Green Offaly

•••

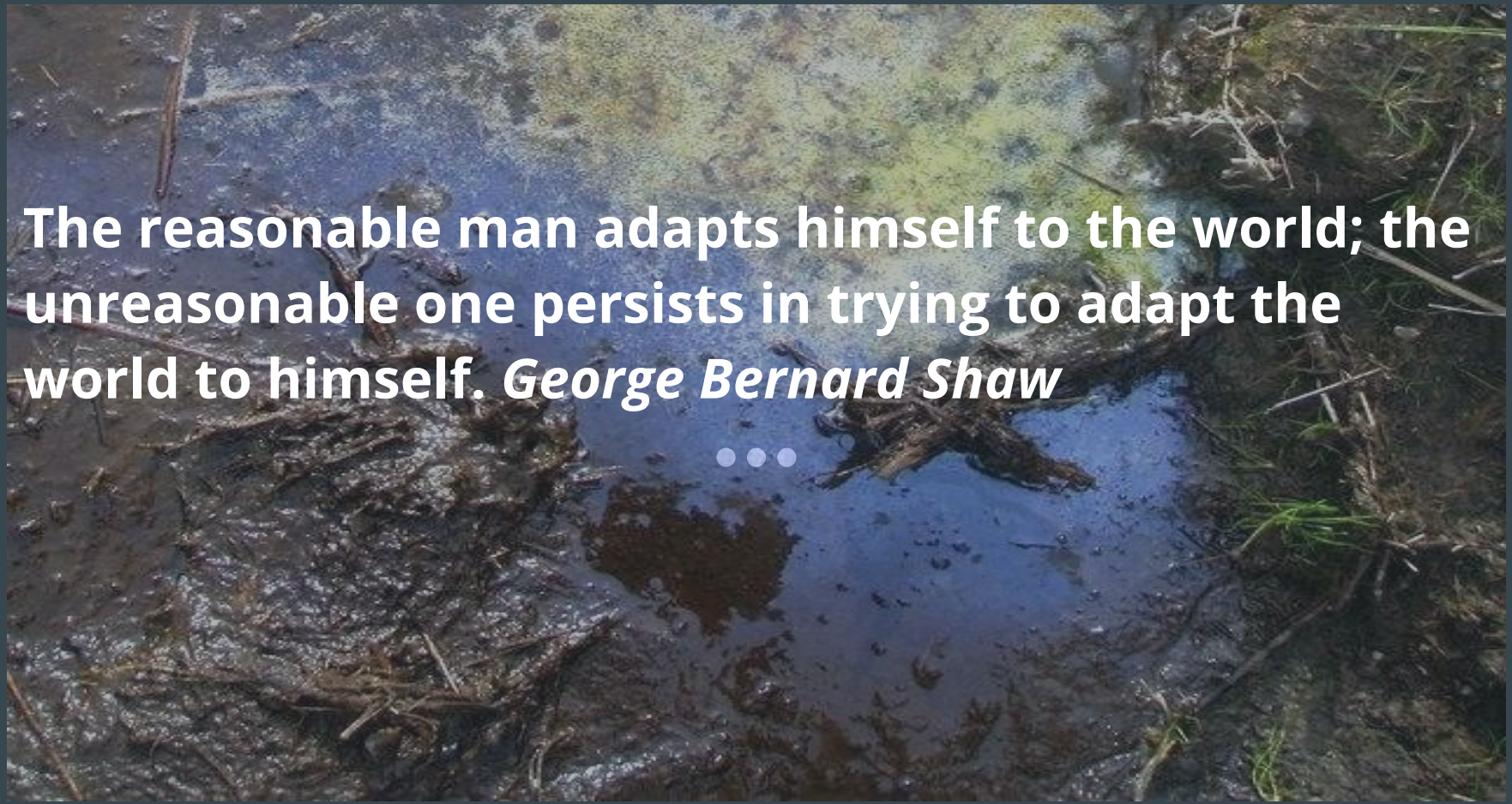
Sustainable Development Trust

Thank you all for coming today.

On 16 August 1940, when visiting the No. 11 Group RAF Operations Room during a day of battle,Churchill told Major General Hastings Ismay, 'Don't speak to me, I have never been so moved'.

After several minutes of silence he said, 'Never in the history of mankind has so much been owed by so many to so few'.

To rephrase that iconic statement it could be said that during the great battle to save our planet, ‘ Never in the history of humankind has there existed so great a challenge; unprecedented in its scale, beset with almost insurmountable difficulties, faced with almost impossible odds and yet if we succeed, once again, so much will be owed by so many to so few.’


The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. *George Bernard Shaw*

Climate Change

I think calling it climate change is rather limiting. I would rather call it the everything change.

Margaret Atwood

We cannot solve our problems with the same thinking we used when we created them.

Albert Einstein

The Science

The Following Climate Simulations for Ireland are kindly provided by Paul Nolan of the ICHEC in conjunction with the EPA and presented to us today by his colleague Alastair McKinstry.

(MSc in Physics B.A. Mod (Hons) in Experimental Physics)
Environmental Activities Lead at the Irish Centre for High-End Computing.

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Environmental Protection Agency

Roinn Cumarsáide, Gníomhaithe ar son na hAeráide & Comhshaoil
Department of Communications, Climate Action & Environment

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Ireland's changing climate – what can we expect?

Paul Nolan
paul.nolan@ichec.ie

MET éireann

An Roinn Post, Fiontar agus Nuálaíochta
Department of Jobs, Enterprise and Innovation

sfi science foundation ireland

AN ROINN OIDEACHAIS AGUS SCILEANNA
DEPARTMENT OF EDUCATION AND SKILLS

HEA Higher Education Authority

NUI Galway OÉ Gaillimh

www.ichec.ie

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- Irish Centre for High-End Computing (ICHEC)
- Met Éireann
- Research Funded by the DCCAE & EPA (Marine Institute)
- Main area of research is Simulating Future Climate Change

Presentation Outline:

- Global Climate Projections
- Regional Climate Projections for Ireland

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Global Climate Modelling (EC-Earth)

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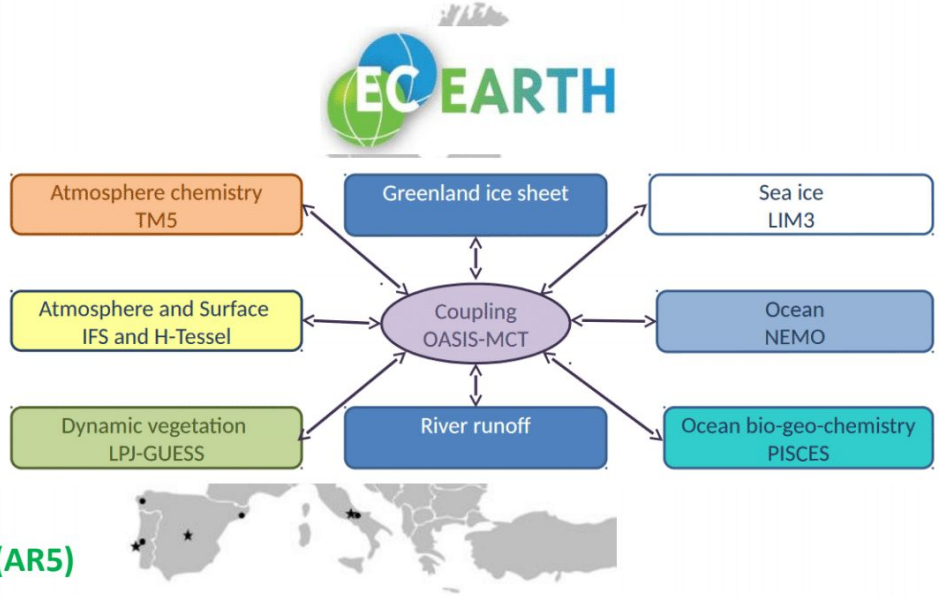
- The impact of increasing greenhouse gases on future climate change can be simulated using **Global Climate Models** (Earth System Models)
- **EC-Earth** is one such Earth System model
  - European Consortium, 29 partners.
  - One of over ~30 "IPCC-class" climate models.
- Irish Centre for High-End Computing (ICHEC) & Met Éireann are partnered in developing and running the model.
- Results contributed towards the **CMIP5 project and the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5)**



- Currently working on **CMIP6 simulations and Ireland's contribution to IPCC AR6 Report** .

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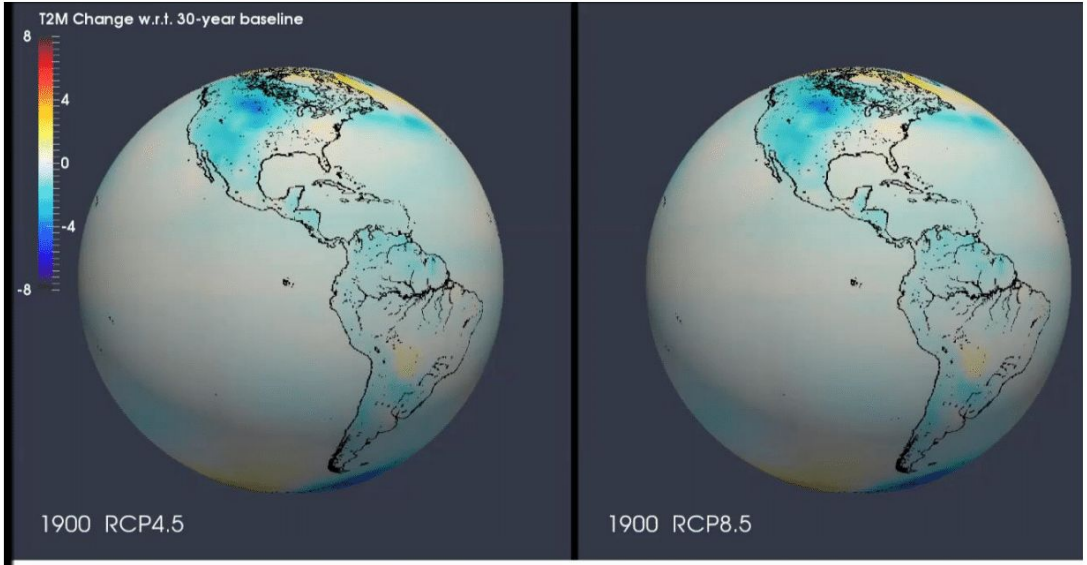

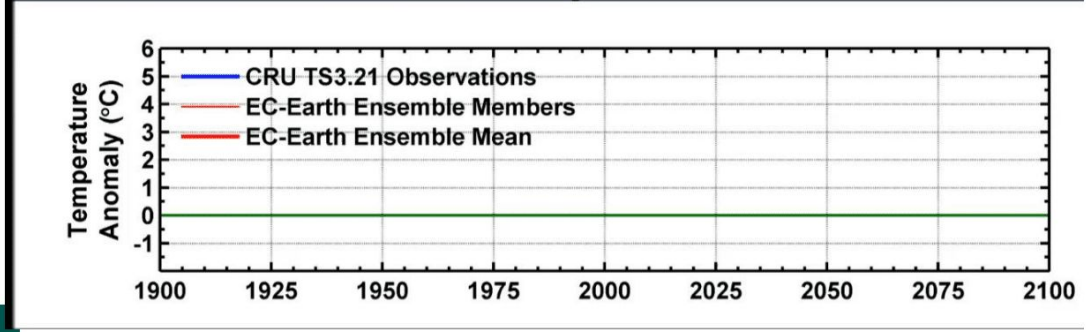

Annual Temperature Change as simulated by the EC-Earth simulations.

Annual mean Temperature minus 1961-1990 mean

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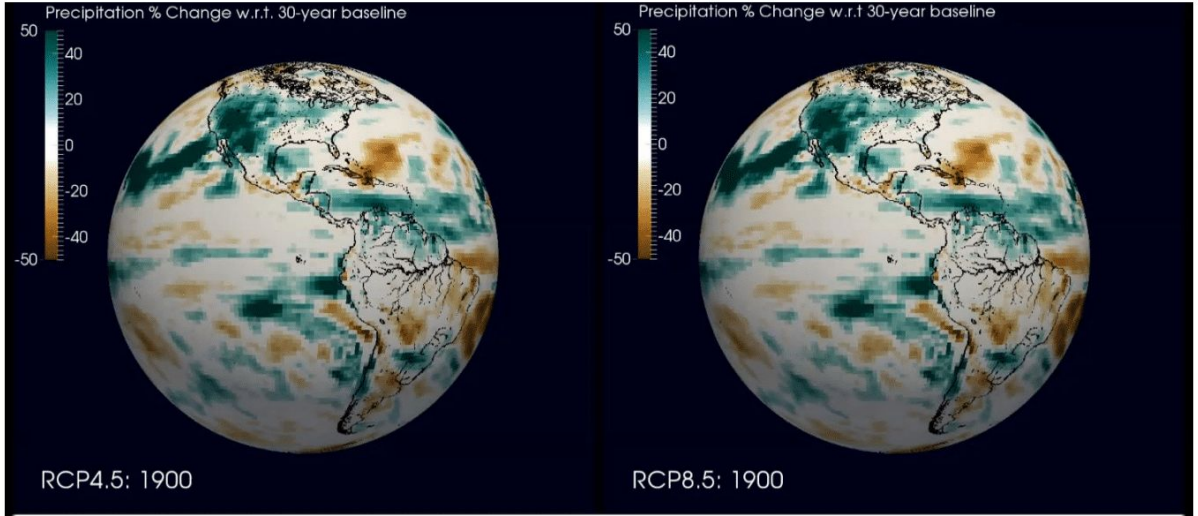

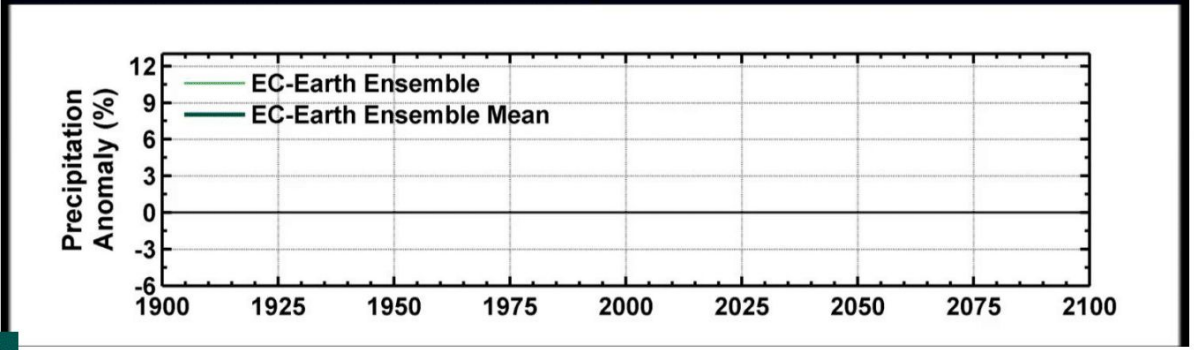

Annual Rainfall Change (%) as simulated by the EC-Earth simulations.

