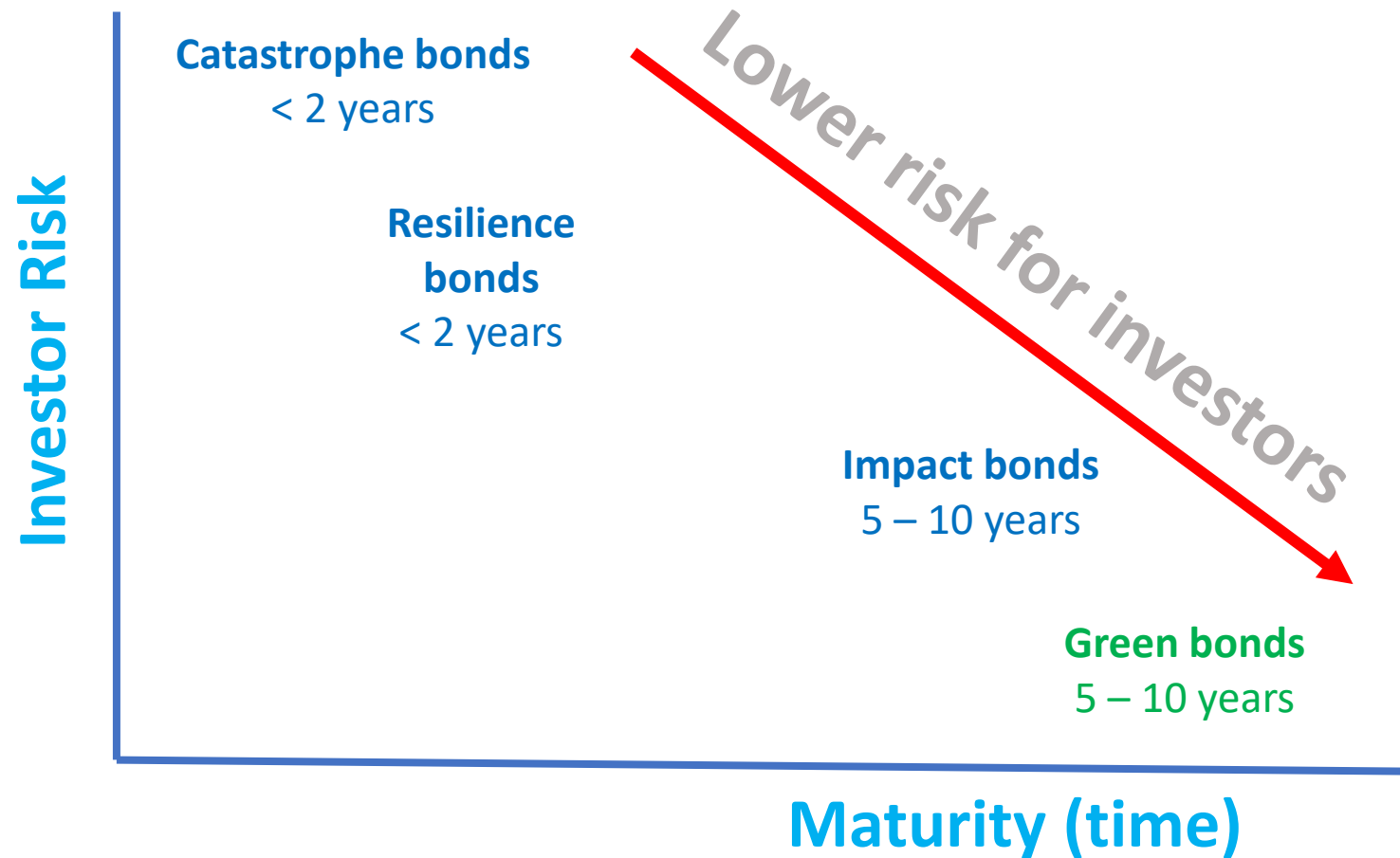
- User driven – transactions Europe :
EUR 36.4 million per year (2014 – 2020)
- Catchment investments by private sector strictly: **1.8 million/year** (< 0.1% of all transactions)
- Small in scale & motivated by specific local water concerns
- Direct contracts between landholders and water users (utilities), or through a collective action fund
- Private investment in catchments remaining tiny and unclear future for scaling-up

	Deals	Total Value	Transaction (Average per buyer)
	No.	mIn EUR	EUR
Private Sector	26	1.8	366,245
Public Sector	20	1.3	121,531
Water utility (public/private)	19	33.3	6,662,302
Total	65	36.4	560,000

