Society of Actuaries in Ireland

Flood Insurance Forum

8th May 2017

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Fit for the future?

The reform of flood insurance in Ireland: resolving the data controversy and supporting climate adaptation

Dr Swenja Surminski, GRI/LSE
8th May 2017, Dublin

Acknowledgements

This work is part of the 'Costing climate change impacts and adaptation in Ireland' research project conducted jointly by University College Cork (UCC) and the Grantham Research Institute on Climate Change and the Environment. The work is funded by Ireland's Environmental Protection Agency (EPA) under the EPA Research Programme 2014–2020.

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Centre for Climate Change Economics and Policy

Policy Paper

Has your home, business or community ever been flooded?

Overview

- Fit for the future? Reflections on cause and symptoms of the flood insurance problems in Ireland
- Transparency and climate adaptation instead of confusion and stop-gap measures: a new flood risk data platform
- What is the role of insurers in all of this?

Why focus on flooding?

- **Large potential costs:**
  - Europe: €4.2bn damages p.a.(2000-2012) rising to estimated €23.5bn by 2050 (Jongman et al. 2014).
  - In Ireland, potential costs demonstrated by recent extreme events e.g. floods in Cork in 2009, which caused direct damages estimated at €100m (indirect costs?).
- **Flooding identified as one of the main threats to Ireland from climate change (e.g. EPA 2012)**
- **Public intervention (adaptation) will be required – from spatial planning and development policies, to flood protection measures and insurance.**
- **Public finances are exposed to the costs of clean-up and recovery**
- **The interactions between stakeholders –government, residents, business – are perhaps most complex (relative to other types of climate risk)**
- **Flood risk also cuts across many sectors of the economy; from infrastructure, built environment, business, health and tourism and is especially relevant for the insurance industry.**

Why insurance?

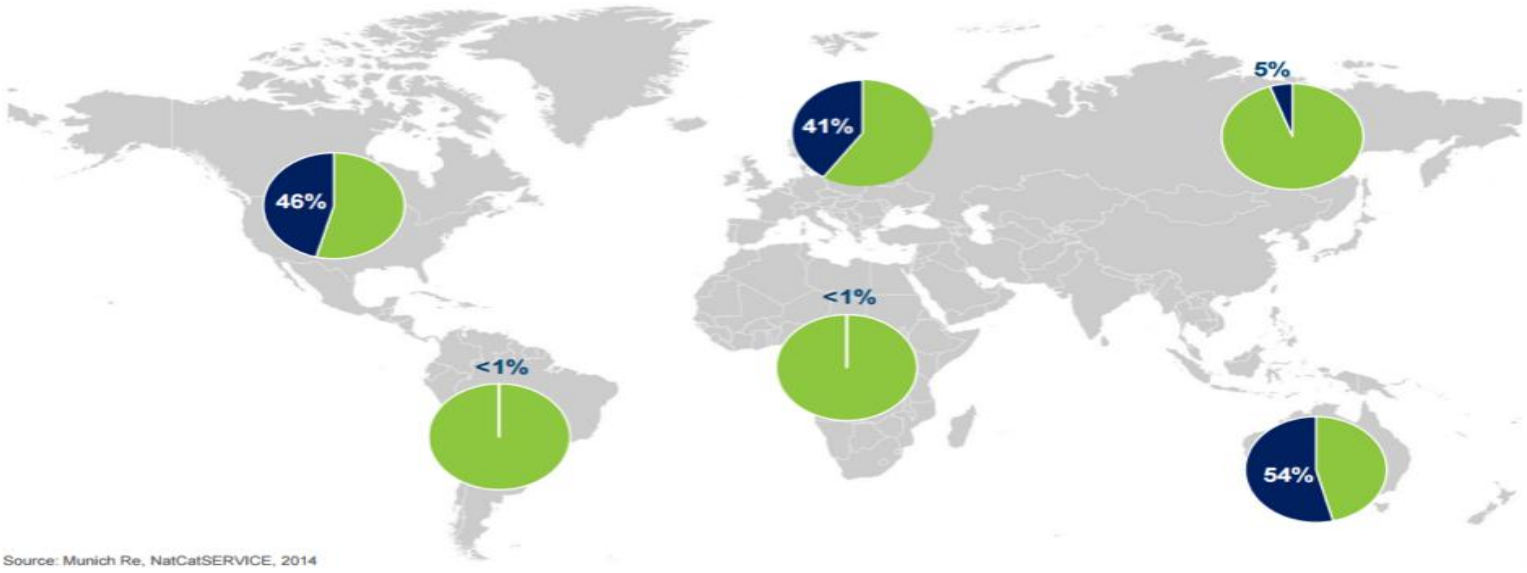
Insurance can play a significant role in our ability to recover from disasters through its risk transfer role:

- Spreading and smoothing of risks
- Faster and more efficient recovery
- Certainty about post-disaster support
- Reducing immediate welfare losses and consumption reduction
- Reducing need for budgetary changes

See for example Hallegatte (2012)

➢ **Can insurance also help us to prevent disasters and adapt to climate change through its influence on risk behavior?**

Protection gap – or resilience gap?



Continent	Overall losses US$ m
N. America	37,500
S. America	1,300
Europe	22,500
Africa	210
Asia	60,000
Australia/ Oceania	3,500

Source: Munich Re, NatCatSERVICE, 2014

Looking at the international context: different systems – same problems

- Flood losses are rising (for a variety of reasons).
- Different views: solidarity versus risk-based concept.
- Low insurance uptake in some countries …
- … and concerns about affordability and availability of flood insurance in other countries.
- Very little innovation – both from policy makers and industry.
- And very little reflection on future risks.

	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Italy	Netherlands	Norway	Poland	Portugal	Spain	Sweden	Switzerland	Turkey	United Kingdom
Storm	O	C[1]	O	O	O	C	O	S	N	O	P	O	O	P	O	C	O	O
Cyclone/hurricane	O	C[1]	N	O	O	C	O	S	N	O	P	N	O	P	O	C	O	O
Floods	O	C[1]	O	N	O	C	S	S	O	N	P	O	O	P	O	C	O	O
Hail	O	O	O	O	O	O	O	S	O	O	S	O	C[2]	O	O	C	S	O
Landslides	O	C[1]	O	O	O	C	S	S	O	S	P	O	O	S	O	C	O	O
Snow	O	O	O	O	O	O	S	S	O	O	N	O	N	O	O	C	O	O
Frost	O	O	O	O	N	O	O	S	O	O	O	O	N	O	O	O	N	O
Avalanche	O	N	O	N	O	C	S	N	O	N	P	O	N	O	O	C	N	N
Drought	O	N	S	N	N	C	N	N	N	N	N	N	N	S	O	N	N	N
Subsidence	O	C[0]	O	N	N	C	S	S	N	N	N	O	O	S	O	N	O	O
Earthquakes	N	C[1]	O			C	O	O	N	N	P	O	O	P	O	O	C	O
Forest fires	S	N	N	O	O	S	O	S	N	O	O	O	O	S	O	N	S	N
Volcanic eruption	N	N	O			C	O	O	N	N	P	O	O	P	O			N
Lightning	O	O	O		O	O	O	O	O	O	O			O	O		O	O

1 for simple retail risks only
2 only if hail results from a storm

Type of insurance cover

C = Compulsory cover by law
P = Obligatory pool
O = Optional cover
S = Cover offered but not widely taken
N = Non-existent

Rate of penetration of cover

= > 75%
= 25-75%
= 10-25%
= < 10%
= not known

Ireland???

Insurance coverage and penetration rate for different natural catastrophes across Europe (Source: CEA, 2009)

What kind of insurance?

Any flood insurance mechanism is subject to different expectations, ambitions and assumptions amongst government, insurers and the insureds.

Whether or not these are met depends on many factors, including design and operation of insurance, risk behavior and risk characteristics.

Evaluation I – flood insurance in Ireland today

Criteria	Findings
Role of public and private sectors	**Private sector underwrites, public sector funds flood risk management.** Memorandum of Understanding between insurers and government to govern the use of flood risk information, concerns about lack of transparency exist on both sides
Take-up rates/penetration	High (**98% of home owners, lower in some areas, 55% of renters**), regional differences unclear – insurance blight? Evidence of coverage gaps and increasingly unaffordable rates, ?, also not clear how much is insured (underinsurance?) SMEs ?
Technical risk cost modelling/risk communication	Customers **don't see technical price**, confusion about use of risk data – **geocoding** ? JBA model widely used, RMS is developing new model Insurers are also using public risk data prepared by the OPW, but face usage limitations when using it for under-writing.
Incentives for risk reduction	**No evidence** that risk reduction measures are recognised by insurers at the point of underwriting. No evidence of incentives for customers/gov.
Distribution of disaster costs	Flood insurance is the **main funding mechanism**, supplemented by ad-hoc government relief measures, anecdotal evidence exists of implicit cross-subsidisation between low- and high-risk properties.

Evaluation II – testing against principles for sustainable flood insurance

Principles

1. Insurance cover for flooding should be widely available.
2. Flood insurance premiums and excesses should reflect the risk of flood damage to the property insured, taking into account any resistance or resilience measures.
3. The provision of flood insurance should be equitable.
4. The model should not distort competition between insurance firms.
5. Any new model should be practical and deliverable.
6. Any new model should encourage the take up of flood insurance, especially by low-income households.
7. Where economically viable, affordable and technically possible, investment in flood risk management activity, including resilience and other measures to reduce flood risk, should be encouraged. This includes, but is not limited to, direct Government investment.
8. Any new model should be sustainable in the long run, affordable to the public purse and offer value for money to the taxpayer.