Annual change calculated w.r.t. 1961-1990 mean

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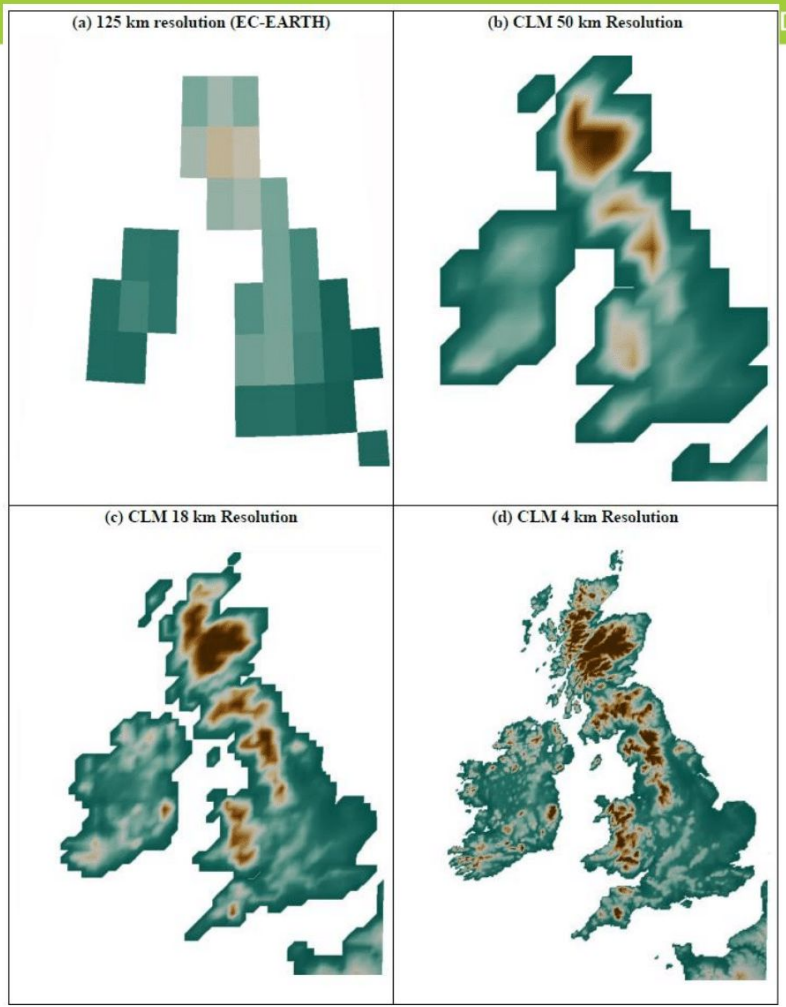
Downscaling the EC-Earth Data

- The spatial resolution of the global models are constrained by computational resources. It is not possible to assess the impacts of climate change at a regional level.

- We used Regional Climate Models (RCMs) to dynamically downscale the coarse information from the global models.

Downscaling Improvements



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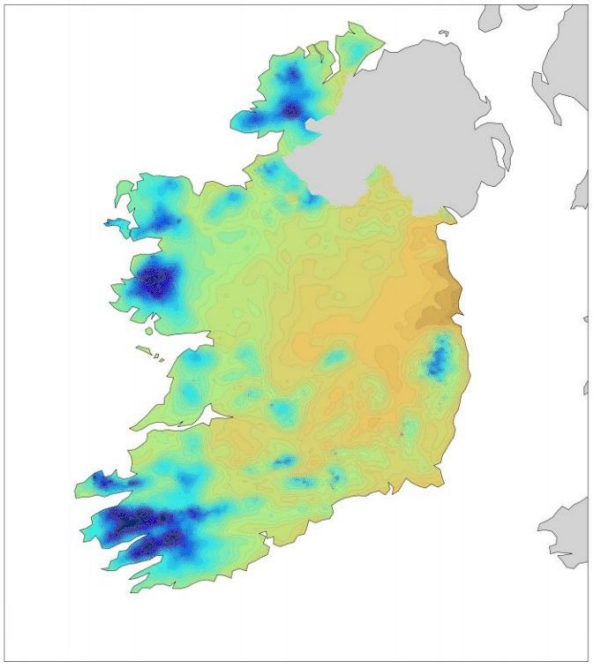
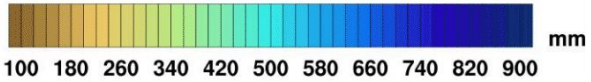
Regional Climate Model Validations

Observations

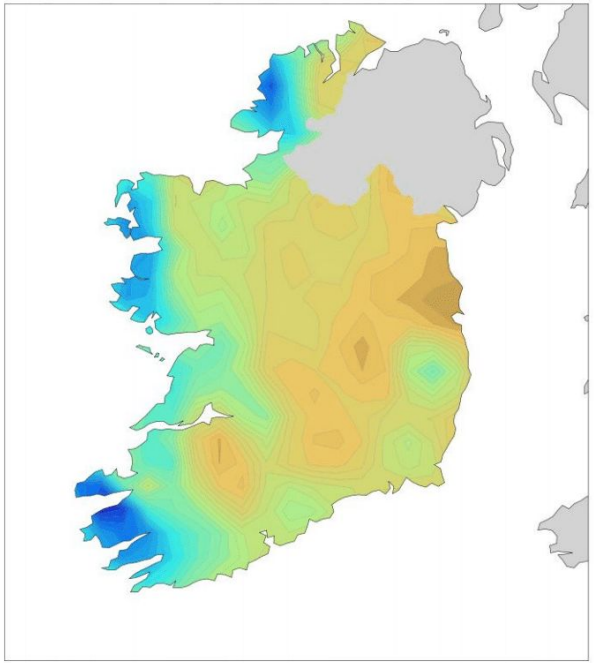
Observed Winter Rainfall (1982-2014)

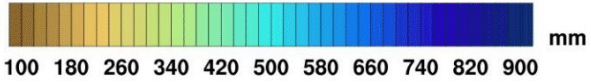




WRF-ERAInterim, 18km

WRF Winter Rainfall (1982-2014), 18km





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Regional Climate Model Validations

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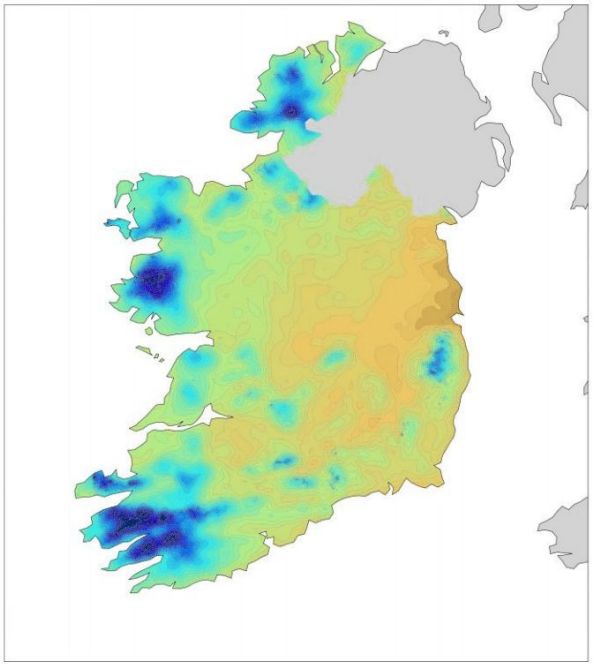
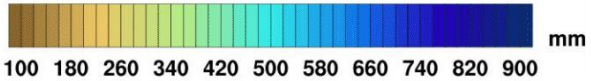
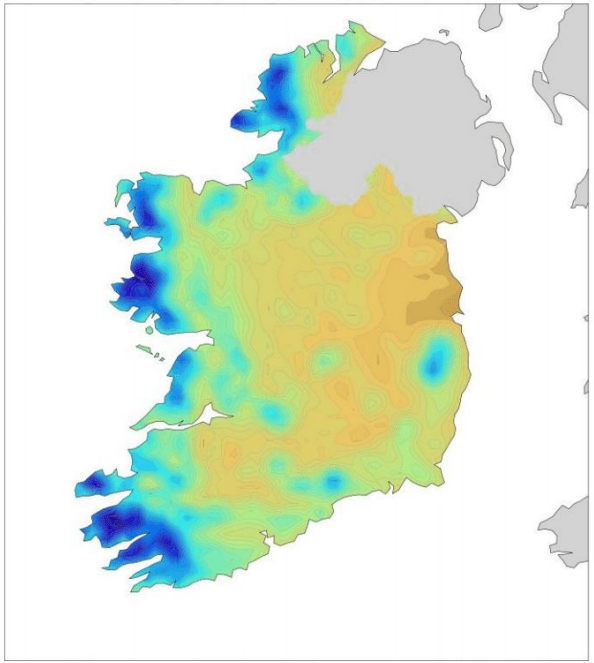
Observed Winter Rainfall (1982-2014)

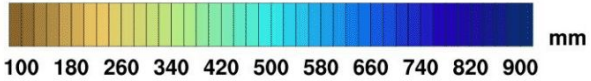




WRF-ERAInterim, 6km

WRF Winter Rainfall (1982-2014), 6km





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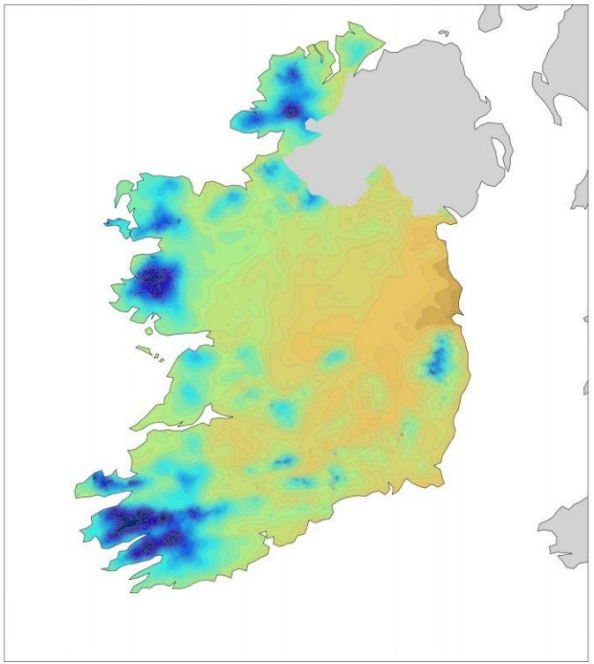
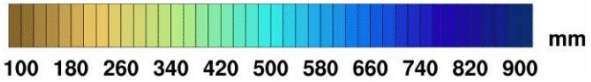
Regional Climate Model Validations

Observations

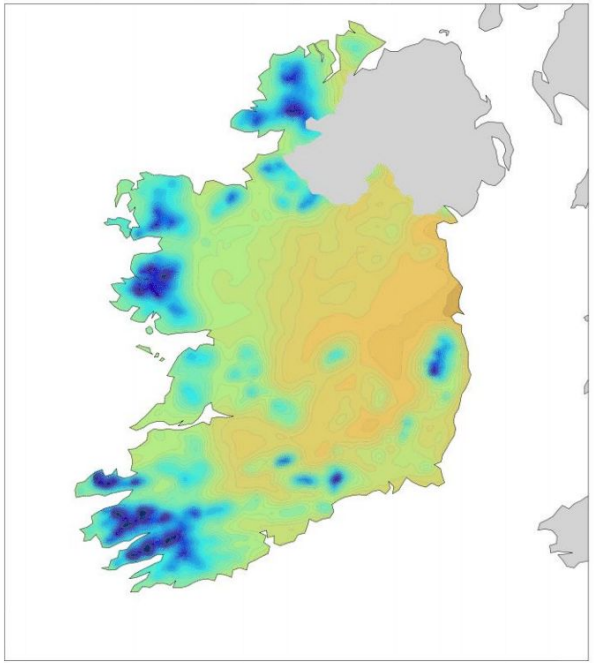
Observed Winter Rainfall (1982-2014)

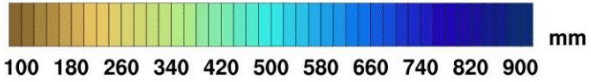




WRF-ERAInterim, 2km

WRF Winter Rainfall (1982-2014), 2km





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RCM Projections for Ireland

- The future climate of Ireland was simulated at high spatial resolution for the 40-year period 2021-2060 (recent simulations extend to 2100)

- For reference, the past climate was simulated for the period 1961-2005

- Difference between the two periods provide a measure of climate change

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RCM Projections for Ireland - the Ensemble Method (Uncertainty)

- Climate change projections are subject to uncertainty, which limits the value of individual projections.
- To address this issue of uncertainty, an ensemble of Regional Climate Models (RCMs) was run.
- Through the ensemble approach, the uncertainty in the projections can be quantified, proving a measure of confidence in the predictions.