Alternative 1: Bond Market

Catastrophe bonds < 2 years	<ul style="list-style-type: none">• No disaster: investors get money back + interest• If disaster: investors lose some or all of their money• = High yielding bonds (= junk bonds: below BBB- from S&P, same as start-up companies)
Resilience bonds < 2 years	<ul style="list-style-type: none">• Monetizes the reduction in insurance premium to pre-finance infrastructure that quantifiably reduces risk of damage.• Pooling of savings from reduced premiums and risk to principal (do not directly raise capital for infrastructure investment)
Impact bonds 5 – 10 years	<ul style="list-style-type: none">• Investors provide capital to deliver positive social/environmental outcomes• Repayment of principal and interest for achieving results (= lower flood damage & costs)
Green bonds 5 – 10 years	<ul style="list-style-type: none">• Repayment to investors with the “savings” as a result of using the financing for flood reduction measures• In practice: NO link between performance of measure and payment to bond-holders

Alternative 1: Bond Market



Info & Knowledge Needs

What is likelihood of a pay-out (a flood with serious damage)?

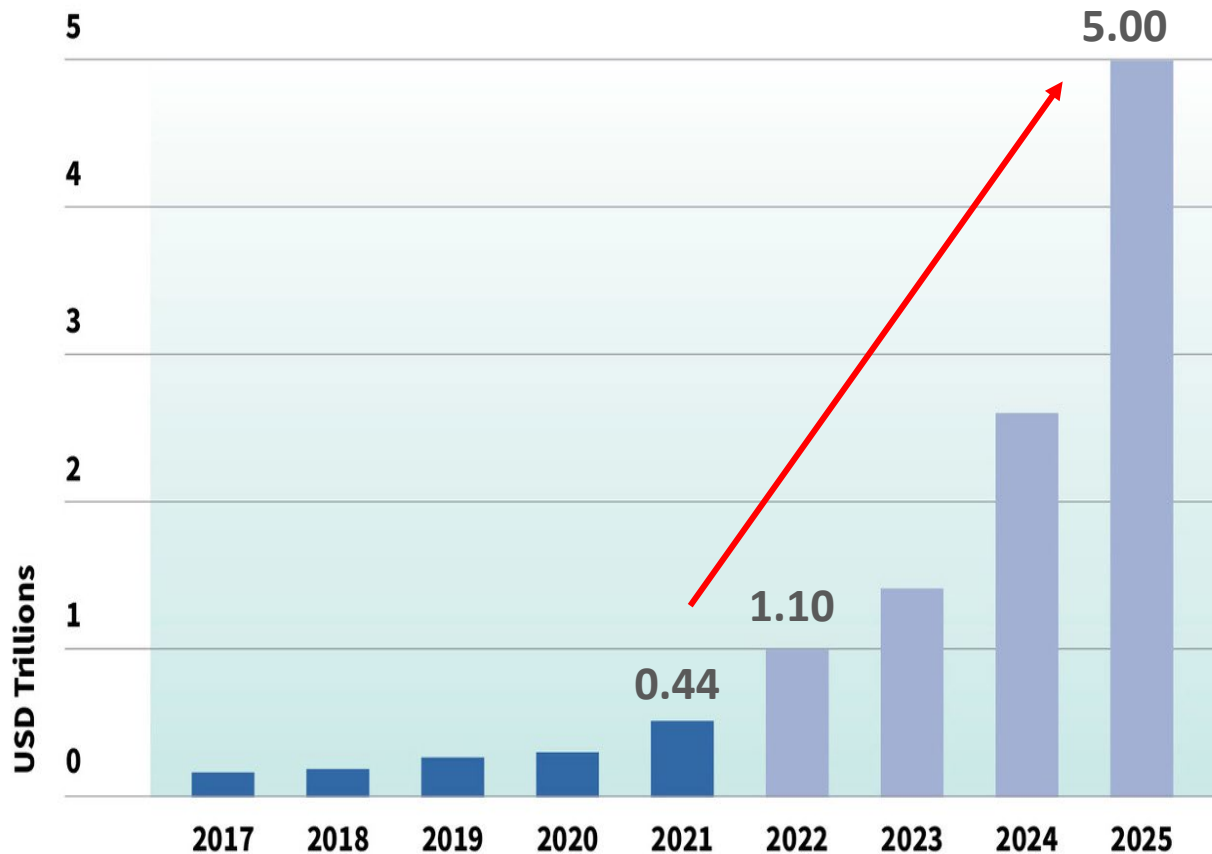
What is likelihood of infrastructure positive impact (reducing flood costs)?