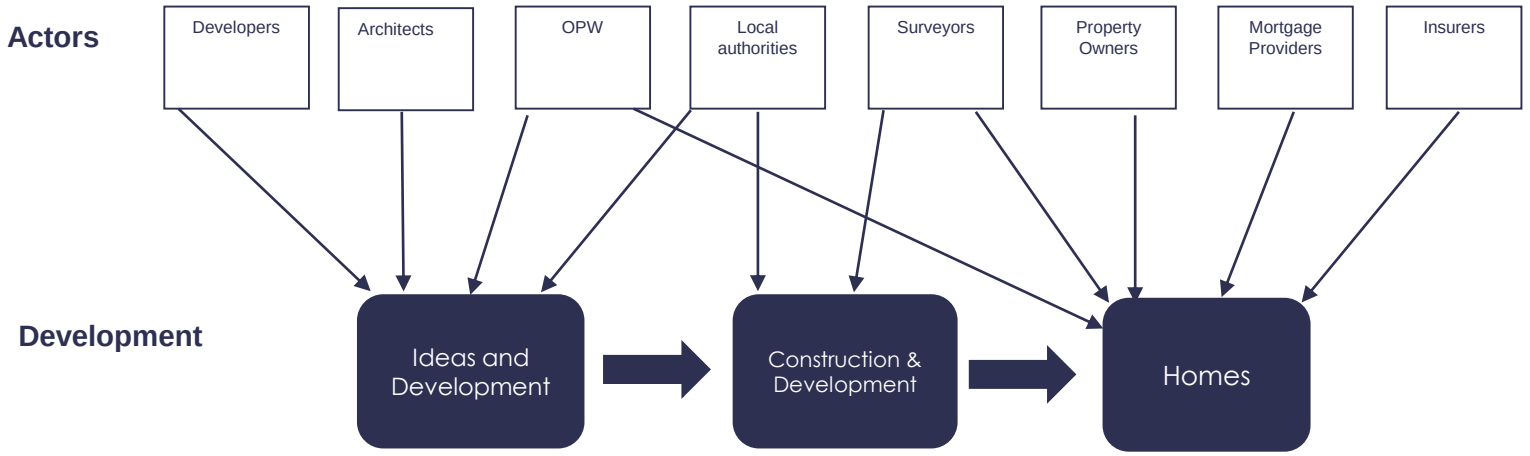
Source: Defra (2011) 'Principles for flood insurance'

Verdict for flood insurance in Ireland
1. Available 👍 – but concerns about lack of access for some 👎
2. Risk reflective 👍–but geocoding?
3. Equitable ? – concerns about geocoding 👎
4. No competition distortion 👍
5. Practical 👍
6. Encourage take –up ?
7. No risk reduction incentives 👎
8. Sustainable and VFM? 👎- unless reformed

Data sharing as an important next step?

Approach to risk assessment and data-sharing	International Examples
Sharing mapping data	**Austria**: HORA risk zoning and mapping model for floods **Germany**: 'ZÜRS')/ ZÜRS Public, is available on the internet.
Sharing flood risk management information	**Australia**: ICA Property Resilience and Exposure Program (PREP), National Flood Information Database, which is owned and operated by the insurance industry. **Denmark**: local authorities and the Association of Danish Insurers are developing a better understanding of how certain risk reduction measures can impact on insurance provision and terms, including price. **France**: *Observatoire National des Risques Naturels*
Sharing claims data	**Norway**, municipalities are engaging with the insurance industry to create data platforms, which can be used for public planning decisions. The Norwegian Natural Perils Pools has developed ClimRes, a map-based online interface to the data on insurance compensation payments.
Limited data-sharing	In the **United States**, FEMA is primarily responsible for data sharing and risk assessment under the National Flood Insurance Program (NFIP). It does so through its Risk MAP programme. This involves flood insurance studies of areas identified as being at particular risk, which are then fed into flood insurance rate maps. lLimited information on how insurers specifically contribute to this process. Furthermore, FEMA will not share parcel-level claims data.

Important to consider all those who make decisions that influence flood risk levels



A: Create a common understanding of current and future flood risk, based on hazard, exposure and vulnerability data

- **For example:**
- Historic flooding; future projections, including climate change
- Asset (public- and private-owned) information including building stock (such as new developments, planning permission)
- Infrastructure map – indicating structural types, location, business usage
- Insurance penetration for homes and businesses, including historic payouts by location
- Public support schemes for flood losses, including historic payouts by location

B: Identify and integrate past, current and planned efforts to manage flood risk

- **For example:**
- National, local and property-level information about risk management efforts – considering timing of completion and maintenance
- Information about cost-effectiveness and risk-reduction impact of protection measures
- Funding levels and streams (who pays)
- Beneficiaries (who benefits)

C: Design platform to support different types of decision-making

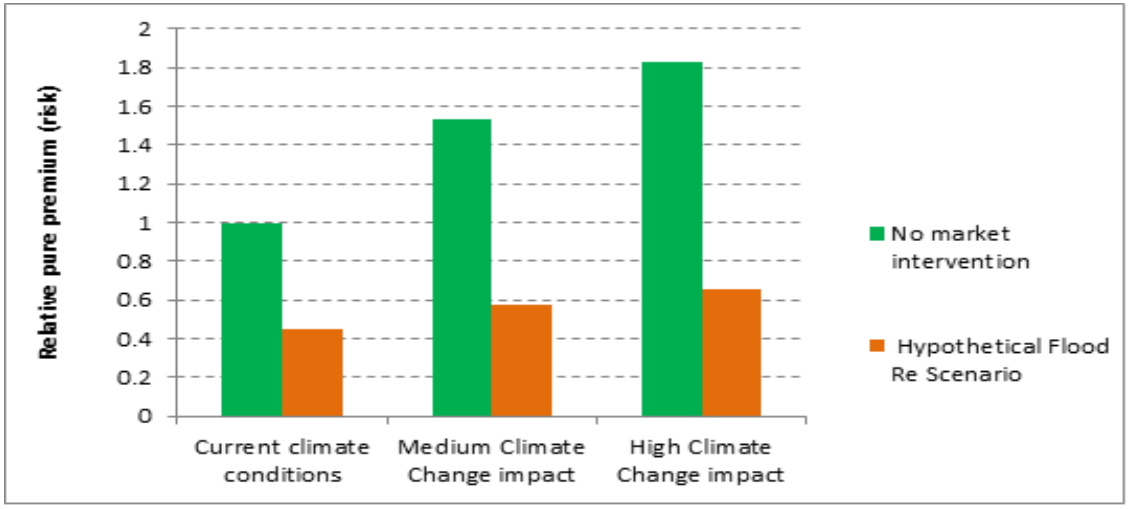
- **For example:**
- Address commercial sensitivity and data protection
- Find common format and tools to translate data from different stakeholders
- Ensure visibility and ease of access
- Promote, and possibly require use, of platform, for example in local planning process
- Avoid timing problems (completion of defences, new developments and updates to data/maps)
- Visualise information and link to other existing tools

What role for insurance?

"We have to create a world in which it is unacceptable not to have planned in advance." (from Lloyds of London, 2017)

"The insurance industry has a role to play in supporting society's climate resilience – by doing this well it can enhance insurability, and protect its own assets." (ClimateWise, 2016)

Impact of rising risk on affordability of insurance



Source: adapted from Jenkins et al., 2016, in Prudential Regulation Authority and Bank of England: The impact of climate change on the UK insurance sector (2015).

What role for insurance?

Does the insurance system ...

1. increase risk awareness and knowledge of risks through flood risk information provision?
2. build capacity for risk reduction through advice on risk reduction measures?
3. provide financial incentives for policyholders toward mitigation investment?
4. promote resilient reinstatement techniques after a flood loss?
5. incentivize public flood risk management policy?
6. require compulsory risk reduction?
7. discourage development in flood-risk areas?

Risk transfer, risk management and investment

The benefits of resilience to insurers

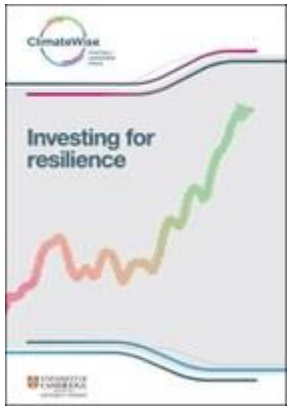
Investing in resilience can provide the following general benefits to insurers (and other investors):

- Reduces their exposure to climate risks;
- Helps to further diversify their investment portfolios;
- Helps manage the transition risks of moving to a low carbon economy (as resilient assets are less likely to be impaired);
- Supports brand and reputation, thereby reducing the risk of hostile investor activism;
- Strengthens the corporate social responsibility argument by supporting the image of a future-oriented and socially engaged company;
- Investing in projects that increase resilience can help to protect or enhance the value of other, related assets, in the same way that investing in infrastructure improvements (like London's CrossRail project) may benefit the owners of neighbouring land or property;
- Fostering a culture of resilience encourages healthier economies, thereby benefitting the overall business environment and supporting growth; and
- Communicating the value of resilience encourages other stakeholders to embrace it, thereby contributing to a mutually supportive societal trend.

It can also provide benefits that are specific to insurers:

- Helps to avoid unintended concentrations of risk, by minimising exposure to assets subject to the same risks as their underwriting liabilities;
- Reduces the threat posed by the general perception from outside the industry that insurers are natural investors in resilience, yet fail to deliver; and
- Fostering a culture of resilience helps to prevent risks from becoming too severe to insure, which would weaken premium income and exacerbate the protection gap.

Source: Investing for Resilience, ClimateWise 2016

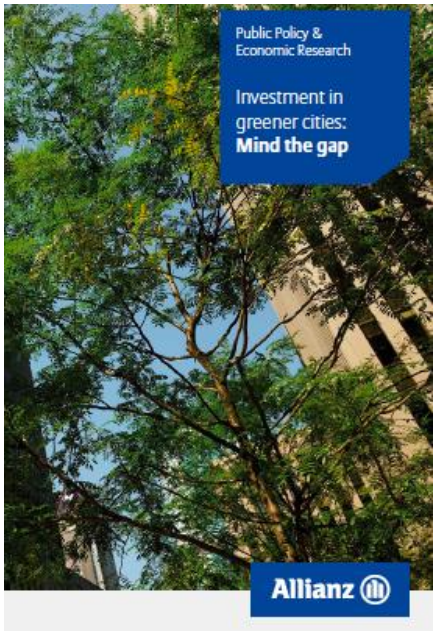


Resilient infrastructure - a signifcant opportunity for the industry

Table 2: Infrastructure investment needs

How much?	For what?	When?	Source
Over USD 40 trillion	Global infrastructure investment most of which will be spent on urban infrastructure development and maintenance	2012 - 2037	KPMG (2012)
Around USD 41 trillion	Amount that cities worldwide will need to invest in expanding their water, power and transportation systems	2005 - 2030	Booz&Company (2007), quoted in Siemens (2010a)
Around USD 50 trillion	Global infrastructure requirements	2007 - 2030	OECD 2006/07 estimates, quoted in OECD (2013c)
USD 57 trillion	Global infrastructure investment needed (even without green targets and development goals)	2013 - 2030	McKinsey (2013)

Source: 'Mind the Gap, Allianz 2015



In conclusion

- Flood risk is Ireland's most costly form of natural disaster, and future projections don't look good.
- Flood insurance in Ireland is not fit for the future but remains a key tool for coping with risk.
- The underlying risks must be addressed in order to improve the current and future availability and affordability of flood insurance.
- Improvements in access to and use of high-quality data and transparency about risk are needed.
- A fundamental review of the collection and sharing of flood risk data is required, going **far beyond government and insurance industry.**
- A data platform would aid a collaborative approach to understanding flood risk and resilience.