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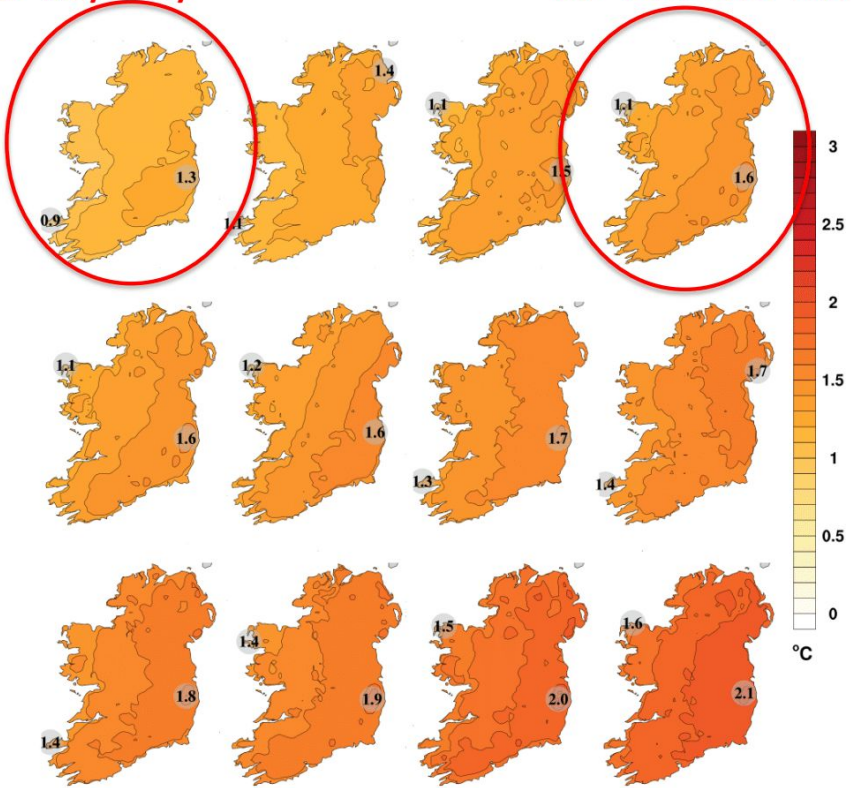
RCM Projections for Ireland
- the Ensemble Method (Uncertainty)

90th Percentile: "Very Likely" **66th Percentile: "Likely"**



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RCM Projections for Ireland - the Ensemble Method

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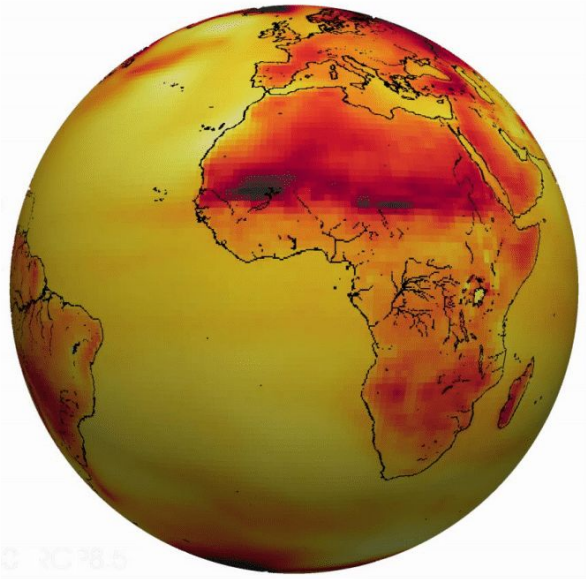
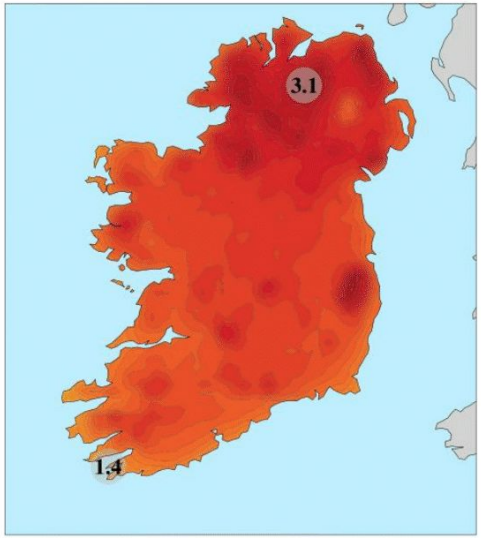
Global Climate Models



Regional Climate Models



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RCM Projections for Ireland - the Ensemble Method

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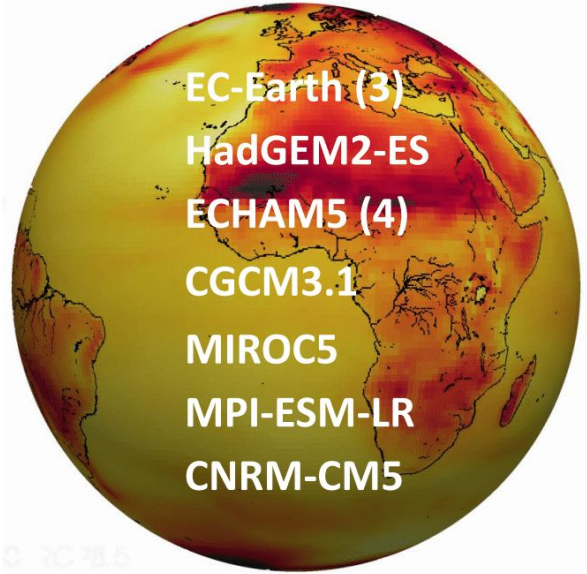
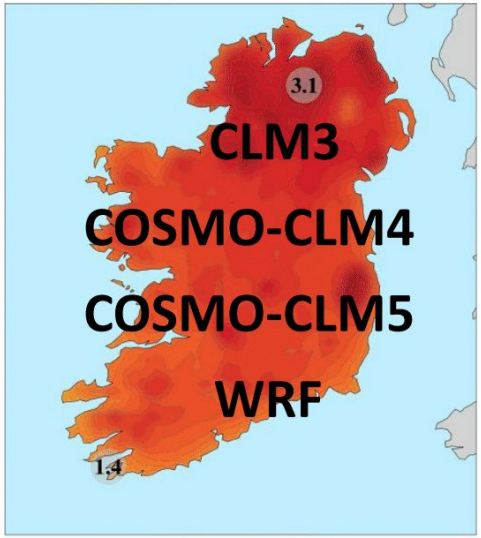
Global Climate Models



Regional Climate Models



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RCM Projections for Ireland - the Ensemble Method

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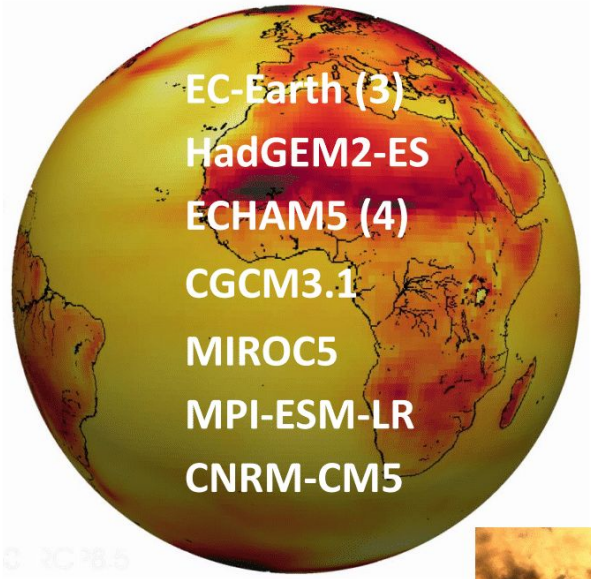
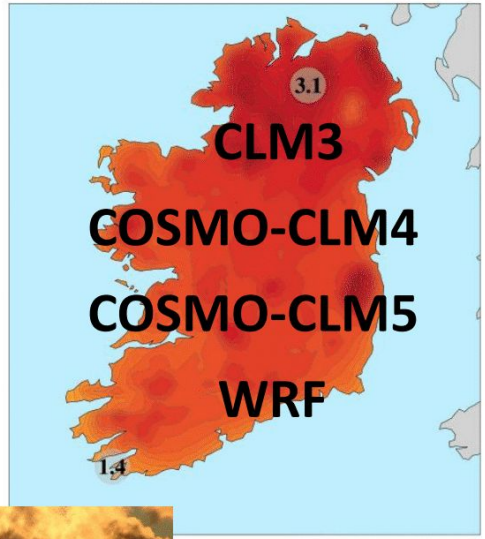
Global Climate Models



Regional Climate Models



Future Climate Emission Scenarios

B1, A1B, A2, RCP2.6, RCP4.5, RCP6.0, RCP8.5

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RCM Projections For Ireland

- Running such a large ensemble was a substantial computational task and required extensive use of the **ICHEC & ECMWF supercomputer systems** over 3 to 4 years.

- The RCP4.5 and the B1 scenario simulations were used to create a **medium-low emission** ensemble while the RCP8.5, A1B and A2 simulations were used to create a **high emission** ensemble.

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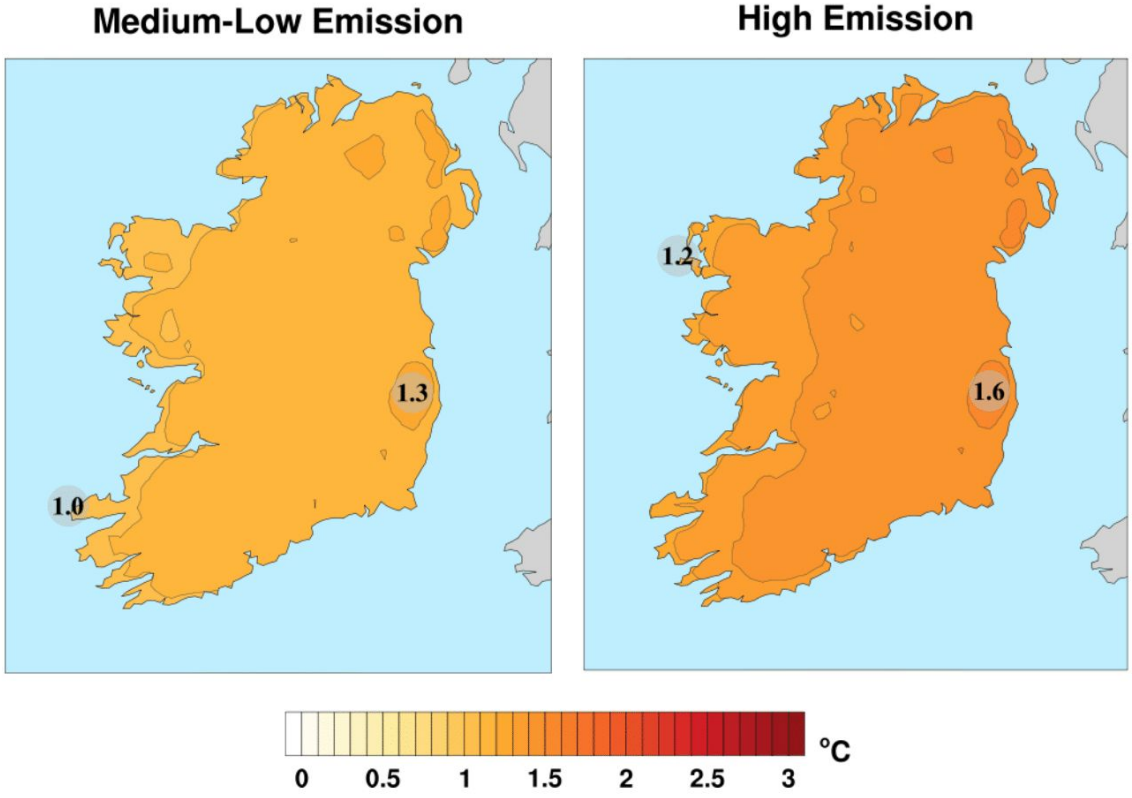
Mid-Century (2041-2060) Projections

Mean Annual 2m Temperature Change



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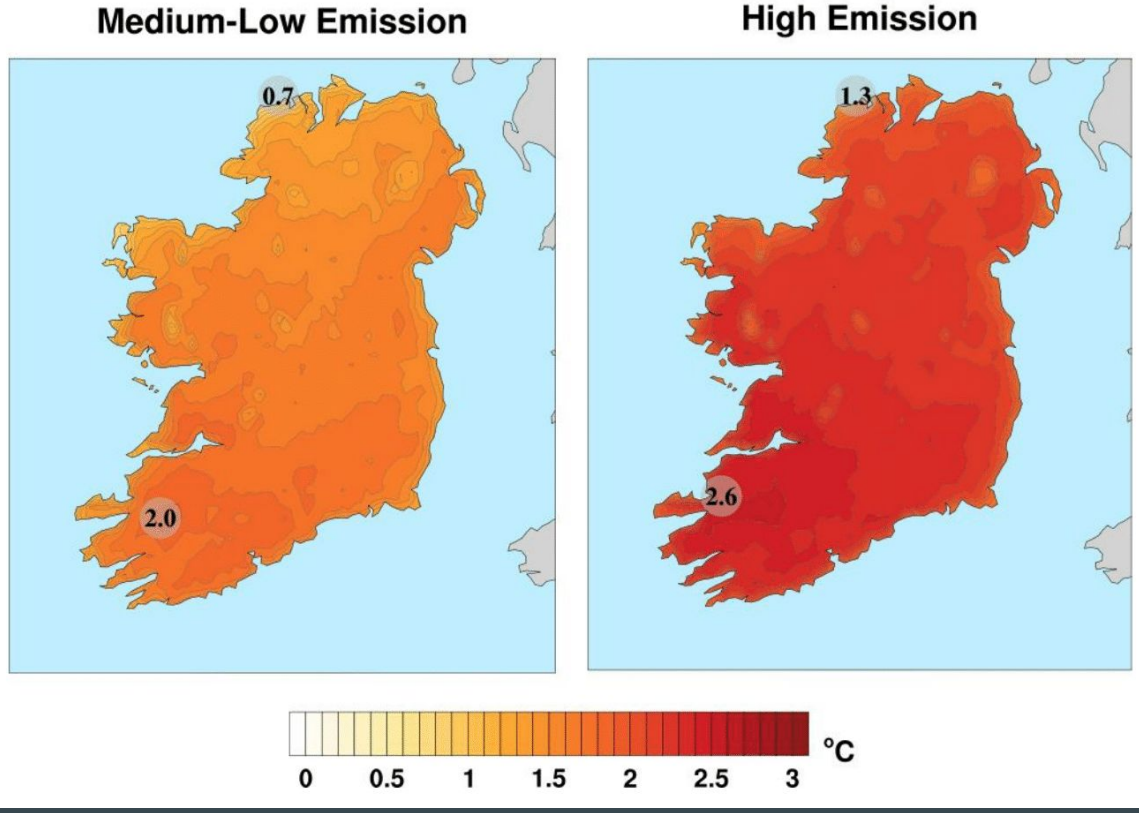
Mid-Century (2041-2060) Projections