What is likelihood of achieving results (high flood resilience)?

What is likelihood of achieving results (generating cash)?

Green Bonds: Market - global

Green Bond Issuance (USD Trillion)



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- **Global Green bond market will grow to EUR 5 trn (2025)** (source: Bloomberg & CBI)
- **Countries:** USA, Germany, China, France, UK, Spain, Netherlands, Italy, Sweden (etc)
- **In Europe:** uniform requirements for issuers of bonds 'European Green Bond' => establishes a registration system and supervisory framework for external reviewers
- **Info & knowledge:** Understanding the likelihood of achieving results (i.e. flood cost reduction) will be increasingly important

Green Bonds (climate bonds) : public & private

Public – sovereign green bonds

Issuer Name	Certified in 2021 (USD billion)
UK government	21.9
KfW (Germany)	13.6
Fannie Mae (US)	13.4
France government	12.9
Republic of Chile	1.2

Private

Issuer Name	Certified in 2021 (USD billion)
China Development Bank (China)	7.4
Société du Grand Paris (France)	5.8
ICBC (China)	4.2
Queensland Treasury Corp	2.2
ABN AMRO Bank NV (Netherlands)	2.2
DNB ASA (Norway)	1.8
Westpac (Australia)	1.2
FS Italiane (Italy)	1.2
Renew Power (India)	1.0

Example

2019

Dutch Government

Issued: USD 12.1 billion

Rating: AAA sovereign green bond

Average yield: 0.104%

Use: partly finance Dutch Delta Plan & flood infra investments

Source:
https://www.climatebonds.net/certification/netherlands_sovereign

<https://www.climatebonds.net/2022/01/500bn-green-issuance-2021-social-and-sustainable-acceleration-annual-green-1tn-sight-market>

Green Bonds (climate bonds): Sector use

Water 6% + Land 5% => Total 11% (historically)

2021

Green Bonds: EUR 440 bln

Land & Water (11%) = **EUR 48 billion per year**

2022

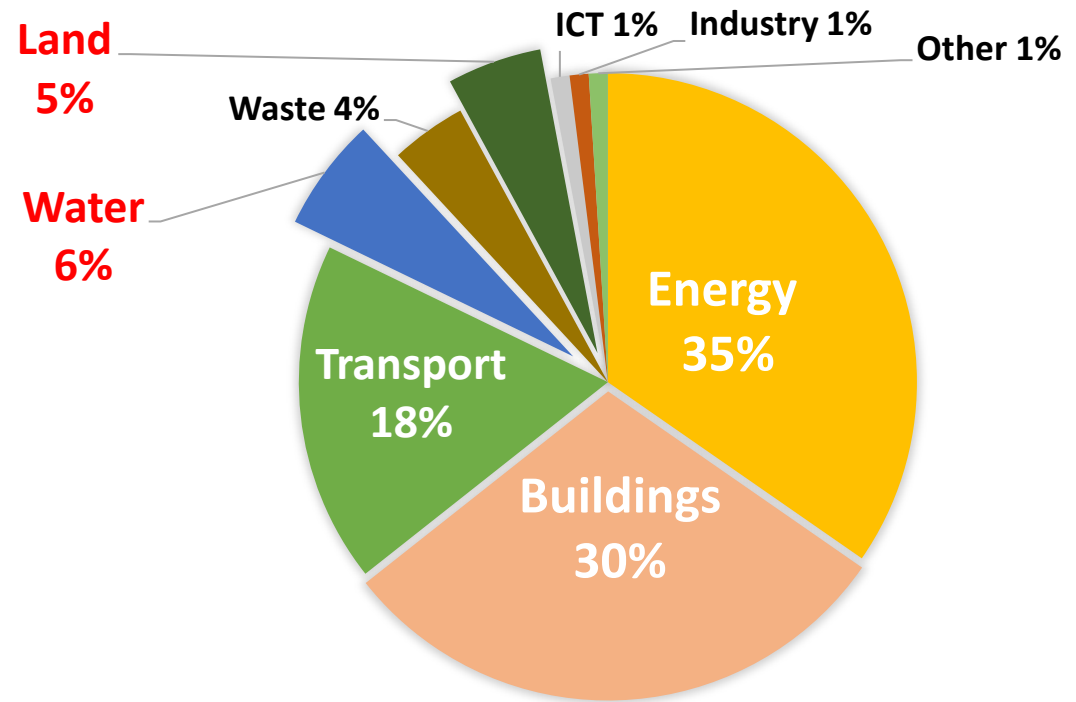
Green Bonds: EUR 1.1 trn

Land & Water (11%) = **EUR 121 billion per year**

2025

Green Bonds: EUR 5 trn

Land & Water (11%) = **EUR 550 billion per year**



Source: <https://www.climatebonds.net/2022/01/500bn-green-issuance-2021-social-and-sustainable-acceleration-annual-green-1tn-sight-market>

Can we invest this money wisely in Nature Based Solutions for flood management?