Policy Paper

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Climate - Water - Sustainability
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Thank you for your attention.

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Met Éireann – UK Met Office

31st January 2017

Flood Forecasting and Warning Service - Plans

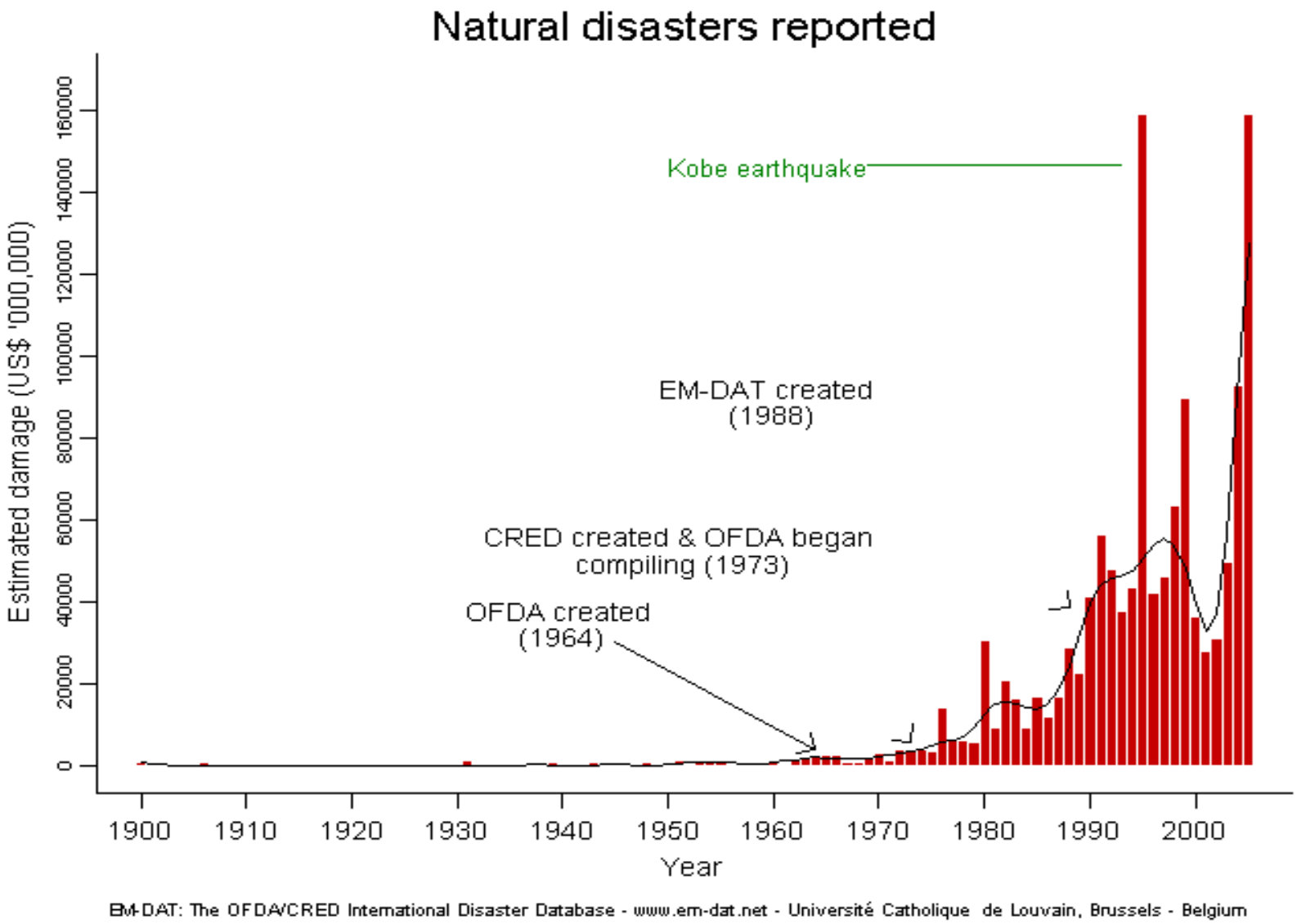
Local Councillor Kevin Moran helps with flood defences in Athlone.
Photograph: Brian Lawless/PA Wire

Presentation Outline

A look at the international context

How we got here – steps to an Irish Flood Forecast and Warnings service

Current Plans


Natural disasters reported
Estimated damage (US$ '000,000)
0
20000
40000
60000
80000
100000
120000
140000
160000
Kobe earthquake
EM-DAT created
(1988)
CRED created & OFDA began
compiling (1973)
OFDA created
(1964)
1900
1910
1920
1930
1940
1950
1960
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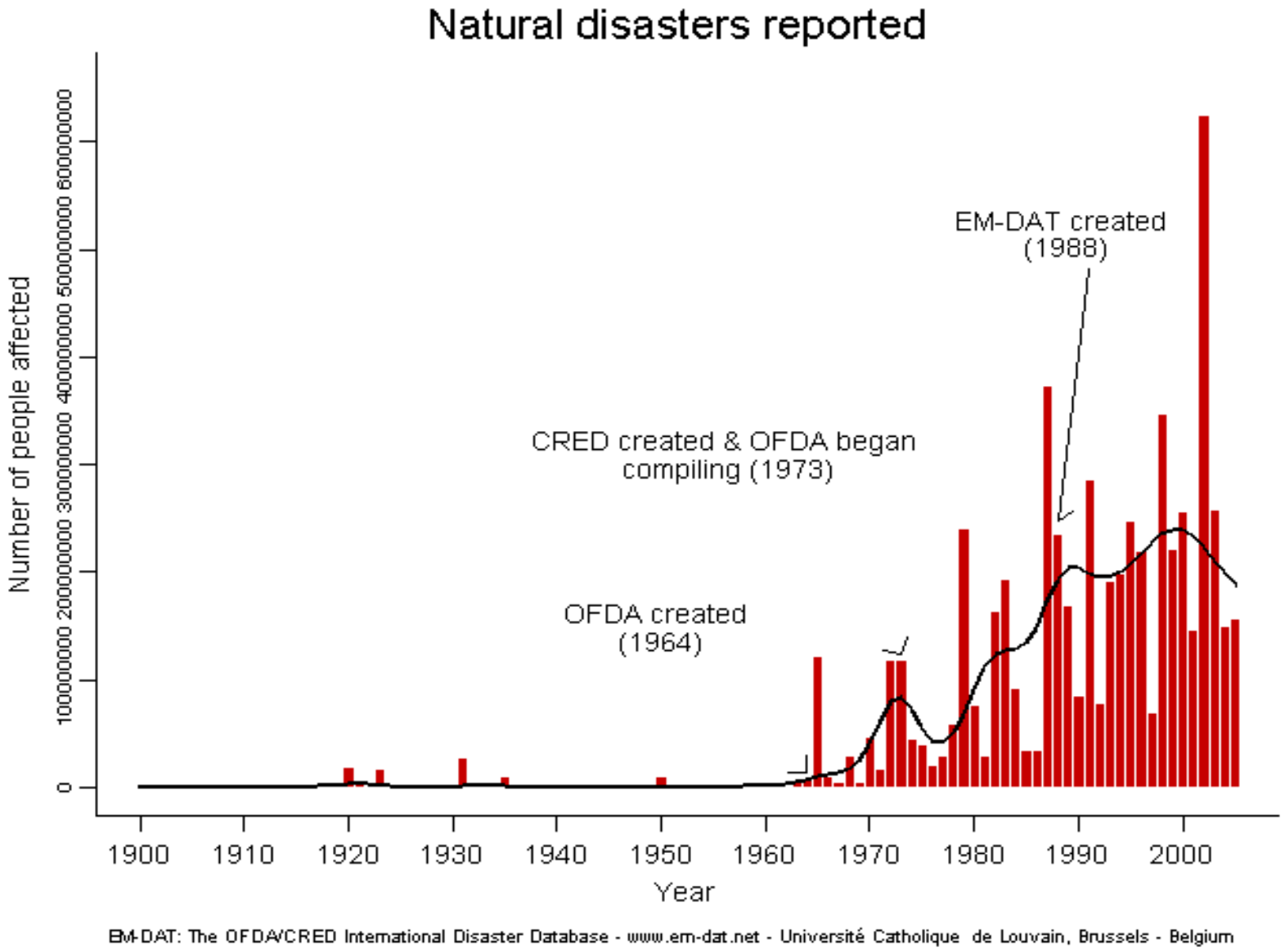
1980
1990
2000
Year
EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain, Brussels - Belgium