Summer Day-time Temperature Change



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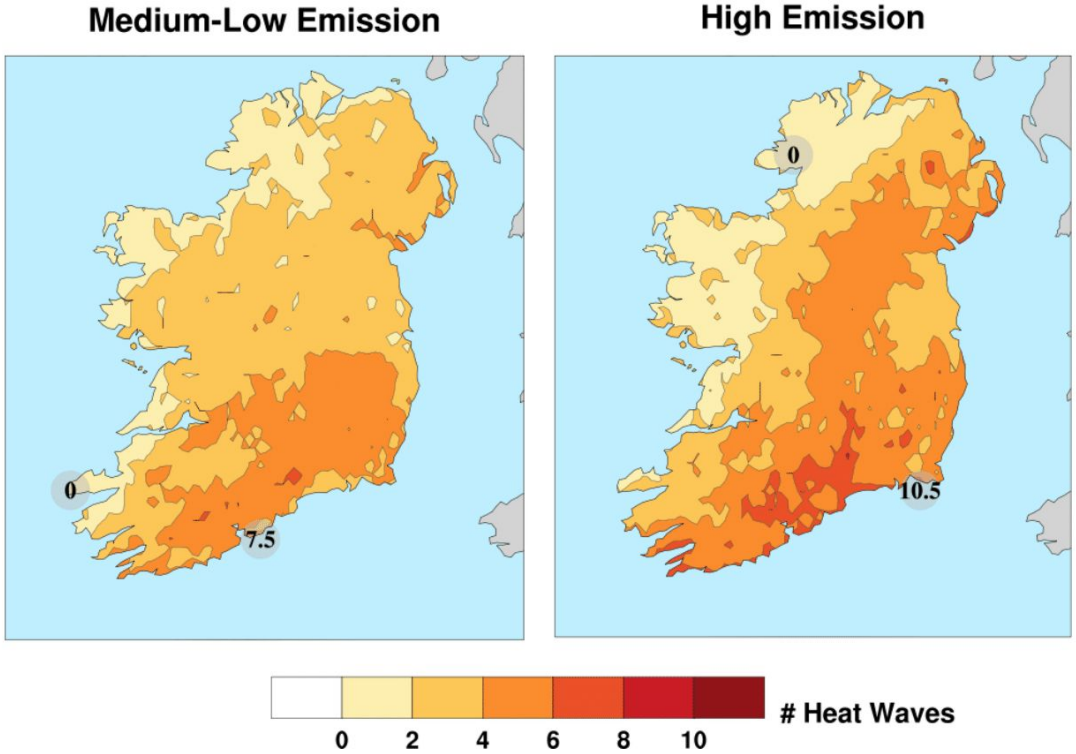
Mid-Century (2041-2060) Projections

Number of "Heat Waves" over 20-year period

"Likely" Increase in Heat Waves



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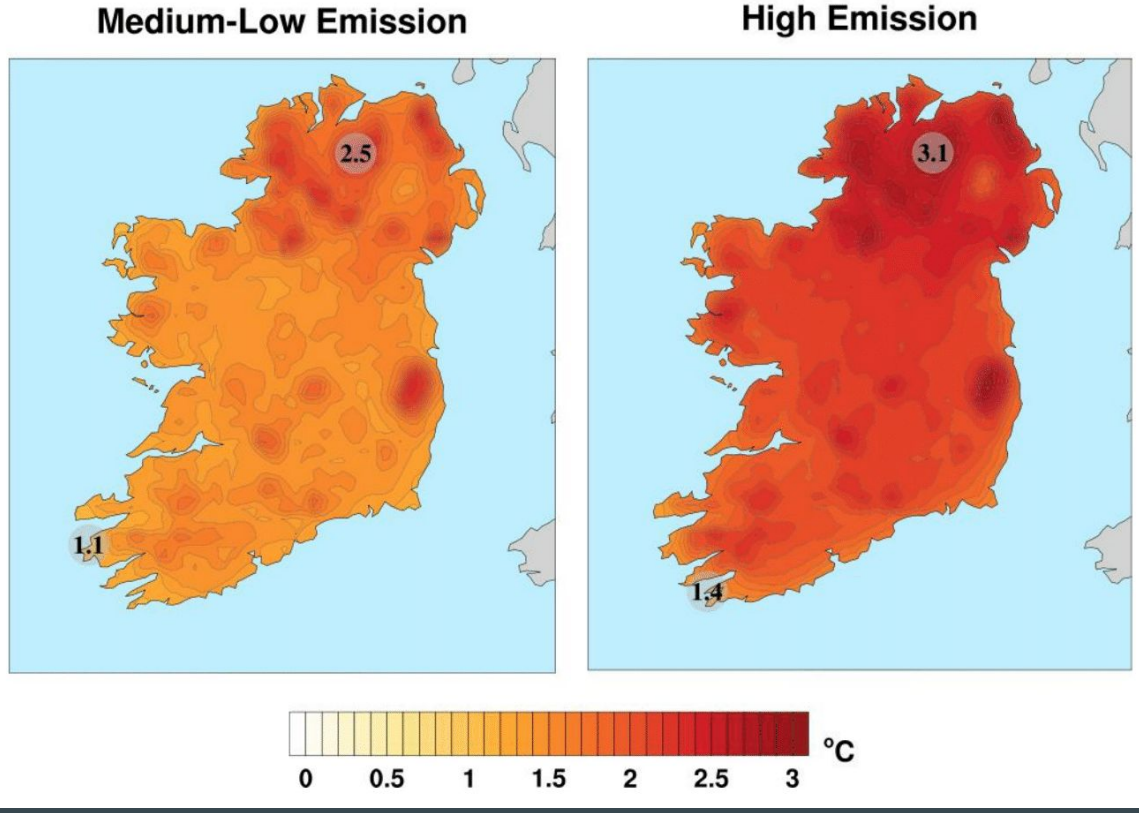
Mid-Century (2041-2060) Projections

Winter Night-time Temperature Change



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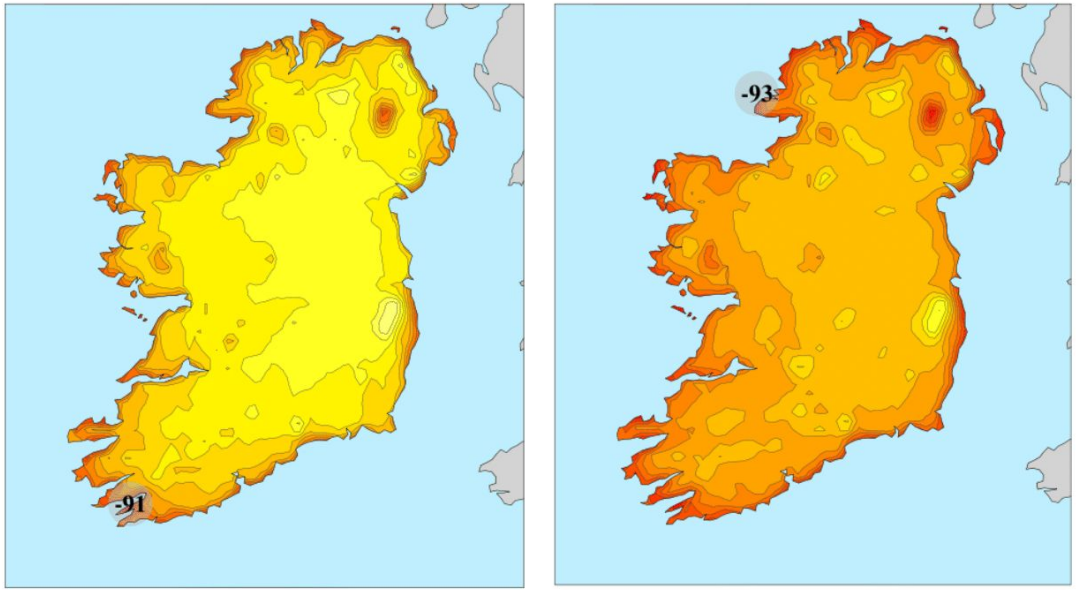
Mid-Century (2041-2060) Projections

Frost Days (T2M min < 0°C)

Annual Change (%) in Number of Frost Days (TMIN < 0°C)

Medium-Low Emission | **High Emission**



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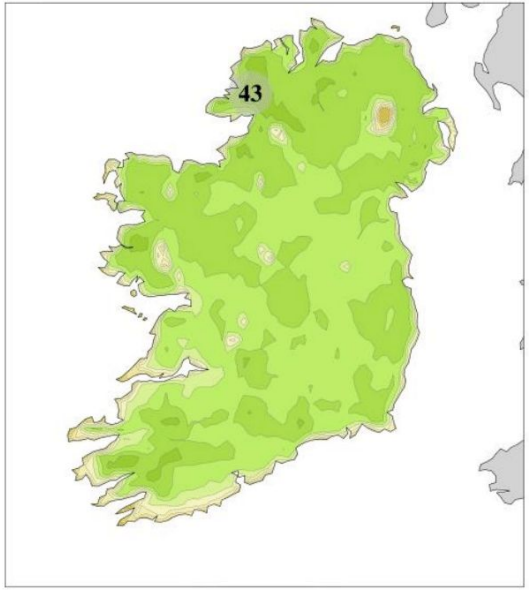
Mid-Century (2041-2060) Projections

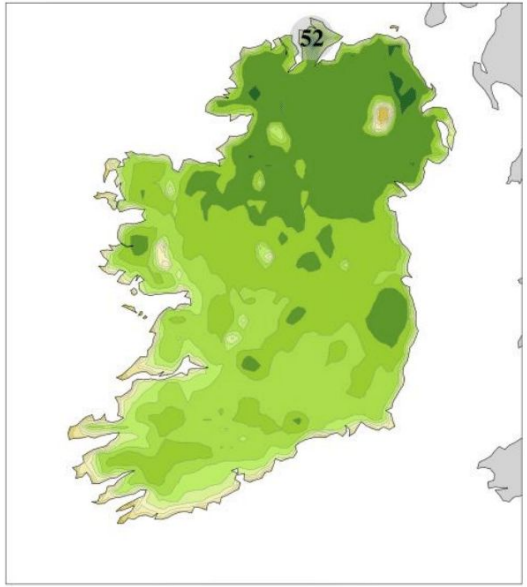
Annual Length of the Growing Season

Annual Change in Length of Growing Season

Medium-Low Emission



High Emission



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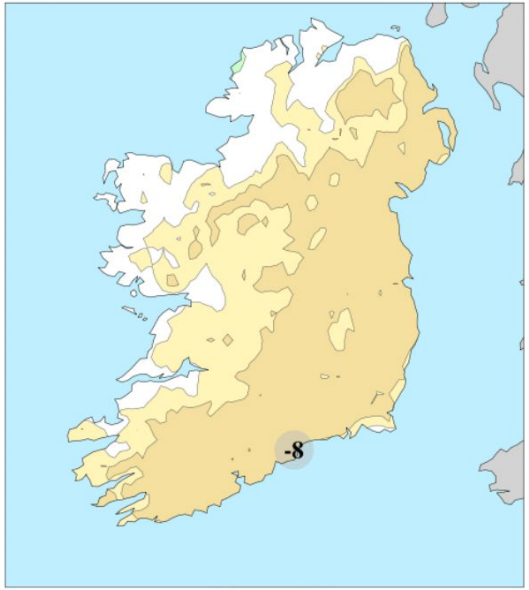
Mid-Century (2041-2060) Projections

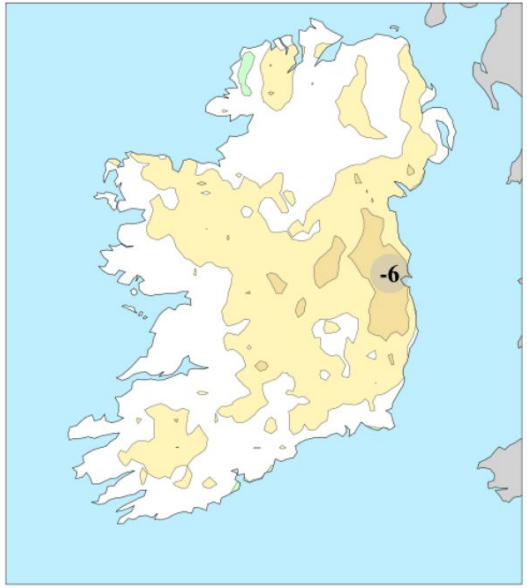
Annual Precipitation Change (%)

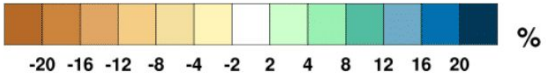
"Likely" Annual Precipitation Change

Medium-Low Emission



High Emission





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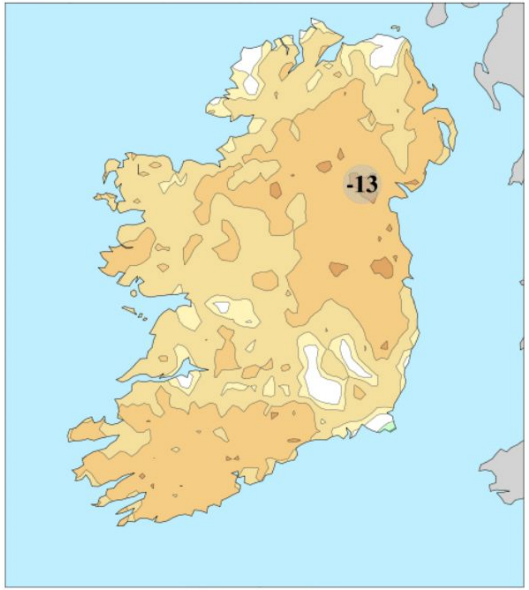
Mid-Century (2041-2060) Projections

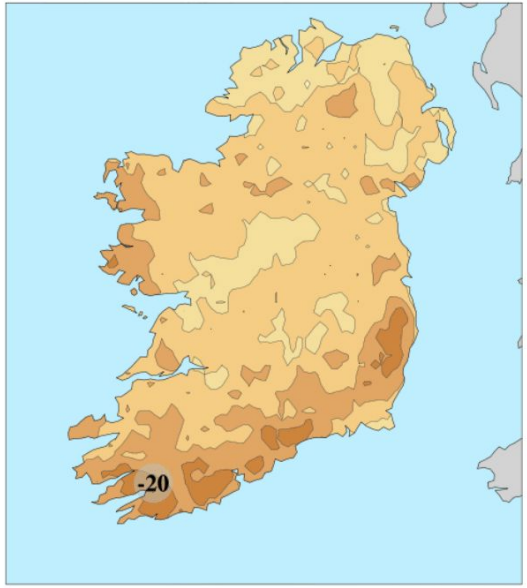
Summer Precipitation Change (%)

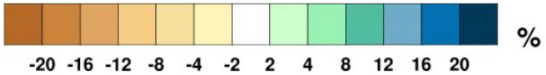
"Likely" Summer Precipitation Decrease

Medium-Low Emission



High Emission





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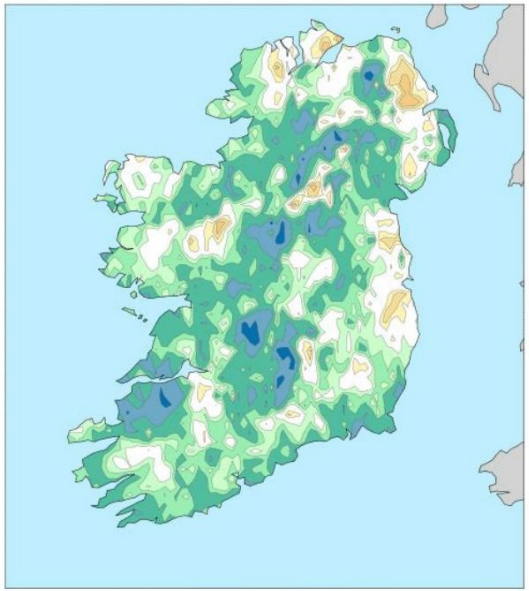
Mid-Century (2041-2060) Projections