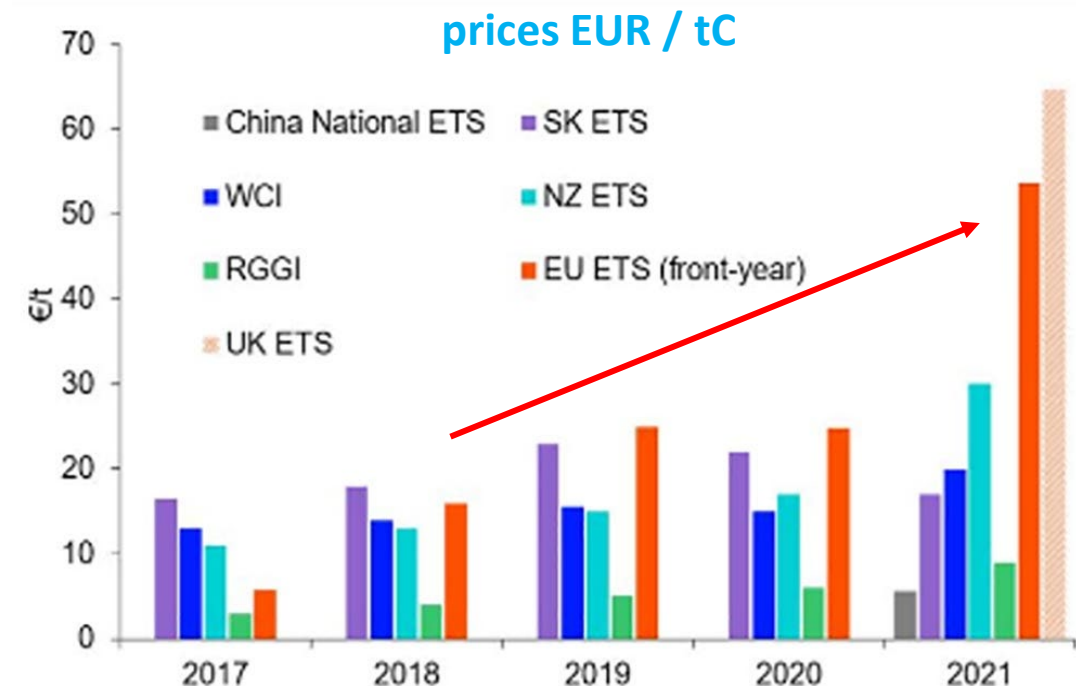
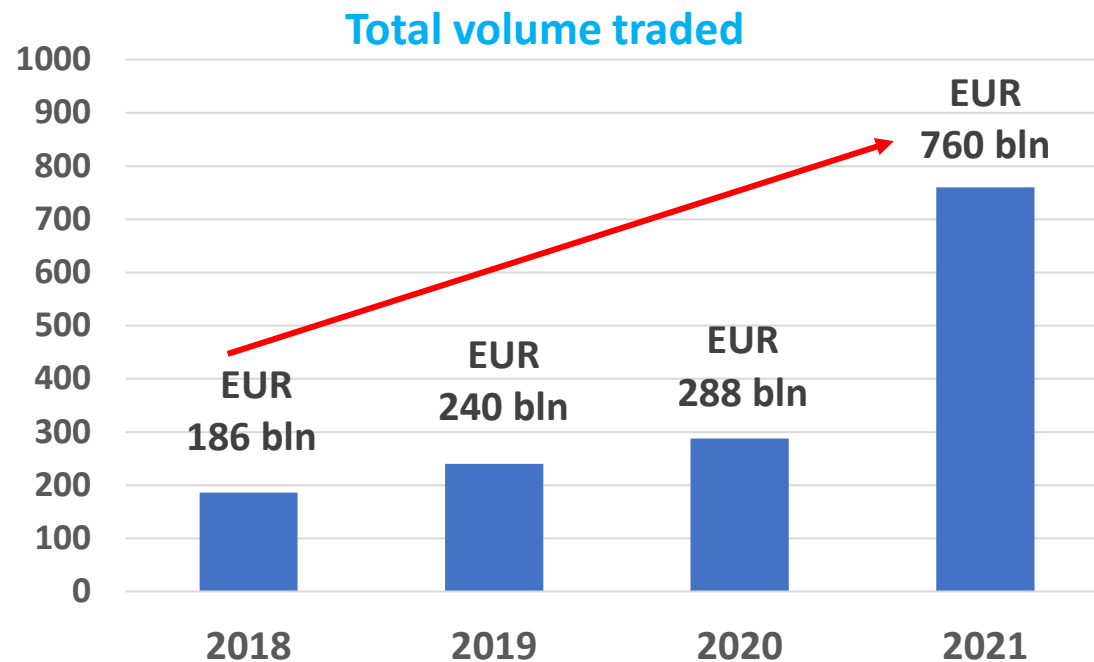
Alternative 2: Carbon Credits – regulated market