Natural disasters reported
Number of people affected
0
100000000
200000000
300000000
400000000
500000000
600000000
EM-DAT created
(1988)
CRED created & OFDA began
compiling (1973)
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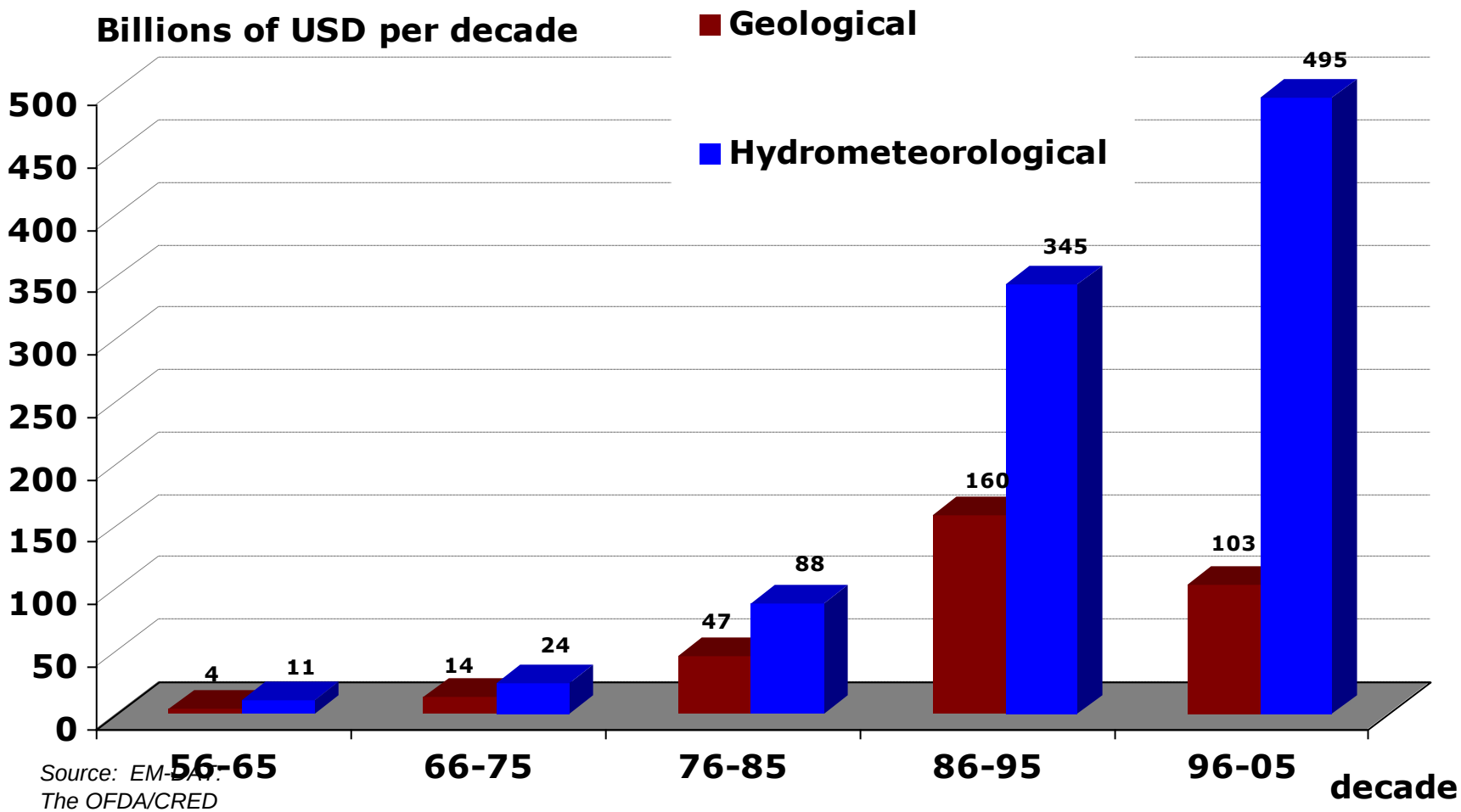
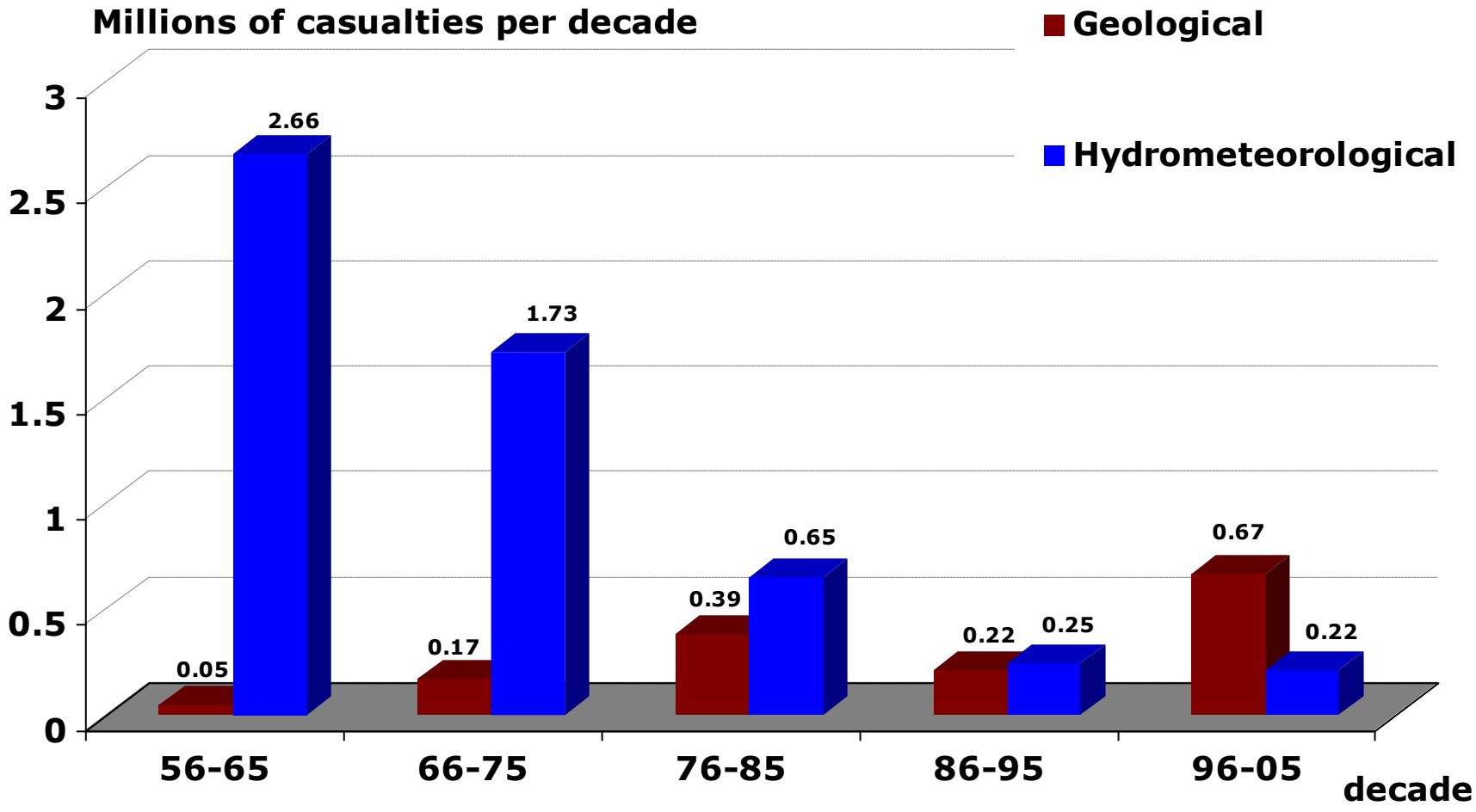
Year
EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain, Brussels - Belgium

Economic Losses going Up….



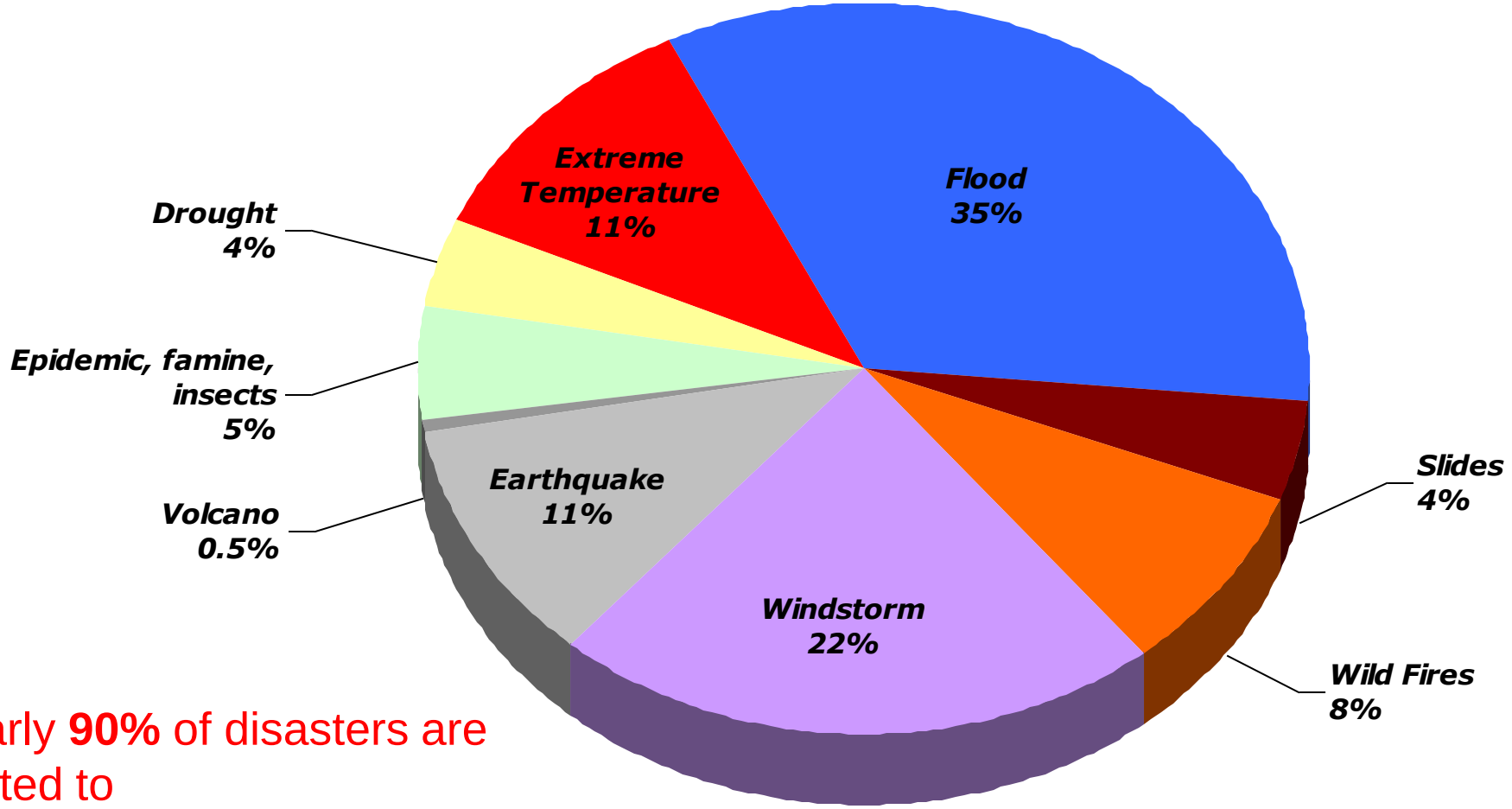
Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de