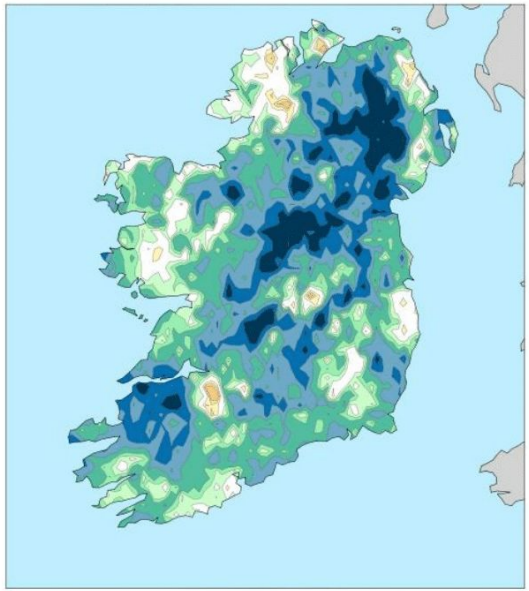
Projected Change in Heavy Rainfall Events (%)

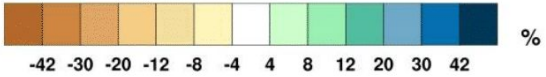
"Likely" Increase Very Wet Days (> 30mm/day). High Emission Scenario

Annual



Autumn





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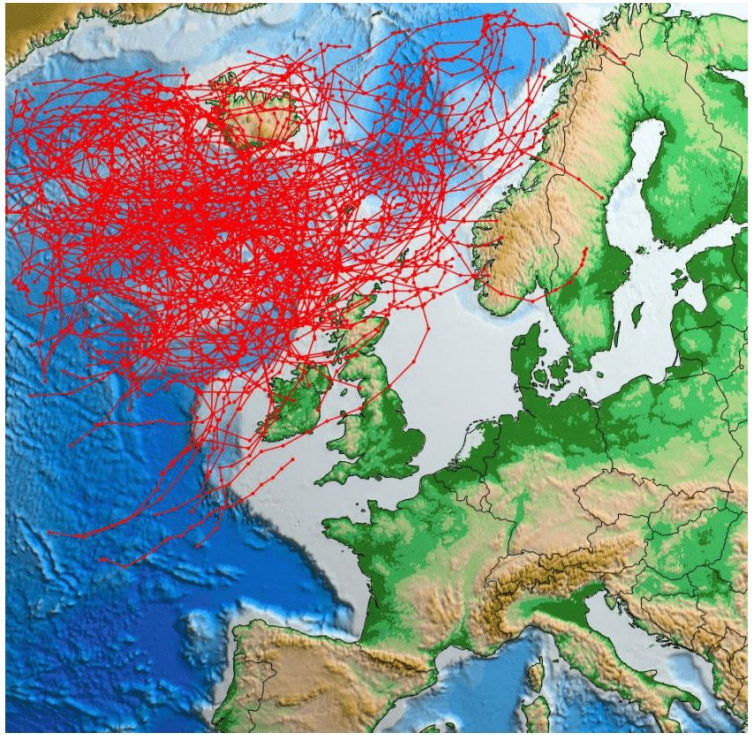
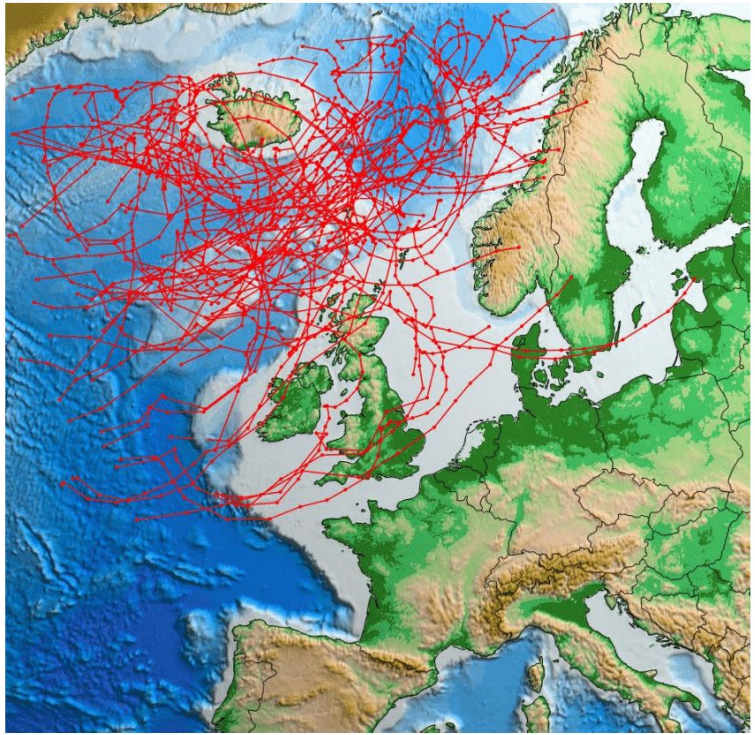
Extreme Storm Track Projections
(Small Increase Over Ireland by Mid-Century)

1976-2005



Mid-century RCP8.5



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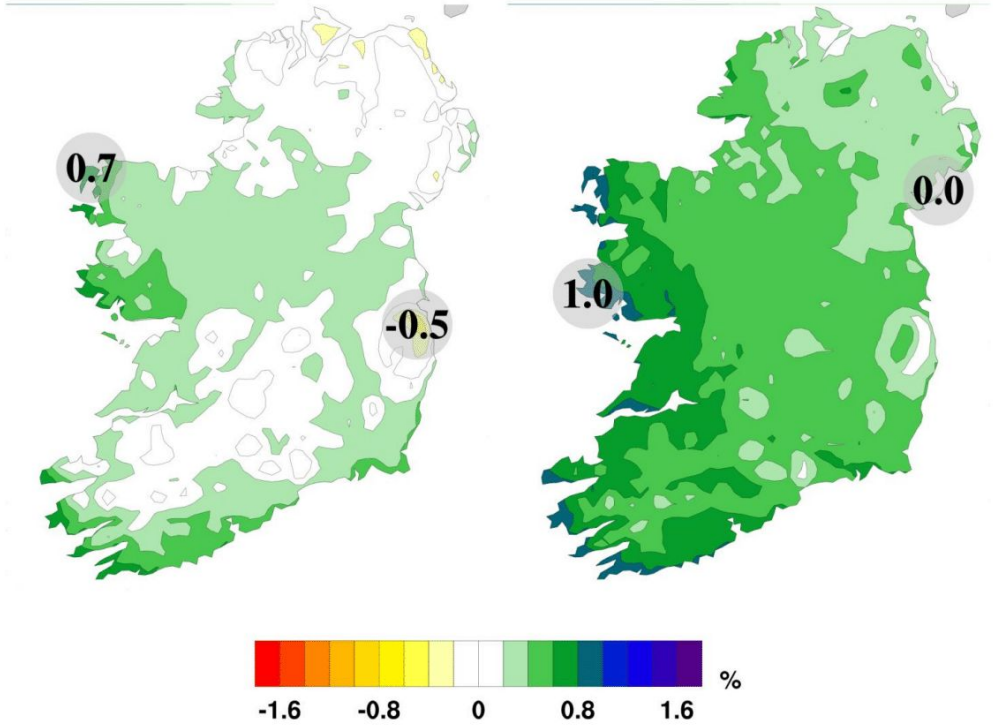
Mid-Century (2041-2060) Projections

January Ensemble Mean Relative Humidity Change

RCP45 RCP85



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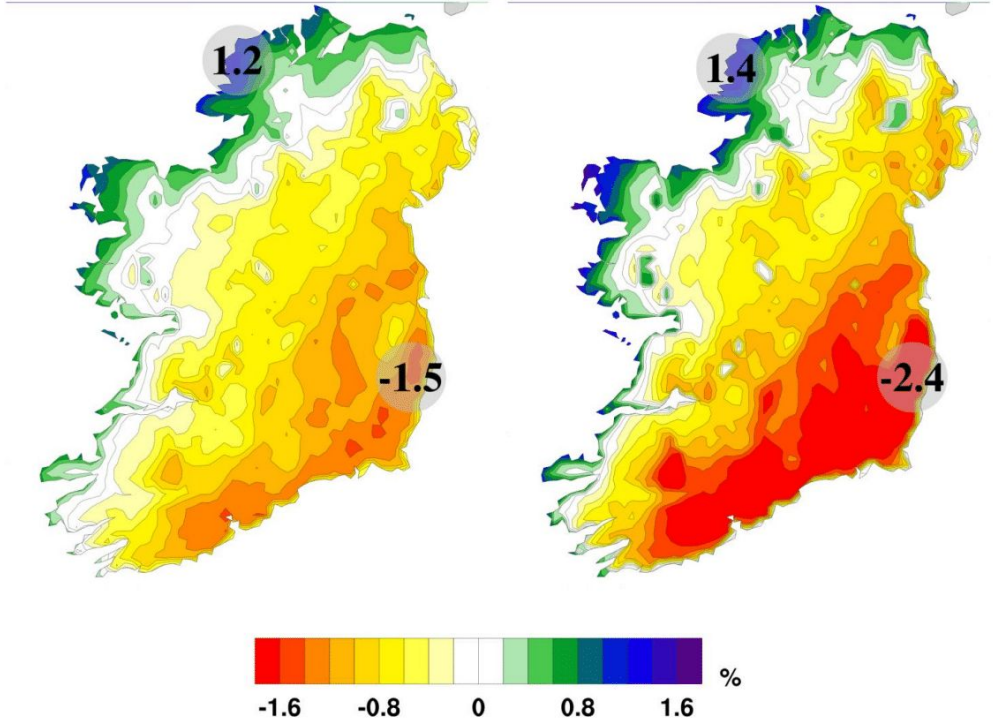
Mid-Century (2041-2060) Projections

July Ensemble Mean Relative Humidity Change

RCP45 RCP85



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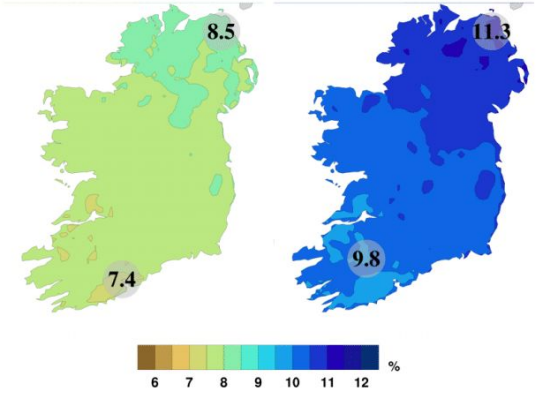
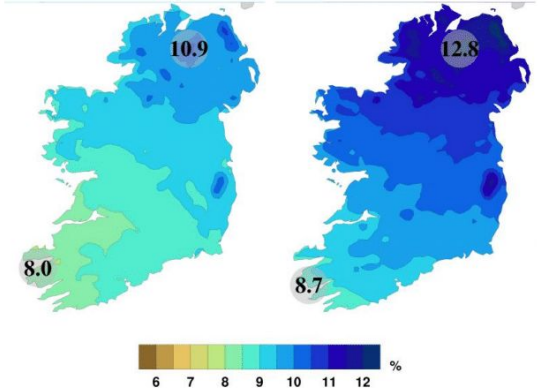
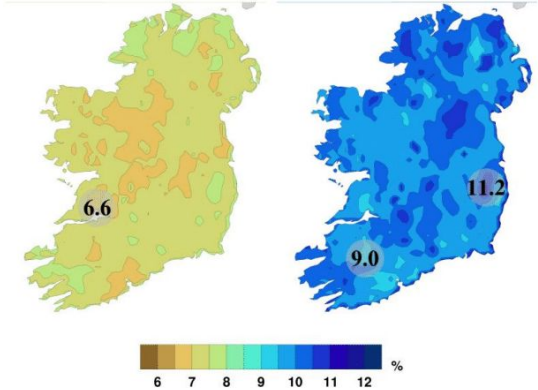
Ensemble Mean Specific Humidity Change



January Ensemble Mean Specific Humidity Change



July Ensemble Mean Specific Humidity Change



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Key Findings/Projection	Areas for consideration and further investigation
Mean temperature increase of 1-1.6℃. Largest increase in the east	Ability to predict change at a regional level allows for a more precise and targeted (geographically) strategy for adaptation
Summer day temperatures increase of over 2℃	Effect on likelihood and severity of heat waves (public health impact)
Frost nights decease of ~50%	Impact on agriculture, pest control and plant growth
Growing season increase of over 35 days/year	Open opportunity to grow new types of crops (agricultural planning)
Large projected drying during summer	More frequent and severe droughts - implication re. water resource management and agriculture
Increase heavy rainfall events during autumn & winter	Increased likelihood and severity of flooding - need to improve reliability of regional forecast for flood management
Wind energy decrease for all seasons (except winter)	Wind energy likely to decrease, may require re-thinking of strategy re. diversification of renewable courses (solar and wind) across the year

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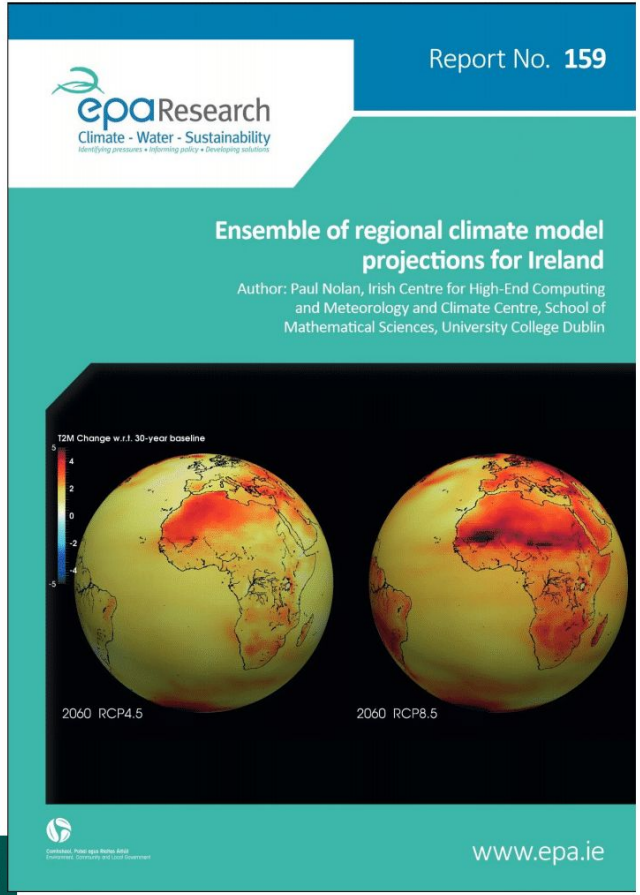