Volume: **EUR 760 bln / year**

Mechanism: “cap-and-trade” regulations (regional / national)(compliance-based)

Price: USD 15 – 90 / tonCO₂

Volume - Future: **4 trillion (2030)**



Source: <https://www.ecosystemmarketplace.com/publications/state-of-the-voluntary-carbon-markets-2021/>

Alternative 2: Carbon Credits – voluntary market

Volume: USD 748 mln / year

Mechanism: Businesses and individuals buy credits to offset their carbon emissions

Carbon price: USD 5 – 25 / tCO₂

Volume - Future: 40 – 180 billion (2030)



Source: <https://www.ecosystemmarketplace.com/publications/state-of-the-voluntary-carbon-markets-2021/>

Aviation Industry Carbon Offset	\$5.60
Nature Based Carbon Offset	\$10.73
Tech Based Carbon Offset	\$4.53

Carbon market: Land use - Europe

EU - New Targets: part of the near-future compliance market in Europe (EU)

- 2030: **310 million** tonnes of CO2 emissions removal by natural sinks
- 2030: **3 billion trees** planted

(Sources: EU Regulation on Land Use, Forestry and Agriculture)

Assumption 1: 2000 tree seedlings planted per ha => **15,000 km²** of new forests in Europe by 2030 (ca. 0.15% of Europe's surface area) (✓)

Assumption 2: needed for CO2 reduction target: **90% survival rate of tree seedlings (X)**

- 2035: **Climate neutrality** in the land use, forestry and agriculture sectors, incl. agricultural non-CO2 emissions, incl. fertiliser use and livestock.

Source https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3541

Is EU land-use/forestry/agriculture carbon-target a major opportunity for flood management finance?

Carbon market: Europe – land use / preliminary estimate

Tree as carbon crop

		Voluntary	Regulated	Future
Yield (EU-avg)	tonC/ha	3.05	3.05	3.05
Price	EUR/ton	11	86	250
Gross Revenue	EUR/ ha	201	1,574	4,575
Operating Costs (estimate)	EUR/ha	305	305	305
Net Revenue	EUR/ha	-104	1,269	4,270

Operating costs: excl. land purchase and fencing + low intensity management

Cereals

		2020-2021	2022
Yield (EU-avg)	ton/ha	5	5
Price	EUR/ton	314	505
Gross Revenue	EUR/ ha	1,565	2,525
Operating Costs (EU-avg)	EUR/ha	635	635
Net Revenue	EUR/ha	930	1,890

https://www.theglobaleconomy.com/World/wheat_price/#:~:text=Wheat%20price%3A%20For%20that%20commodity,metric%20ton%20in%20March%202022.
https://ec.europa.eu/info/news/income-eu-cereal-farms-increased-2017-2019-dec-20_en

Will carbon-forests start to compete with other agriculture products?

Can we invest carbon money wisely in NBS for flood management?



|Take-home Messages

- **Flood costs:** USD 25 – 107 bln / year to rise to USD 126 bln/year (Bizz impact USD 336 bln/year)
- **Insured losses:** emerging markets - 5% / advanced economies - 34%
- **Flood financing:** public finance dominates / private finance remains very small & localized

➤ Public finance will not be able to continue to finance managing flood risks and costs

➤ Private finance will need to be mobilized:

Alternative 1. Green Bond market : EUR 5 trn (EUR 37 – 550 bln / year for land & water)

Alternative 2. Carbon market : EUR 4 trn (regulated market) / 180 bln (voluntary) by 2030

How to invest this money wisely in NBS for flood management?

➤ **Solid Monitoring, Reporting and Verification:**

**Can we deliver this incl. sound catchment models,
monitoring ... digital twins ... etc?**

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