While Casualties are Decreasing



Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

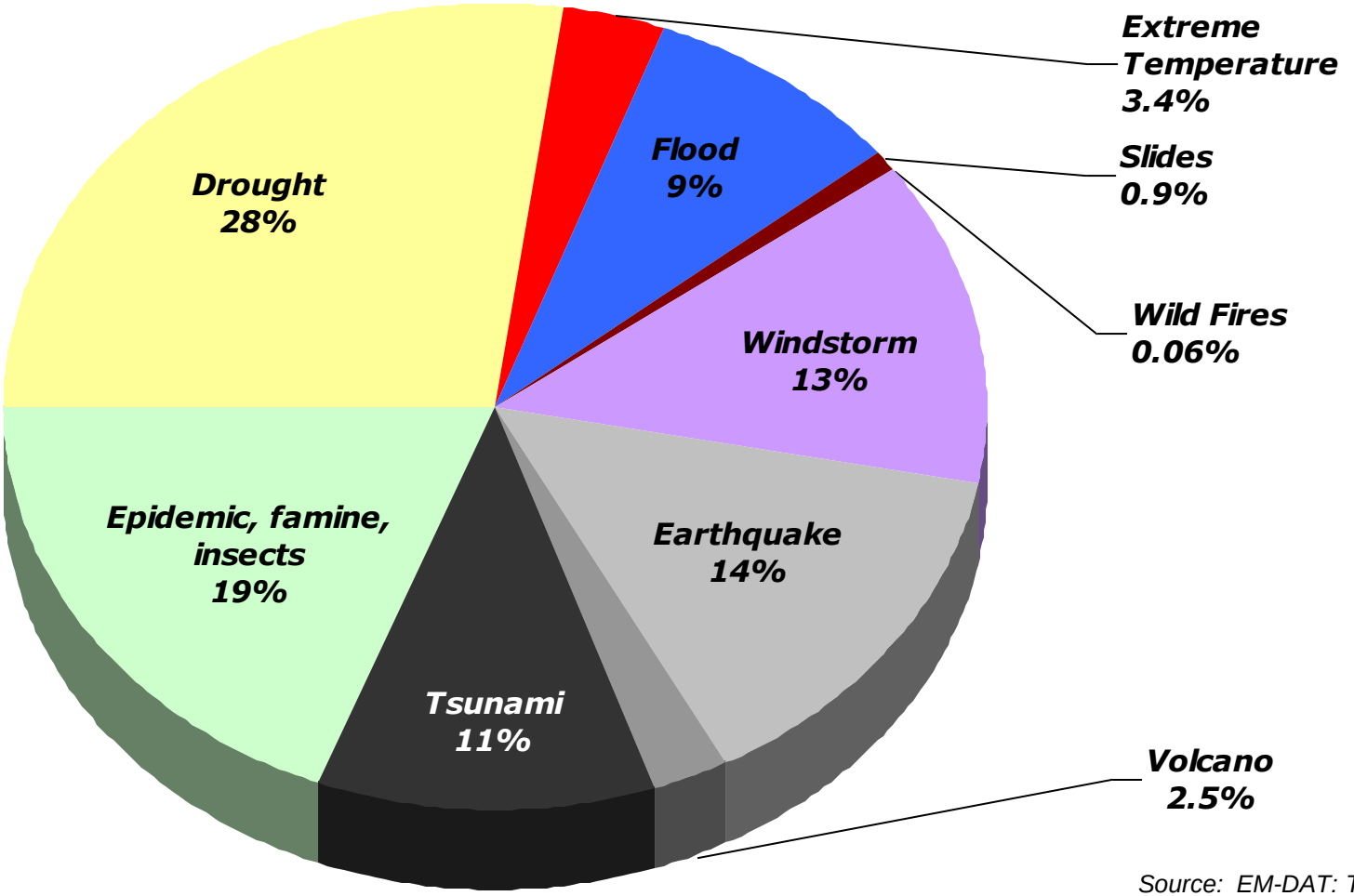
Number of Disasters (1980-2005)



Nearly **90%** of disasters are related to hydro-meteorological hazards.

Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgiumc

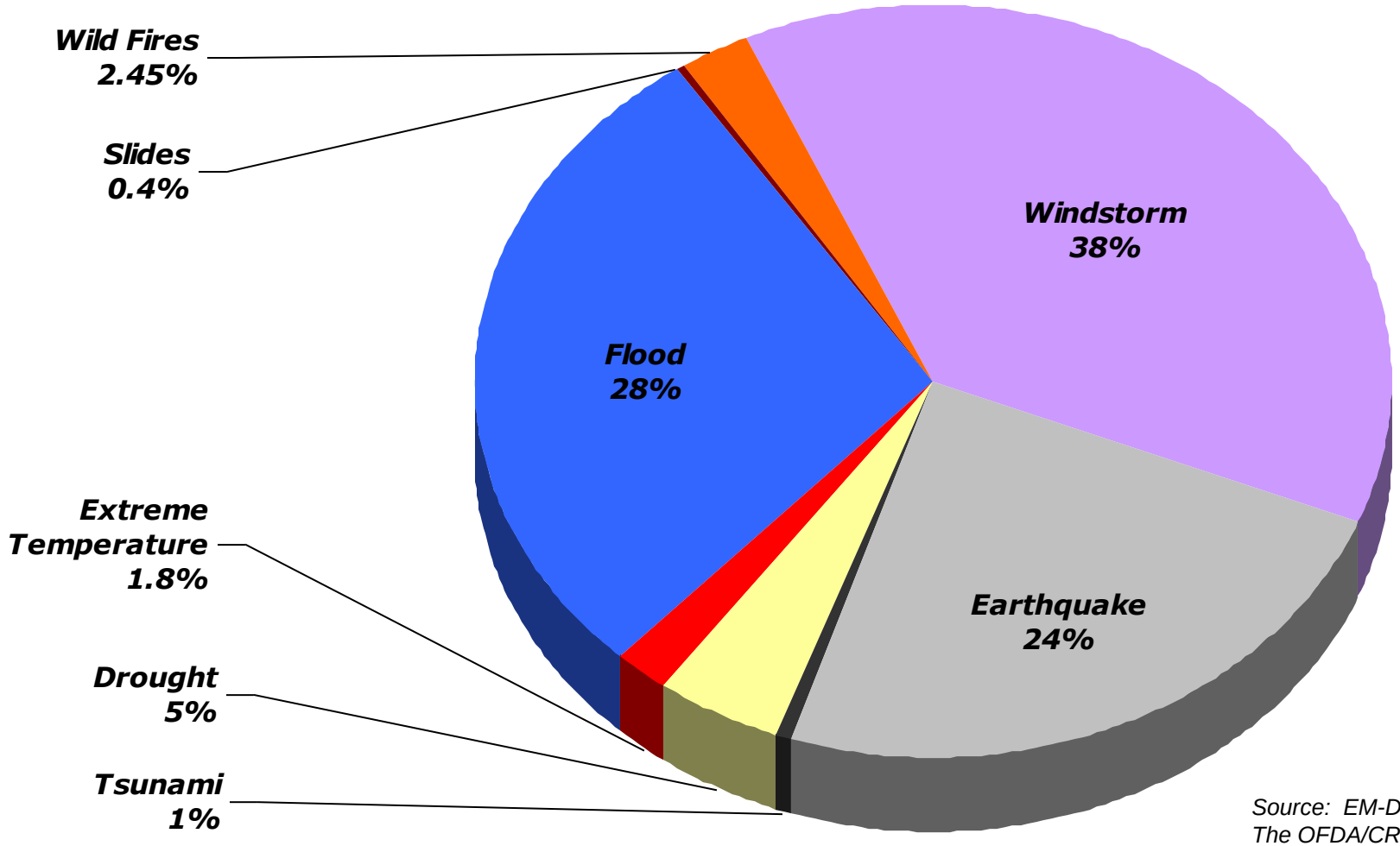
Loss of Human Life (1980-2005)



Nearly **70%** of loss of life are related to hydro-meteorological hazards.

Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

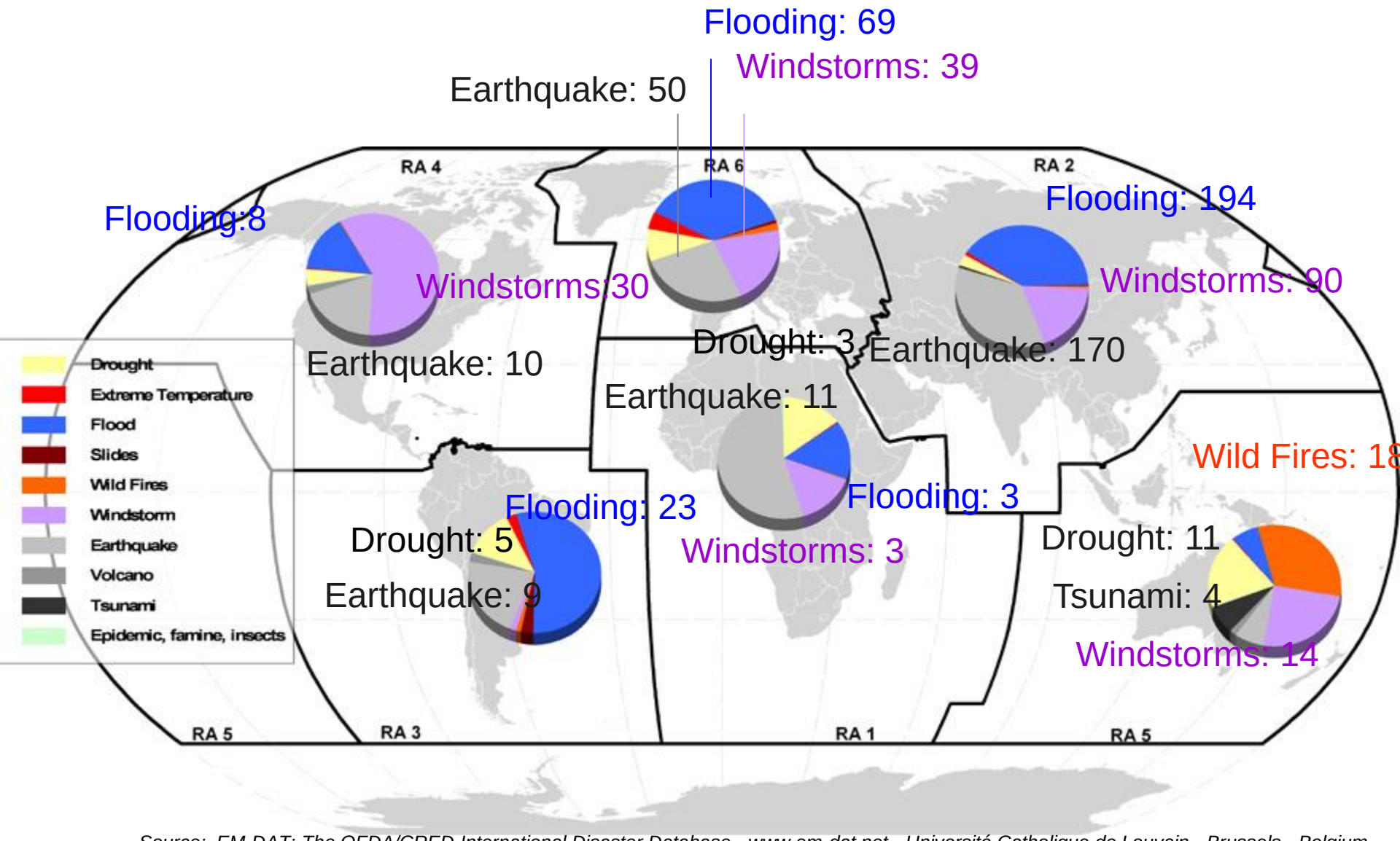
Economic Losses (1980-2005)



Nearly **75%** of economic losses are related to hydro-meteorological hazards.

Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

Regional Distribution of Economic Losses, 1980-2005



Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

In the beginning…

- Severe flooding in November 2002

In the beginning…

In the beginning…

- Severe flooding in November 2002
  - Flood Policy Review Group (“Parlon Report”)
  - Office of Public Works (OPW) designated as the “lead agency for management of flood risk”
  - Commencement of the “Catchment Flood Risk Assessment and Management” process

Following on…

- Severe flooding in November 2009

Following on…

Following on…

- Severe flooding in November 2009
  - Strategic Review of Options for Flood Forecasting and Flood Warning in Ireland (“JBA Report”)
  - Detailed framework for setting up a flood forecasting service
- High Court case following this flooding, with the ESB (dam operators) as defendants – still under appeal…

Following on…

- Severe flooding in December 2015
- Storms Desmond, Eva and Frank all impacted during that month
- Flooding persisted until mid-to-late January

Following on…

Following on…

- Severe flooding in December 2015
  - Government decision (January 2016) to proceed with Phase One of the "JBA Report" and establish a National Flood Forecast and Warnings Service with an operational unit of 11 staff in Met Eireann
  - Steering Group established with representation from *Met Eireann*, the *OPW*, the *Dept. of Housing, Planning, Community and Local Government*, the *Dept. of Agriculture, Food and the Marine*, and the *Local Authorities*.

Strategic Review of Flood Forecasting and Warning Options

Phased Implementation (over 16+ years)

- **Stage 1 aim (year 1 to 5):** establish interim operational arrangements, launch national strategy and regional/catchment warning service, deliver and implement a national flood alerts service, develop and implement a regional/catchment flood forecasting and warning service (1 region only)
- **Stage 2 aim (year 5 to 10):** establish operational arrangements, improve national flood alerts service, develop and implement further regional/catchment flood forecasting and warning service, develop and implement local flood forecasting and warning service for priority sites
- **Stage 3 aim (year 11 to 16+):** establish operational arrangements, develop and implement further regional/catchment flood forecasting and warning service, further develop and extend local flood forecasting and warning service for priority sites

National Flood Forecasting and Warning Service

- **Stage 1 aim (year 1 to 5):**
  - Establish interim operational arrangements,
  - Launch national strategy
  - Regional/catchment warning service,
  - Deliver and implement a national flood alerts service,
  - Develop and implement a regional/catchment flood forecasting and warning service (1 region only)

National Flood Forecasting and Warning Service

Features of the NFFWS – Stage 1

- Deals with flood forecasting from **fluvial and coastal** sources
- Involves issuing of **flood forecasts and general alerts** at both national and larger catchment scales
- Given the complexities involved in establishing, designing, developing and testing the new service, anticipated to take at least **5 years before being fully operational**

Current Plans

Next Steps

- Draft job specifications for Met Éireann Flood Forecasting Centre staff
- Identify internal organisation and accommodation options in Met Éireann HQ for the new staff
- Identify suitable training for the new staff, some of whom will be “hydro-meteorologists” which is a new discipline in Ireland
- Research suitable models and other software for the new operational centre

Met Éireann – UK Met Office

31st January 2017

Flood Forecasting and Warning Service - Plans

Local Councillor Kevin Moran helps with flood defences in Athlone.
Photograph: Brian Lawless/PA Wire

Society of Actuaries in Ireland

Flood Insurance Forum

8th May 2017

Sinéad Duffy, Met Éireann

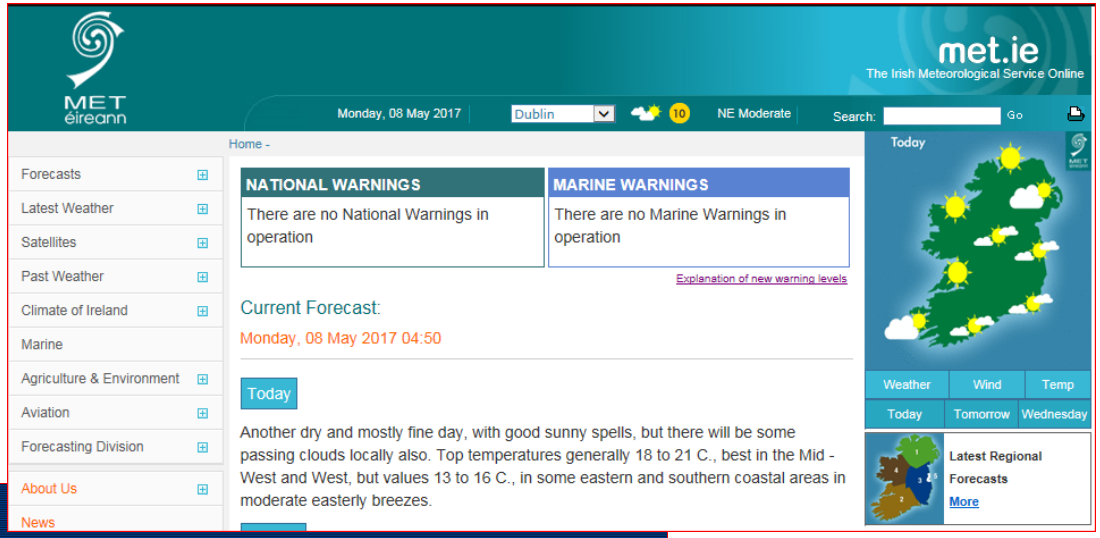
National Flood Forecasting and Warning Service

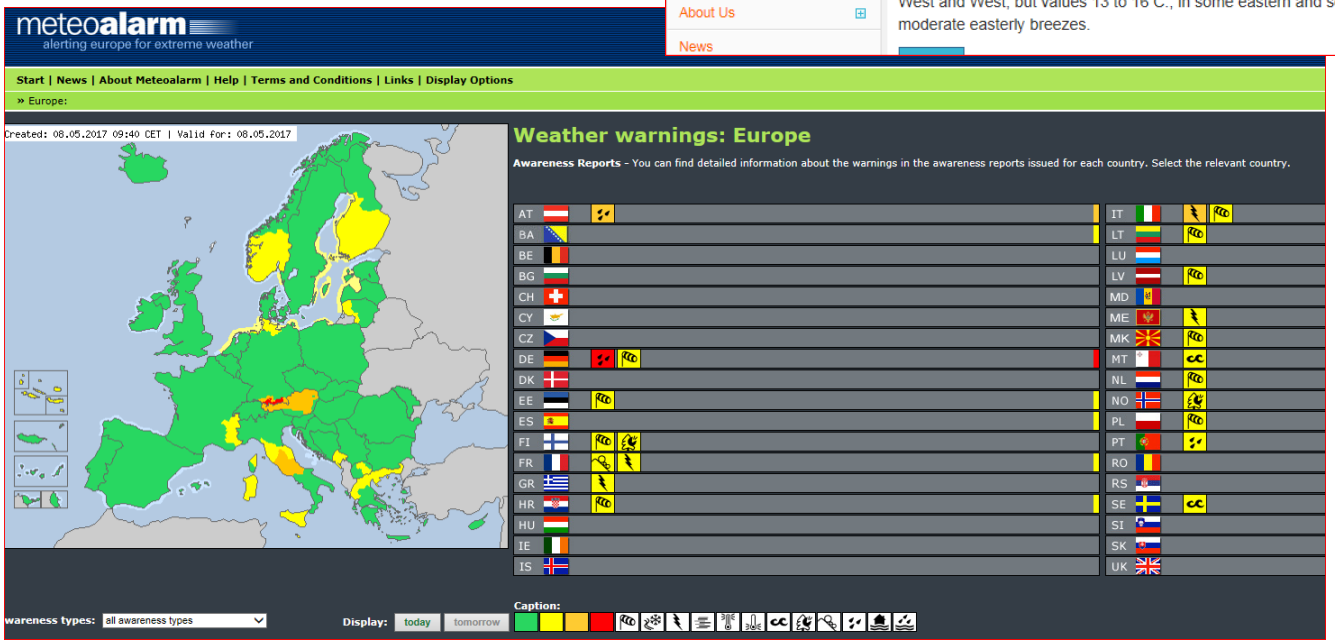
Presentation Outline

- **Current arrangements**
- **National-scale Flood Forecast Plan**
- **Catchment-scale Flood Forecasts Plan**
- **Communication**