"Ensemble of regional climate model projections for Ireland"

http://www.epa.ie/pubs/reports/research/climate/research159ensembleofregionalclimatemodelprojectionsforireland.html

- Results have contributed towards numerous governmental climate change reports
- An updated report is currently under preparation.
  - Future time period extended to 1975-2100.
  - Future climate simulated under all 4 RCPs (2.6, 4.5, 6.0 & 8.5)

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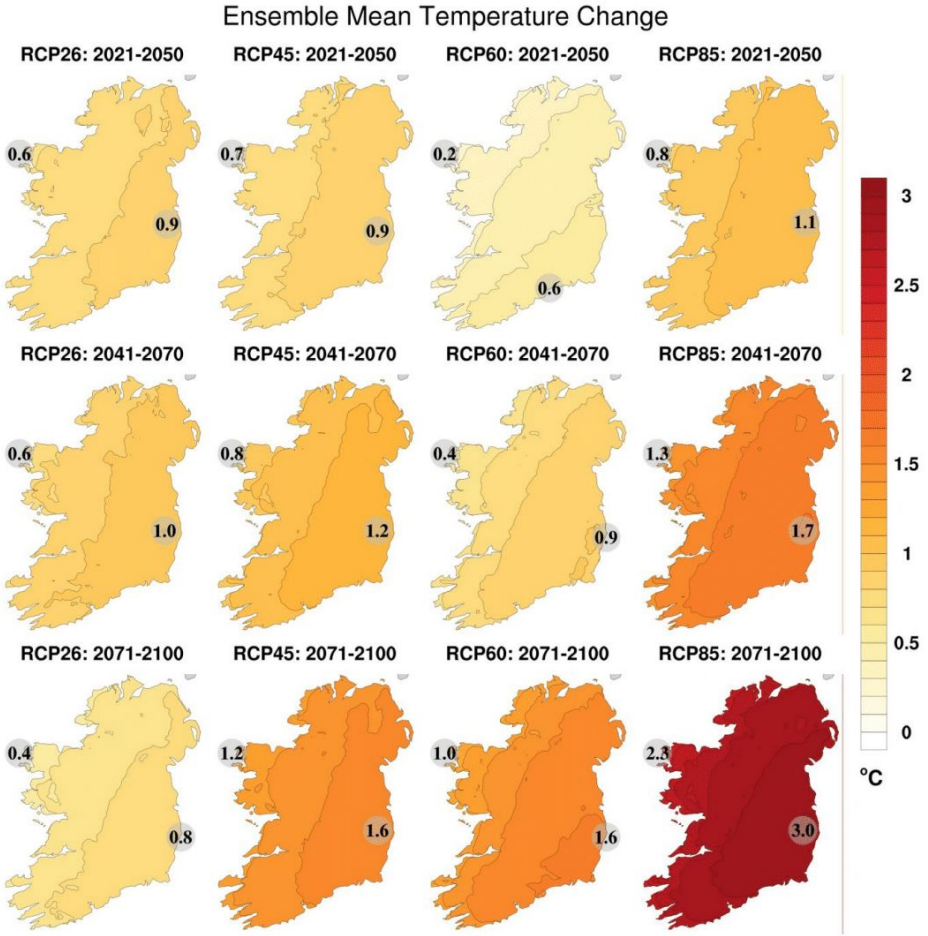
Preliminary End-of-Century Temperature Projections



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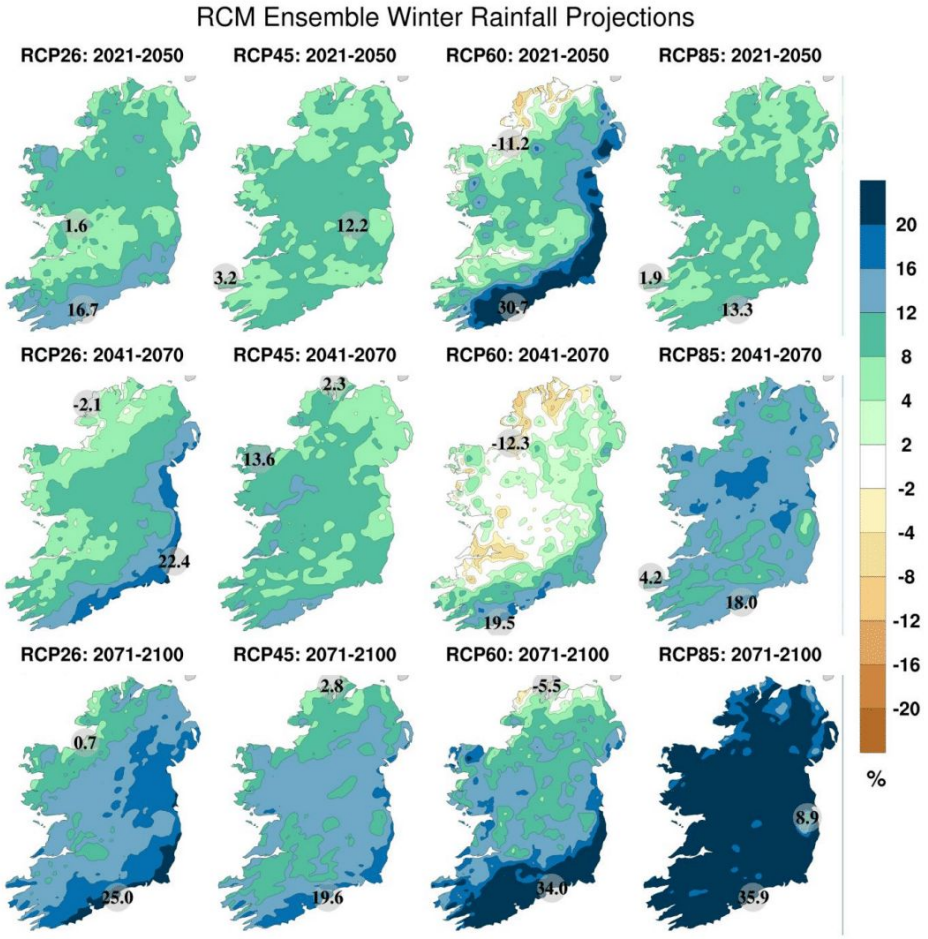
Preliminary End-of-Century Winter Rainfall Projections



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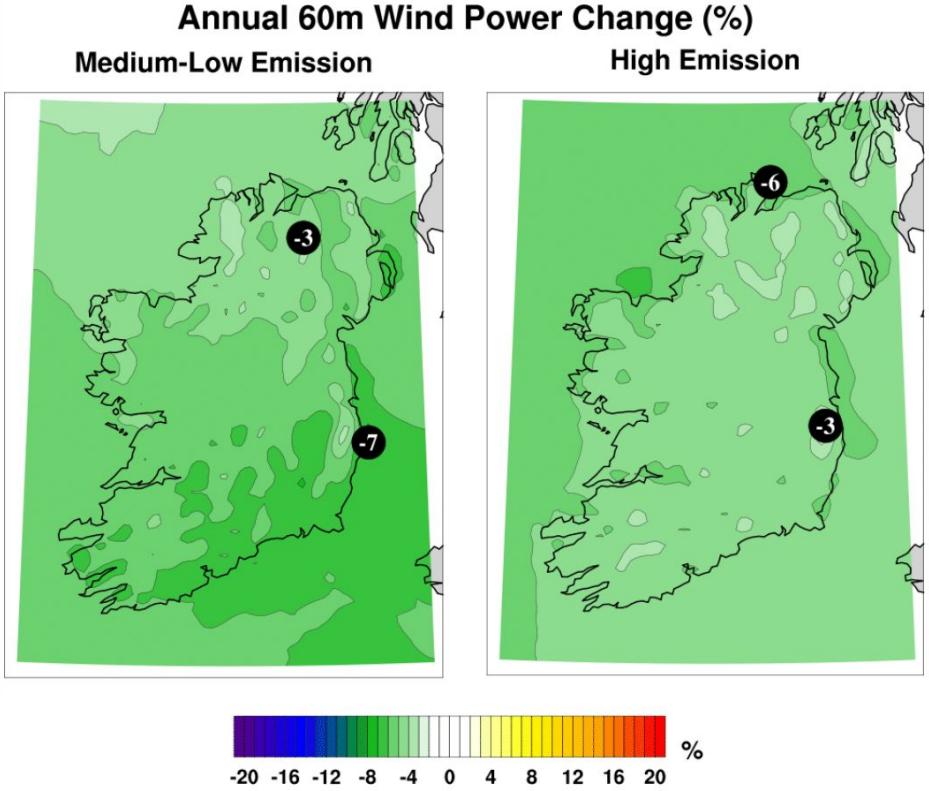
Mid-Century (2041-2060) Projections

Annual Wind Energy Projected Change (%)



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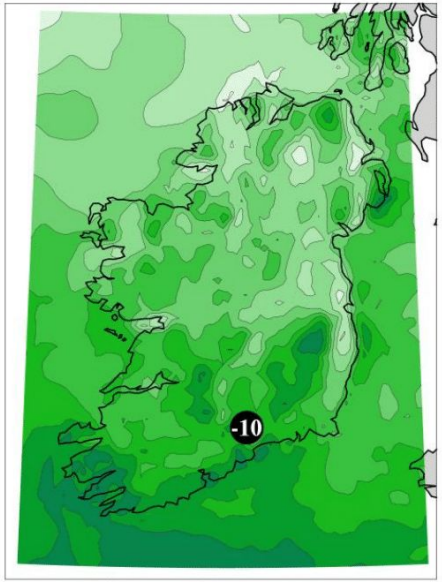
Mid-Century (2041-2060) Projections

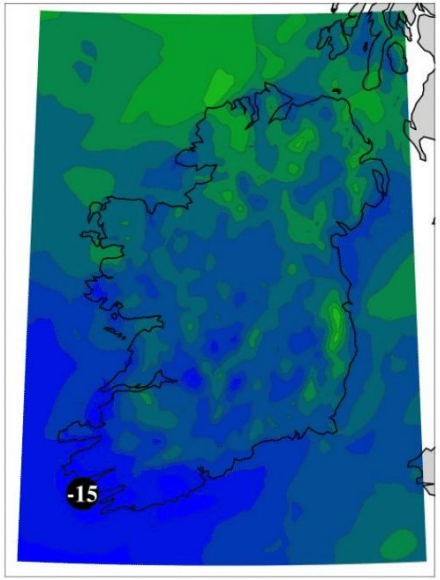
Summer Wind Energy Projected Change (%)

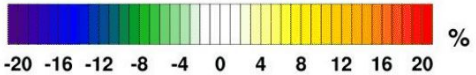
"Likely" Summer 60m Wind Power Decrease

Medium-Low Emission



High Emission





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Thank You

Key Outcomes for Ireland's Climate….

We can expect a temperature increase of 1 - 1.6 degrees Celsius.

A 2 degrees Celsius increase in daytime summer temperatures.

A 50% decrease in frosty nights.

A growing season increase of 35 days per year.

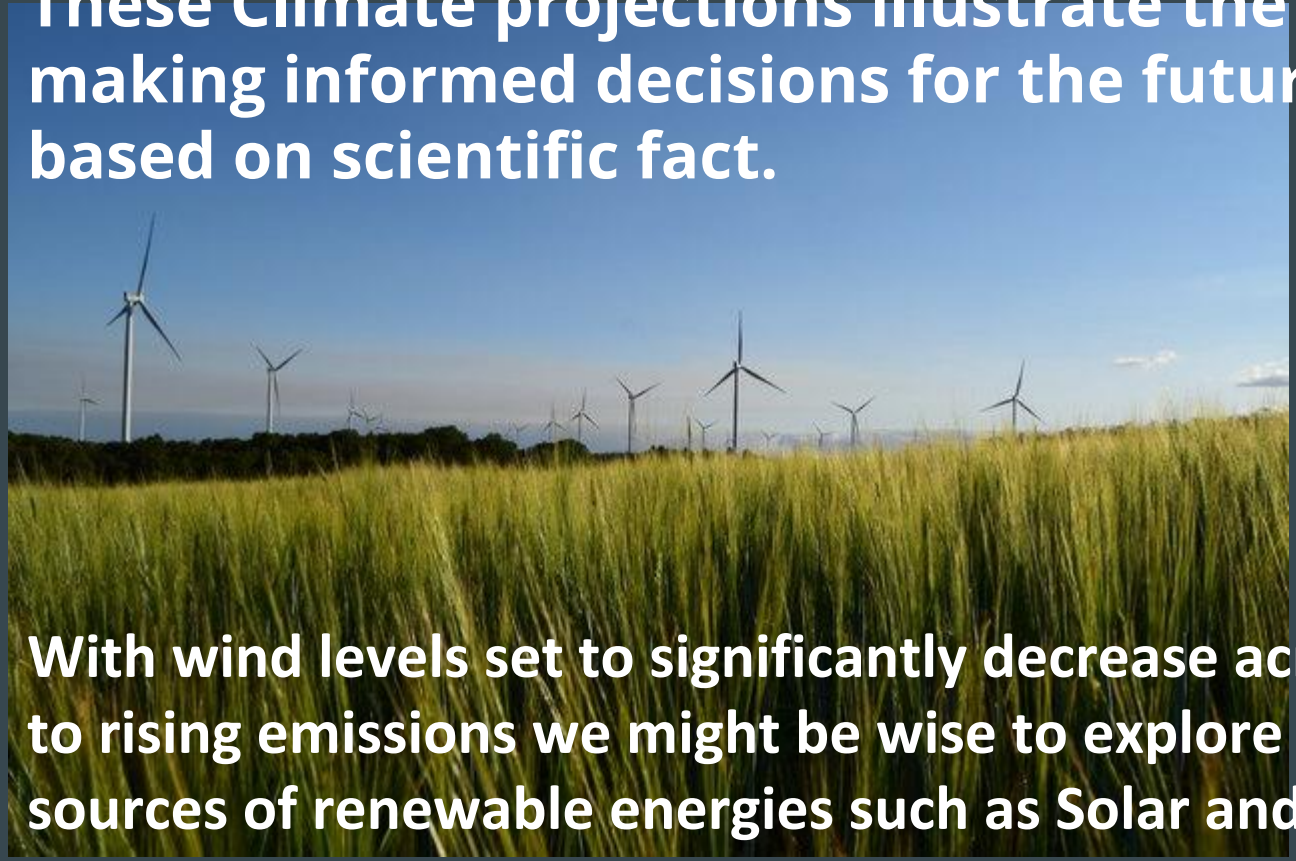
An increase in frequent and severe droughts.

Increased heavy rainfall events leading to flooding.

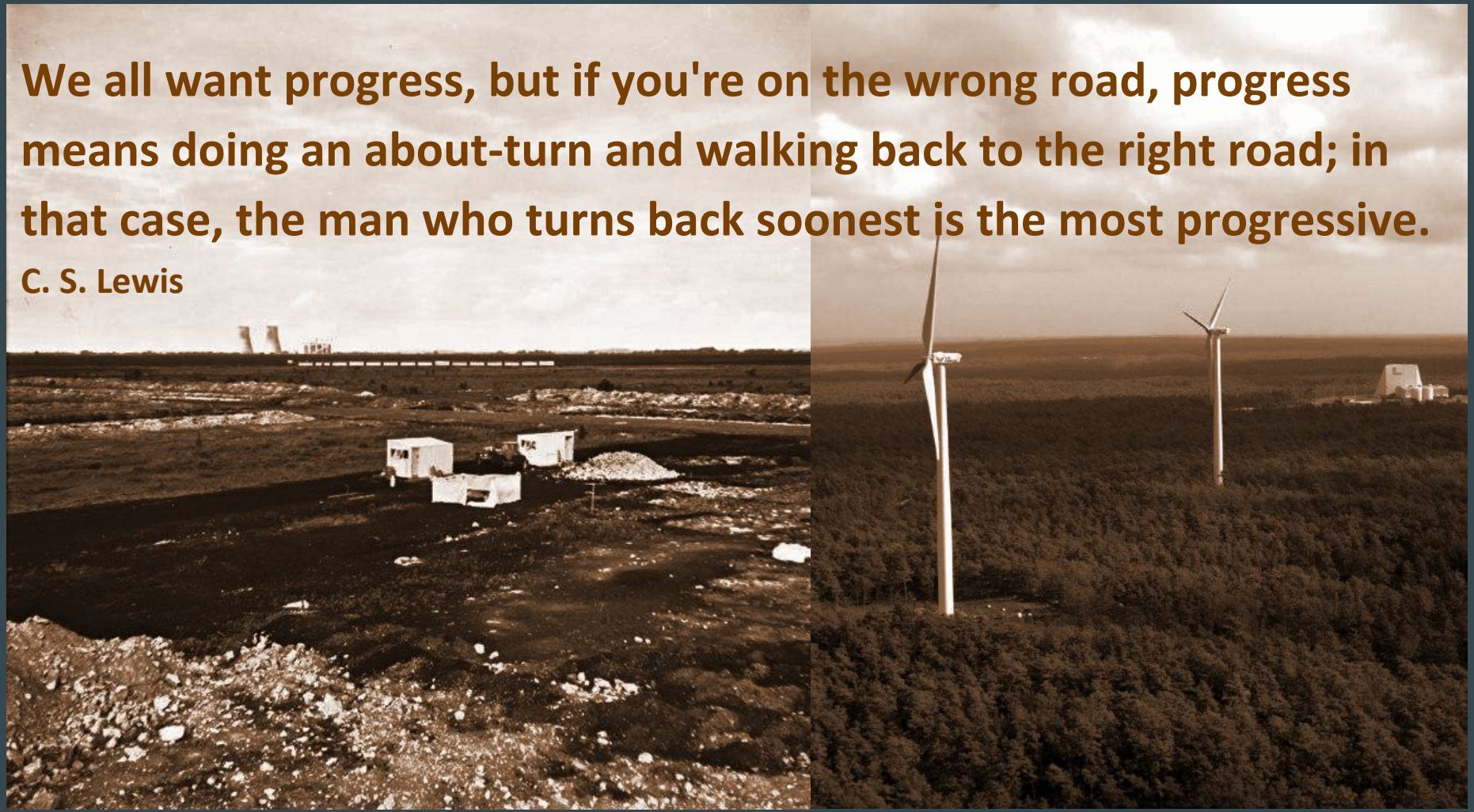
Wind energy decrease for all seasons except Winter.

These are the key findings of the Climate Change Model Projections by The Irish Centre for High-End Computing with Met Eireann. The research was funded by the DCCAE and EPA and kindly supplied Paul Nolan.

These Climate projections illustrate the importance of making informed decisions for the future of Offaly based on scientific fact.



With wind levels set to significantly decrease across Ireland due to rising emissions we might be wise to explore alternative sources of renewable energies such as Solar and Geothermal.


We all want progress, but if you're on the wrong road, progress means doing an about-turn and walking back to the right road; in that case, the man who turns back soonest is the most progressive.
C. S. Lewis

So now we know what to expect, what can we do as a County?

GREEN OFFALY
Sustainable Development Trust

While many are still deliberating the best course of action concerning the implementation of a cohesive climate strategy that reaches across all sectors of Irish society, here in Offaly we have already started work.

We have travelled across Offaly, consulting with Communities and listening to experts in the areas of Renewable Energy, Sustainability & Green Business.

‘A Trust that is independent from changing councillors and political parties would help build community belief in a long term plan’

Participant at Daingean Community Consultation.

What is Green Offaly?

Green Offaly is an Offaly Public Participation Network Initiative which has been set up as a response to the Government's Project 2040 seminar, 'Empowering Communities in the fight against Climate Change'. It is widely acknowledged that Communities have a pivotal role to play in the decarbonisation of Ireland and yet are often lacking in the specialised expertise and time needed to implement green projects.

Our answer to these challenges is the creation of 'Green Offaly', a countywide Sustainable Development Trust. Development trusts are in for the long haul. They are sustainable organisations for a sustainable future.

Why a Sustainable Development Trust?

Development Trusts are organisations that are community based, owned and led. Green Offaly aims to cultivate green community enterprises for long term sustainability. We will be trading for social purpose – where surpluses are reinvested into further enterprises for community benefit.

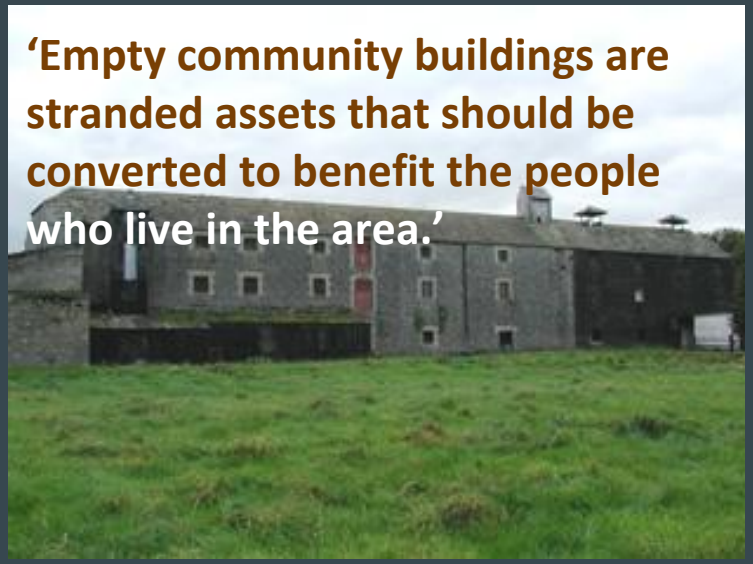
This is green regeneration and it has never been done in Ireland before.

Image- Banagher on the Shannon

The Mainstreaming of Low-Carbon Sustainable Lifestyles through Innovative Initiatives.

By working in partnerships that support the individual needs of our Communities, we can learn how to power our homes naturally, how to restore lost biodiversity and discover creative ways of changing our consumer choices.

Community Asset Transfers - A wealth of unexplored potential.



Participant - Tullamore Community Consultation

The Community ownership of assets (buildings, land and other assets) will assist us in building business capacity and will help us to achieve community renewal combined with local economic resilience.

Voices from our Communities.

‘We have been bypassed by the large employers when it comes to investment in skills and employment opportunities –

Renewable energy is a game played by the big boys and we have no ownership. Communities will engage if they feel they have investment options and dividends on a project.’ Participant, Ferbane Community Consultation

‘Community energy schemes must benefit the community first.’

‘The willingness to transition to a green future is there but a cohesive plan and community gain incentives to change have not been delivered’.

All comments from participants - Ferbane Community Consultation

‘The red tape associated with retrofitting is prohibitive.’

Voices on Energy.

‘Job creation in the transition to date has been very poor’.

‘Mount Lucas will increase from 28 wind turbines to 210 as per planning – is the efficiency/science enough to warrant so much hope on one renewable source. The willow program failed – are turbines next?’

Participants from Daingean Community Consultation.

‘Wind power is not enhancing the natural biodiversity or economics of the communities where they have been installed.’

‘Wood pellets were a failure as they were not reliable in supply and needed importing increasing costs and carbon footprint’.

Participants -Tullamore Community Consultation

Renewable Energy - The Current Situation.

The roll out of Community owned Green Energy projects has been beset with difficulties here in Ireland.

The knowledge required to install a renewable energy scheme can be a full time job in itself. Volunteers struggle with the time and expertise needed.

There are also problems with connecting to National Grid.

Often when Individuals and Communities are able to install a system they find that they can not sell the surplus energy back to the Grid. The return on investment is then limited.

This situation has been brought to the attention of the department. We are hopeful that it will be resolved soon.

Water Powered Offaly's Past, perhaps it could Power its future?

Of the 119 grain mills noted in Co Offaly, water provided the motive power to no fewer than 113 (95%).'

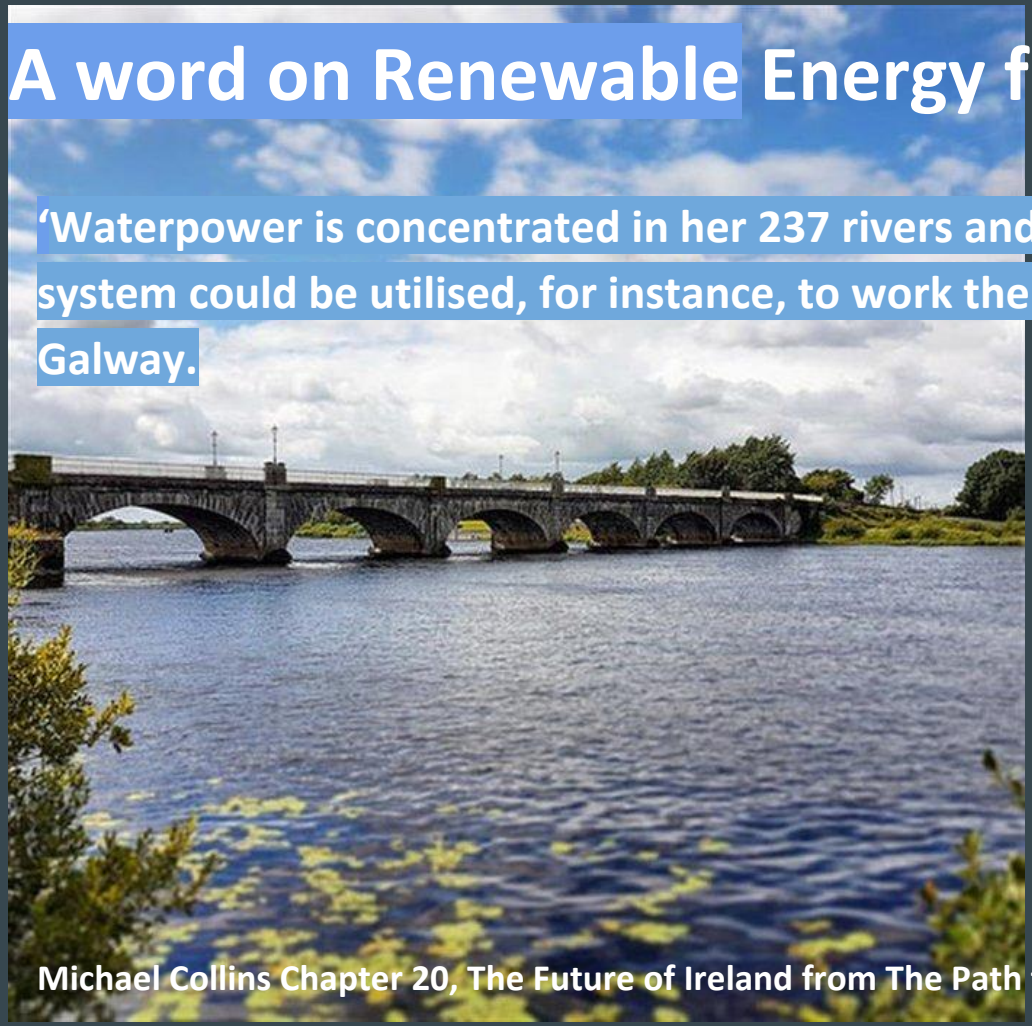
Image Kilcormac Water Wheel Today

'Compared with wind power, water can be relied upon for most of the year (in the form of rainfall!), is storable in millponds, and is also fairly straightforward to control by means of a sluice gate on the head race.'

'That wind-powered mills account for a mere 5% of the recorded number of grain mills in Offaly is undoubtedly because wind power is difficult to control, impossible to store, and unreliable.'

Extracts from Mills in Offaly -
A report by Fred Hamond, commissioned by Offaly County Council.

A word on Renewable Energy from Michael Collins.



‘Waterpower is concentrated in her 237 rivers and 180 lakes. The huge Lough Corrib system could be utilised, for instance, to work the granite in the neighbourhood of Galway.