Current Arrangements

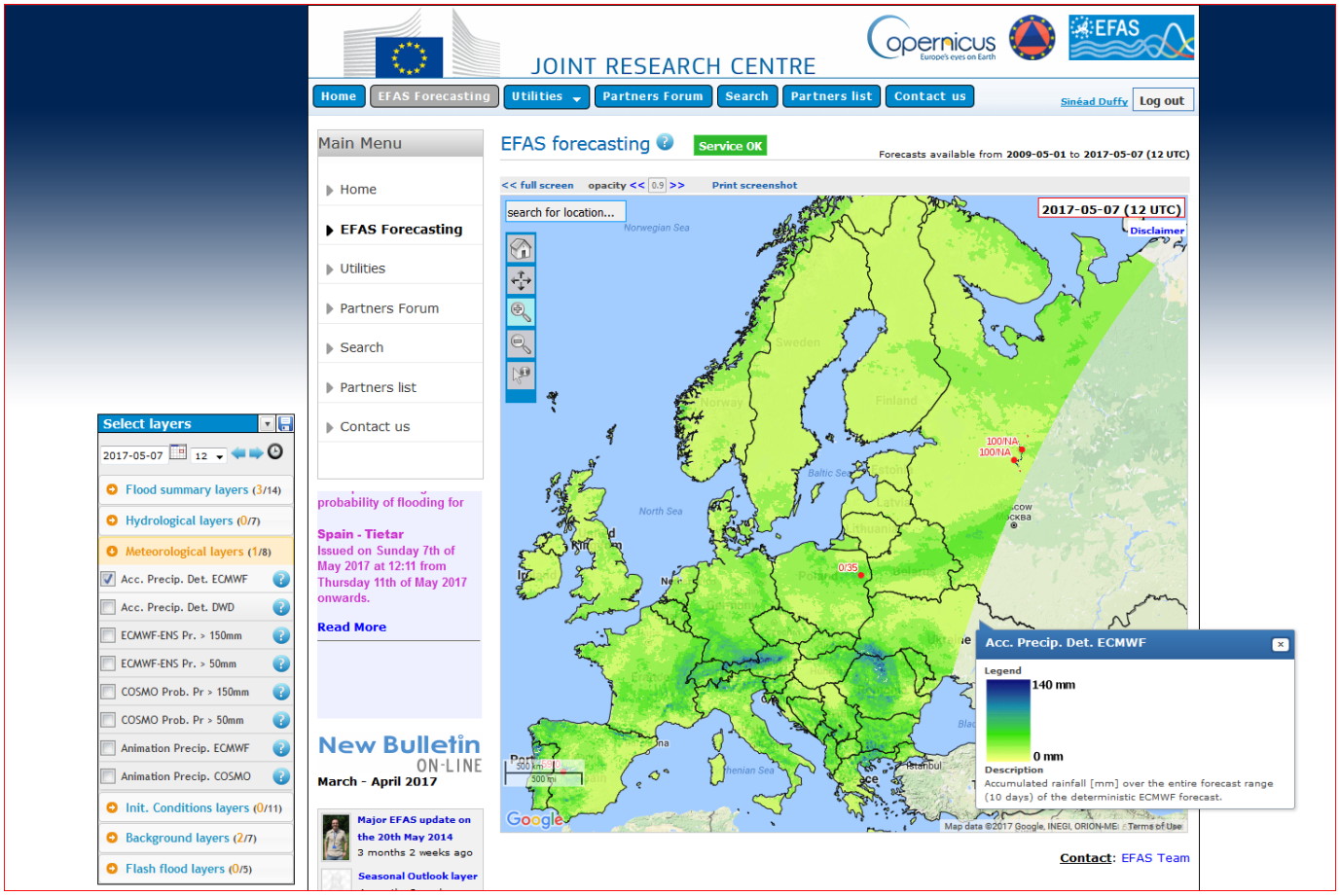
Weather Warnings





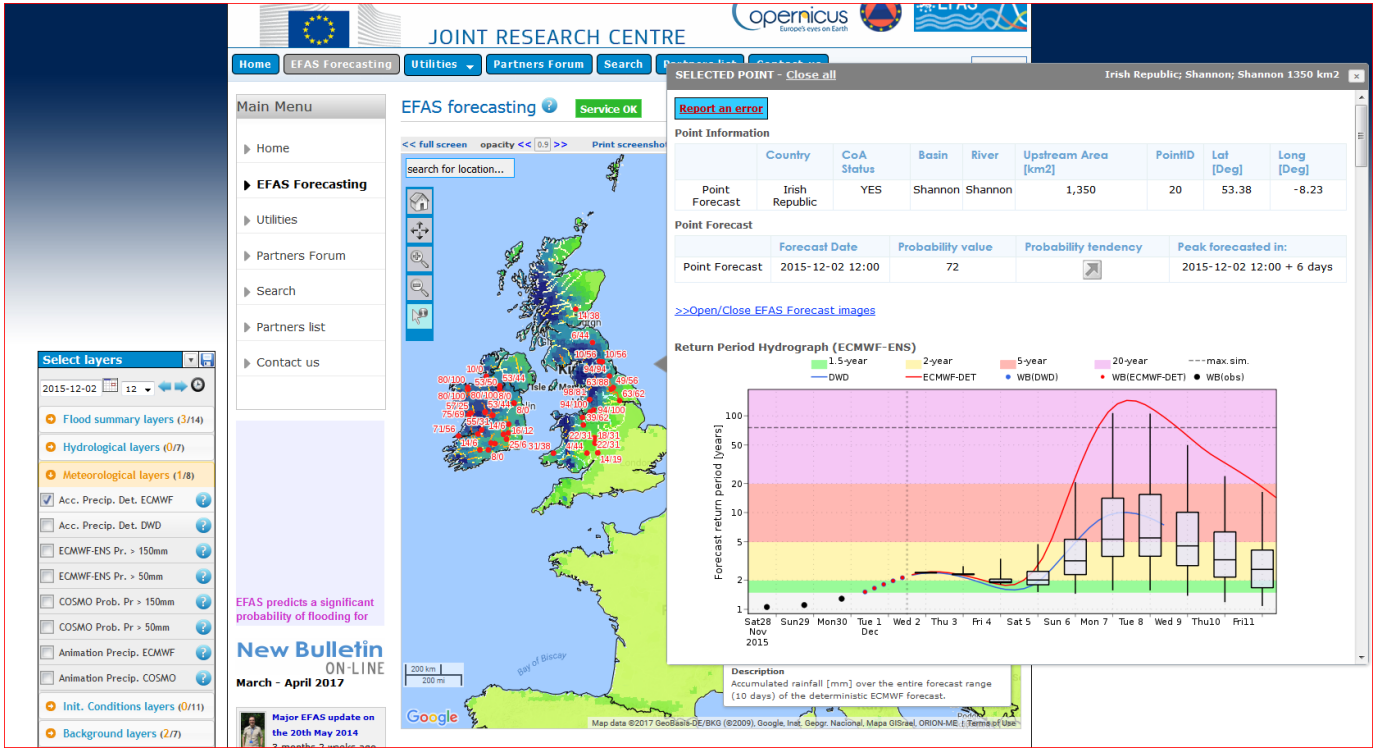
Current Arrangements

- European Flood Awareness System



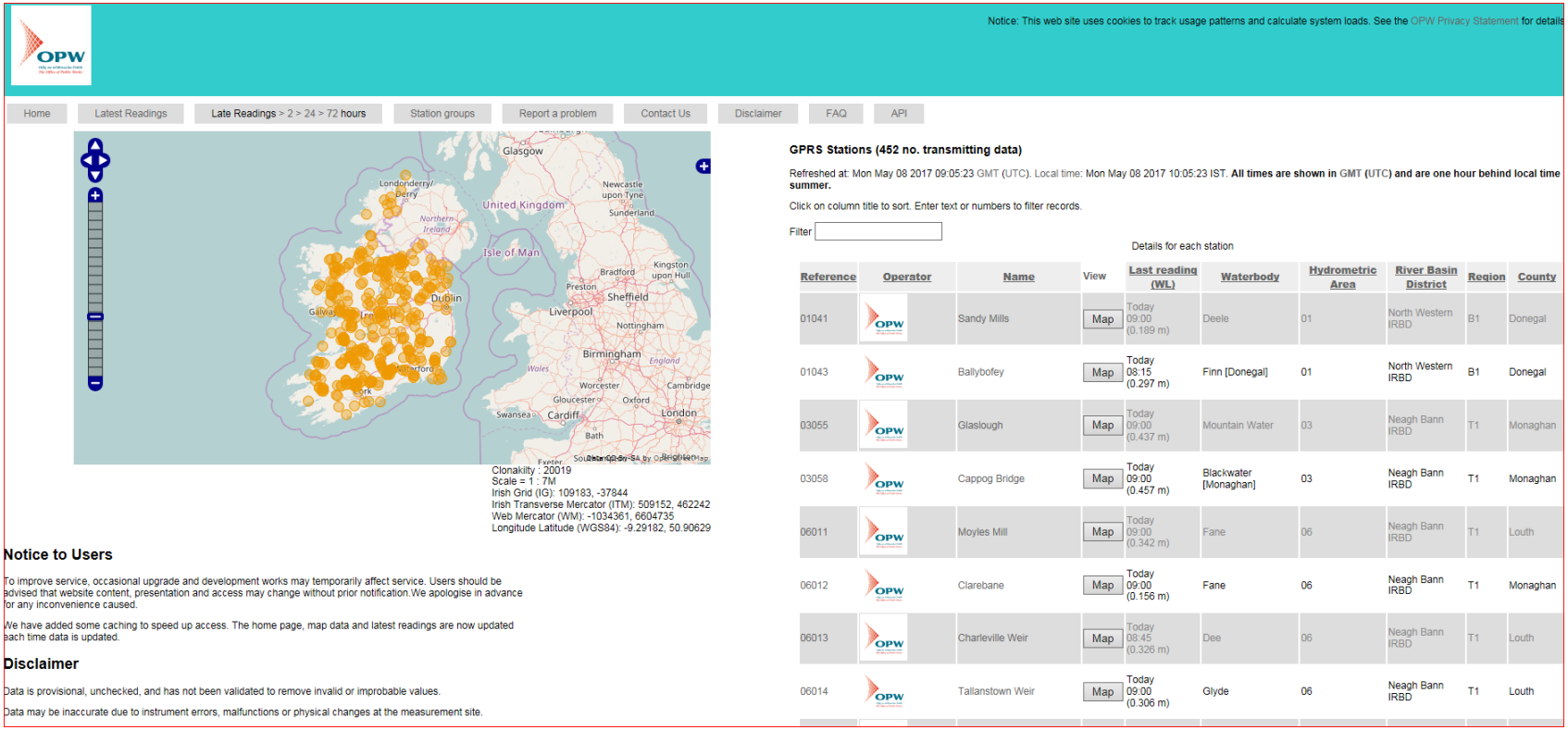
Current Arrangements

- EFAS Forecast 2 December 2015



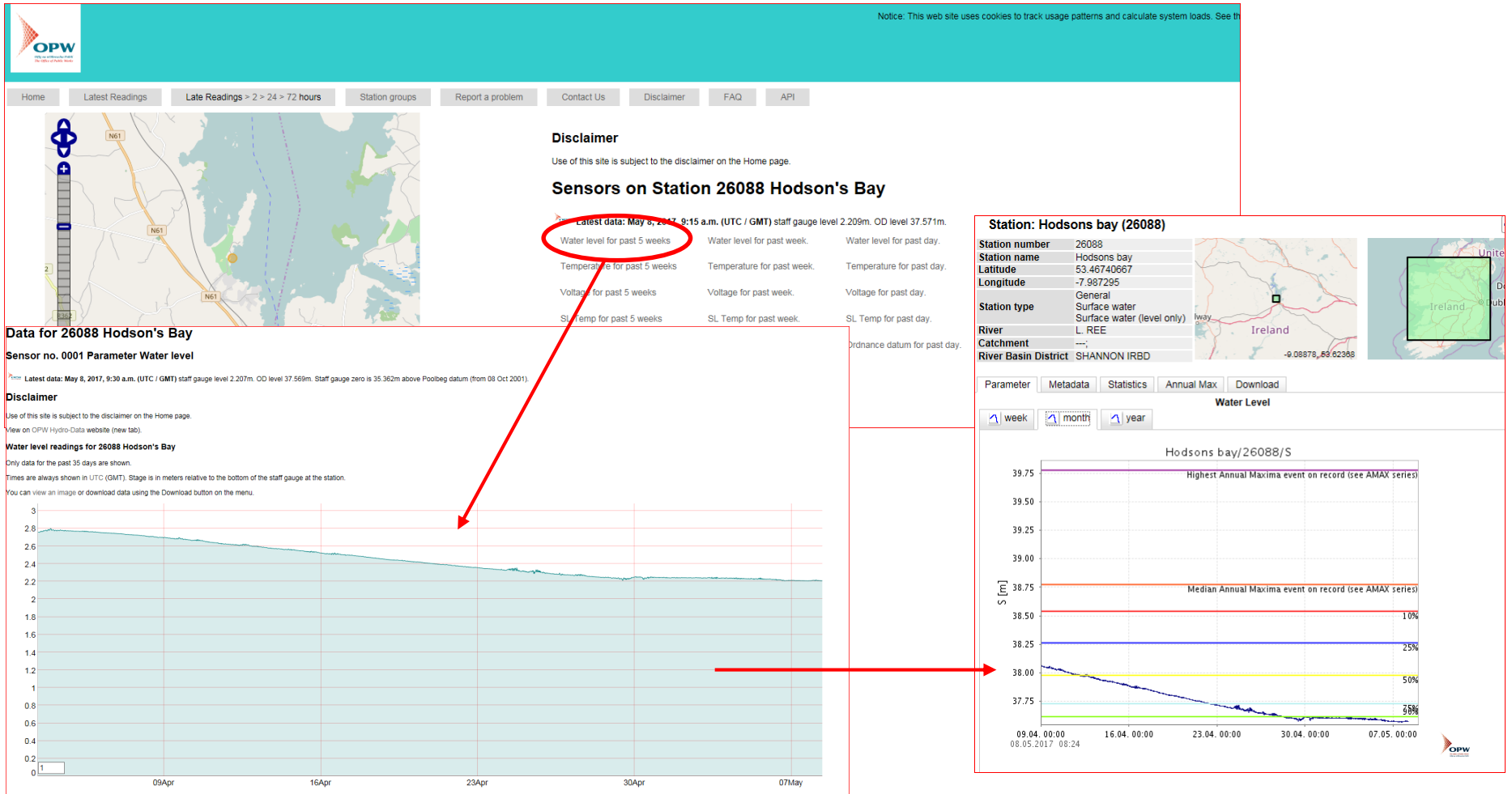
Current Arrangements

- http://waterlevel.ie/ - real-time data from OPW's hydrometric network



Current Arrangements

- http://waterlevel.ie/ - Hodson Bay, Athlone



Current Arrangements

Coastal Flood Forecasting

- Tidal and Storm Surge Forecasting System around Ireland
- Focus on:
    - Cork Harbour
    - Wexford Harbour
    - Dundalk Bay
    - Galway Bay
    - Shannon Estuary
- Dublin Bay also has a forecasting system

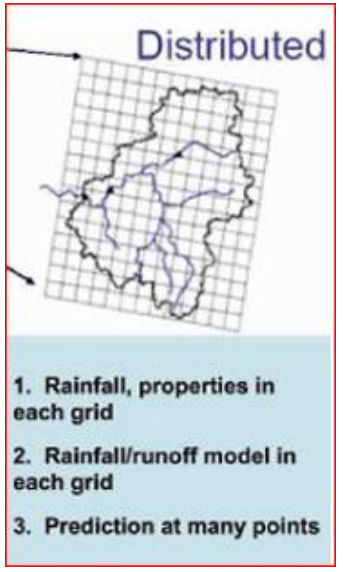
Clontarf Promenade under water 1st January 2014, Photograph: Dara Mac Dénaill/The Irish Times
http://www.irishtimes.com/news/environment/dublin-authorities-anxiously-await-thursday-high-tide-1.1641466

Current Arrangements

- National Co-ordination Group on Severe Weather
  - Lead by National Directorate for Fire and Emergency Planning
  - Incorporates Government Departments, Local Authorities, Fire & Rescue Service, etc.
  - Meets at the Office of Emergency Planning, D2
  - Looks ahead and co-ordinates response
  - Provides briefings to the public and Government

National-scale Flood Forecasting Plan

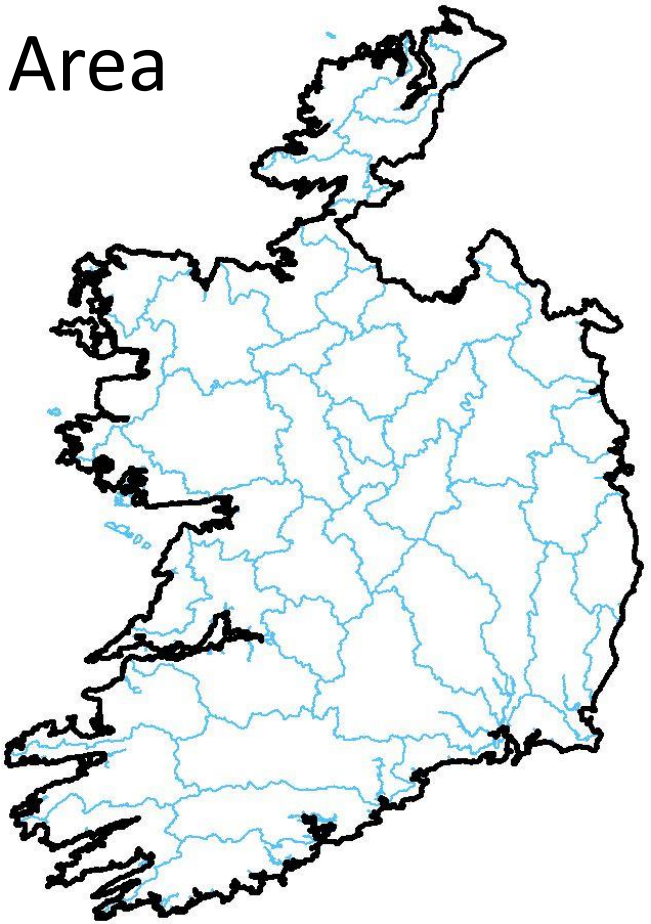
- Country-wide overview of flood situation and magnitude (low, medium, high, severe).
- Lead-time of up to 5 days which allows principal response agencies time to plan.
- Distributed hydrological model
  - Digital terrain model & Mapped river network
  - Rainfall forecast
  - Catchment area, soil, land use, etc.
  - Calibrated against observed data from river gauges



National Research Council 2006. *Toward a New Advanced Hydrologic Prediction Service.* Washington, DC: The National Academies Press.

Catchment-Scale Forecasting Plan

- Catchment ⇔ Hydrometric Area
  - 47 hydrometric areas
- Lead-time of 2-3 days
- Distributed model
  - similar to national-scale model but at a finer scale
  - Incorporates 24 hours of real-time river gauge data



Communication

- Primary Responders
  - Local Authorities
  - Health Service Executive
  - Fire & Rescue Service
  - An Garda Siochána
- Public

Society of Actuaries in Ireland

Flood Insurance Forum

8th May 2017

Sinéad Duffy, Met Éireann

Flood Forecasting and Warning Service

OPW Defended areas

- Over the years OPW have funded or delivered a large number of flood relief schemes.
- These areas are now determined to be protected against flooding up to a 100 year event (ie The worst level of flooding you would expect to see every 100 years) or 200 years event from coastal flooding.
- This map show the areas that are now defended or protected as a result of these schemes http://maps.opw.ie/defended_areas/map/