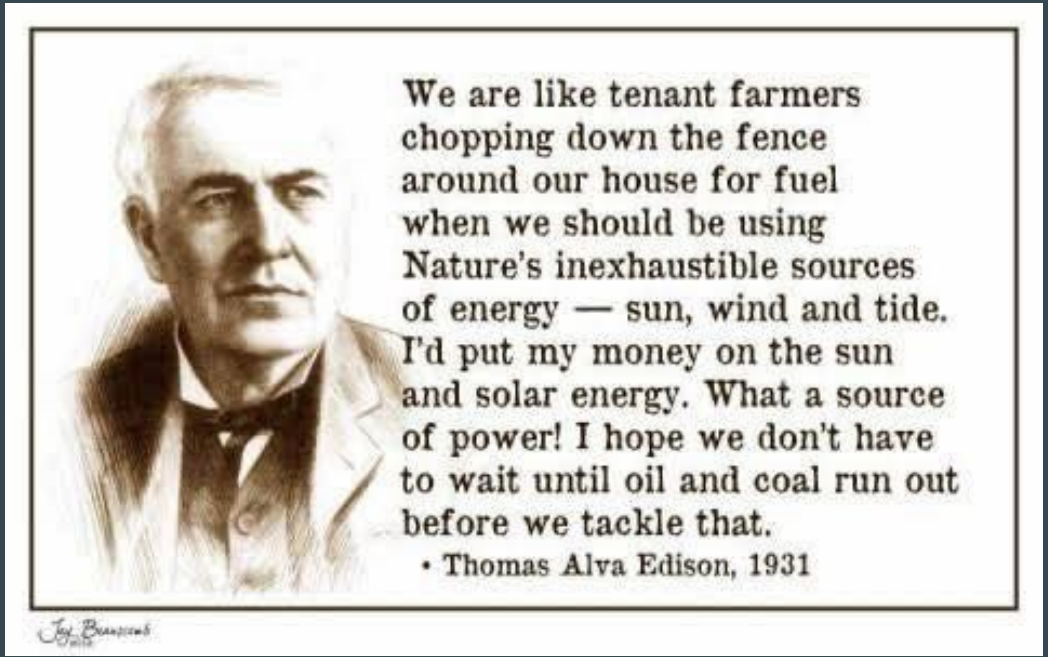
In the opinion of experts, reporting to the Committee on the water power Resources of Ireland, a total of 500,000 horsepower can be developed from Irish lakes and rivers. The magnitude of these figures is appreciated when it is known that to raise this power in steam would require 7,500,000 tons of coal. ” Schemes have been worked out to utilise the waterpower of the Shannon, the Erne, the Bann, and the Liffey’.

Michael Collins Chapter 20, The Future of Ireland from The Path to Freedom.

The Bogs.

“Our raised and blanket bogs have been systematically degraded through peat extraction, drainage and inappropriate tree planting.”

President Michael Higgins.



Peatlands are the Superheroes of Ecosystems:

Peatlands as Carbon Sinks.

In their natural state peatlands act as long-term sinks for atmospheric carbon dioxide.
A persistently high water table is necessary for this function. ...
The peatlands in the northern hemisphere alone store approximately 450 billion tonnes of carbon

(Gorham, 1991).

A Solitary Island of Uncut Peat in a Desert of Extraction.

BALLARD BOG - TULLAMORE 2019

Photo credit Emily Toner- Fulbright National Geographic Fellow.

Image of a raised bog before restoration….

Like humans, peatlands need water to survive. When peatlands are drained, the compressed organic matter begins to decay, turning long-submerged carbon into carbon dioxide and adding more greenhouse gases to our already overheated atmosphere.

Peat covers one-fifth of Irish land and has been heavily targeted for drainage, extraction and/or land use conversion. Currently, less than 15 percent of Irish peatlands are in good ecological condition.

Bog after Restoration

‘Ecologically speaking, Offaly has some of the best remaining bogs in Ireland. Of the four places in County Offaly classified as “Nature Reserves” important to wildlife by the Irish government, all four are bogs. Three are raised bogs--Clara Bog, Raheenmore Bog and Mongan Bog--and one is a blanket bog, Slieve Bloom Mountains Nature Reserve.’

Emily Toner- Bog Curious.

Voices On Nature.

‘The biodiversity that already exists is not being promoted properly. A Biodiversity Officer is needed in every county’ - Participant Daingean Community Consultation.

‘I remember when the hedgerows were full of damsons and fruit’
Participant Tullamore Sustainability Session

‘Commercial interests and government support for the big players, but no long term plan for the Communities on the ground has been a part of the problem,’ Participant Daingean

‘Studies over the past five years have shown that of 202 species of commonly occurring birds in Ireland, an alarming 63% are now on the Red and Amber Lists of Birds of Conservation Concern.’

President Michael D.Higgins - February 21, 2019, National Biodiversity Conference.

‘Our natural spaces, rivers, parks, bogs should be treated with respect and custodianship

It is time for the leadership to act boldly and make a statement to affect change.’

Participant - Tullamore.

‘The social/economic issues in an urban area creates a disconnect from nature.’ Participant-Tullamore

Corncrake

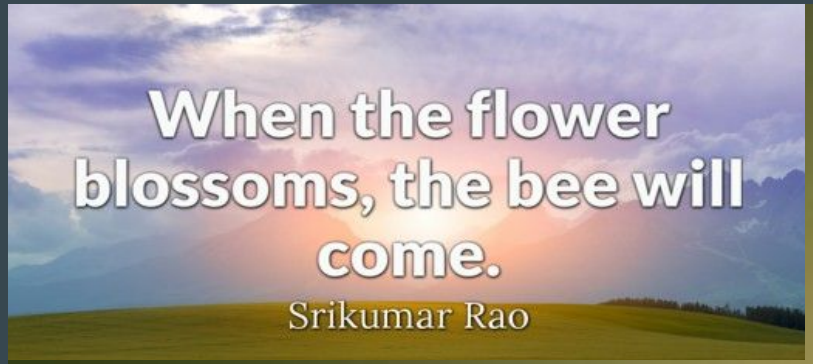
‘Community Action is needed to drive the Green Offaly Trust. Groups such as Tidy Towns are the on the ground’ Particpant Birr.

The Creation of wealth from working with Natural Materials.

Linen, Wool, Jute, Hemp, Hops, Straw - These Natural products are in demand once again. Community Enterprises based on Natural Products can bring wealth back to our Communities.

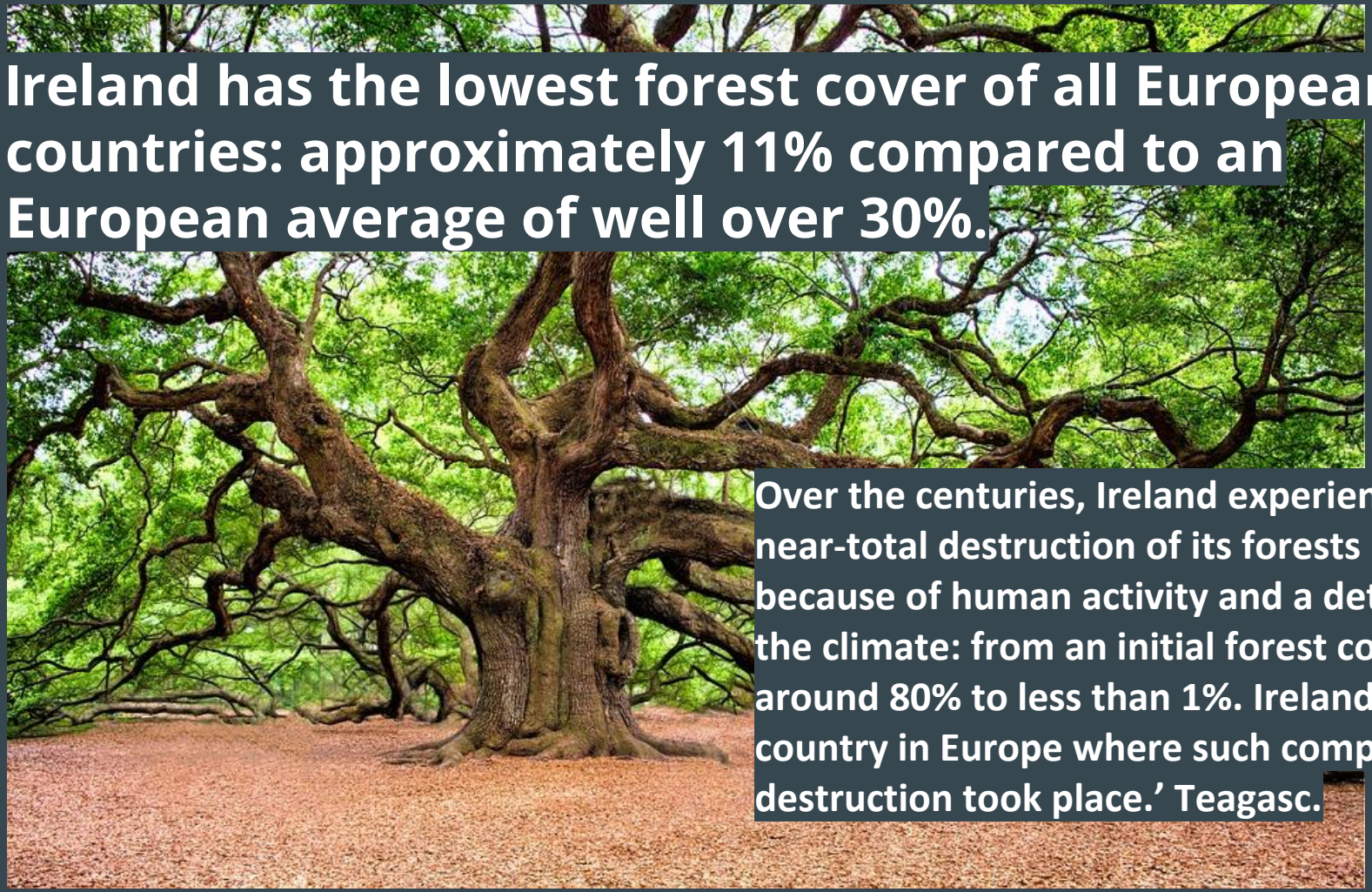
Concurring hands divide
flax for damask
that when bleached by Irish
weather
has the silvered chamois-leather
water-tightness of a
skin.
~ Marianne Moore

morefamousquotes.com



‘The Banning of Pesticides has to passed into legislation. Pesticides are leaking into our rivers. They destroy bees and they poison us.’
Participant Birr

‘30% of Ireland’s wild bee species are threatened with extinction and studies suggest that we in Ireland are losing butterflies and bees at a faster rate than in the rest of the world.’
President Michael Higgins February 2019



Ireland has the lowest forest cover of all European countries: approximately 11% compared to an European average of well over 30%.

Over the centuries, Ireland experienced a near-total destruction of its forests mainly because of human activity and a deterioration of the climate: from an initial forest cover of around 80% to less than 1%. Ireland is the only country in Europe where such complete forest destruction took place.’ Teagasc.


Offaly is rich in natural capital and being a predominantly rural County, we have an unprecedented opportunity to become a leader in Sustainable Development and guide from the centre. This is an Initiative which, if fully supported, could be the blueprint for how to empower communities in the fight against climate change across the country.
© Paul Moore Photography

Our Local Landscapes - a Wealth of Natural Capital.

The River Shannon floodplain lies to the NW of the County.

We have the Camcor, Brosna and Silver Rivers.

The Grand Canal runs from Edenderry through to Shannon Harbour.

We have many small lakes and 42 hectares of Swamp land.

21% of our total land area is comprised of 42,000 hectares of large bogs and peatlands which with careful restoration, form a mighty carbon sink.

4.5% of our land contains 22,000 acres of forest and woodland areas, 75% of this is Forested High Conifer. More Community owned Forests would increase our Carbon Bank.

Working in partnership with our Natural Capital around the following Themes:

BIODIVERSITY- Preserving and increasing our natural habitats and plant life.
ENERGY - The exploration and installation of renewable technologies via wind, water and earth.
SUSTAINABLE FORESTRY - Community Owned Native Forests, the safeguards of our water and soil.
GREEN AGRICULTURE- The conversion of a percentage of our farms to organic food production. Farms which maximise the capture of carbon into the soil. Farms which increase biodiversity. **Eco**
ECOTOURISM-The utilisation and restoration of our bogs and unspoilt land as geoparks as exemplified by Lough Boora Discovery Park.
FUTURE EDUCATION-The county environment as a natural classroom, apprenticeship schemes and certified training in future technologies and sustainable skills. Waterways Conservation, Eco and active tourism, natural energy, natural building, soil science.

‘A Trust that is independent from changing councillors and political parties would help build community belief in a long term plan’ Participant Daingean.

From the Outside, Looking in.

Opinion: rather than promotional labels like Hidden Heartlands, creative thinking is the key to a sustainable Midlands. Midlands landscapes are the legacy of years of laissez-faire attitudes together with decisions made by semi-state companies driven by economic imperative rather than environmental sustainability.

The potential for positive and creative change is exemplified by the otherworldly Lough Boora, Co. Offaly.

Here the rehabilitation of an industrialised bog combining both natural and human features offers a metaphor for a possible future Midlands where the landscape is transformed while remaining true to its heritage.

Extract adapted from 'The problem of branding the Midlands - RTE News - April 27th 2018
Dr Ruth McManus is associate professor at the School of History and Geography at DCU

THE VISION - County as a Green Campus

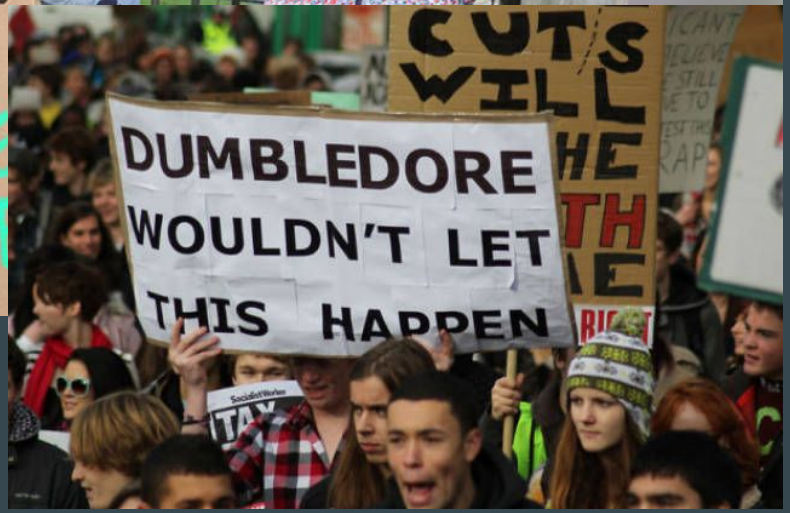
GREEN OFFALY IMPACTS

1. Delivering on Ireland’s legal commitments to the decarbonisation targets.
2. Decoupling Economic growth from Environmental degradation.
3. Creation of Sustainable Employment via the Green Economy.
4. Exemplary countywide educational training programme.
5. All contributing to the green regeneration of the county and a shared prosperity.


DO IT FOR
DAVID


WHICH GREEN
DO YOU SEE?


SORRY
I CAN'T TIDY
MY BEDROOM
I HAVE TO
SAVE
THE
PLANE
SAVE PLANET
EARTH
THE WORLD


CUTS
WILL
DUMBLEDORE
WOULDN'T LET
THIS HAPPEN

To finish- A word from the President

‘We are the first generation to truly comprehend the reality of what we’re doing to the natural world, and we may be the last with the chance to avert much of the damage. With this knowledge comes an extraordinary burden of responsibility that we all share…’

President Michael Higgins speaking at the first Irish Biodiversity Conference - Dublin February 2019.