Climate Change Adaptation Innovation Network

UKRI Innovate UK

Innovate UK Climate Change Mitigation Activities

Innovate UK continues working with sectors and industries on climate change mitigation to support the UK in net zero aspirations.

This work has been achieved through a variety of activities that includes the following Innovation Networks:

Cross-Sector Battery Systems Innovation Network

Circular Economy Innovation Network

Hydrogen Innovation Network

Net Zero Places Innovation Network

Why Climate Change Adaptation?

"adaptation remains the Cinderella of climate change, still sitting in rags by the stove: under-resourced, underfunded and often ignored."

….without action on adaptation we will struggle to deliver key Government and societal goals, including Net Zero itself."

June 2021 - Baroness Brown of Cambridge DBE FRS Chair of the Adaptation Committee, Climate Change Committee

Independent Assessment of UK Climate Risk - https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf

Innovate UK Climate Change Adaptation Innovation Network

Problem Statement: There is a role for innovation to build resilience against immediate and imminent effects of climate change.

This is important as there are key risks to many industries which will have significant impact on the operability of the broader UK business sectors.

Mission: To support collaborative industry-based communities that are taking action to adapt to the impacts of climate change in the next 10 years, building their resilience and enabling them to prosper.

UKRI Innovate UK

Why Innovate UK and Business Connect

Adapting to our changing climate cannot be done by government alone. It will require collaboration across civil society, local authorities, private and public sectors and infrastructure providers.

Communication of the risks, the impacts and the actions to take is an important part of this”

DEFRA - July 2018 - The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting - Making the country resilient to a changing climate

Areas Of Focus and Scope

Water

- Identify the impact changing climates have on the key sectors that rely on a resilient water management beyond the water companies.
- Identify the role of innovation and opportunities for regional and national investment

Cooling

- Space cooling in homes and commercial businesses (offices, retail, factories)
- Refrigeration required for the manufacturing and storage of products (manufacturing, retail, medical etc).

Biodiversity

- Define the role of biodiversity to create resilient environments for UK businesses to flourish
- Identify the role of innovation

UKRI Innovate UK

Let's connect!

Kelly Botham (AIEMA)

Facilitator, Teacher & Founder, Naive Expert, Master Generalist | Net Zero | Climate Chan...

Preparing for Climate Change

An introduction to adaptation

29 January 2025

Morgan Roberts, Sustainability West Midlands

sustainability west midlands

Who we are

- Sustainability West Midlands are the **independent advisor** for sustainability in the region (and beyond!)

- **We coordinate and monitor** the only existing regional Sustainability Roadmap; a framework to 2030.
- Supporting **all sectors** to be more sustainable, fairer, and greener

What does climate change mean for people and organisations in England?

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Climate Change and Net Zero

- Greenhouse gases (GHGs) such as **carbon dioxide** trap heat in our atmosphere. **Human activities** such as burning fossil fuels have led to a surplus of these gases and an observed increase in global temperatures, resulting in **accelerated climate change**

- **Climate change mitigation** means avoiding and reducing emissions of these gases

- **Climate change adaptation** means preparing ourselves for the worst projected impacts of climate change

‘Decarbonisation’

‘Net Zero’

Flooding

Severe weather

Heatwaves

Drought

Climate Change in England

What we can expect:

- Increased temperatures in both summer and winter
- Overall drier summers and wetter winters
- More intense downpour events in winter and summer

Flooding

Severe weather

Heatwaves

Drought

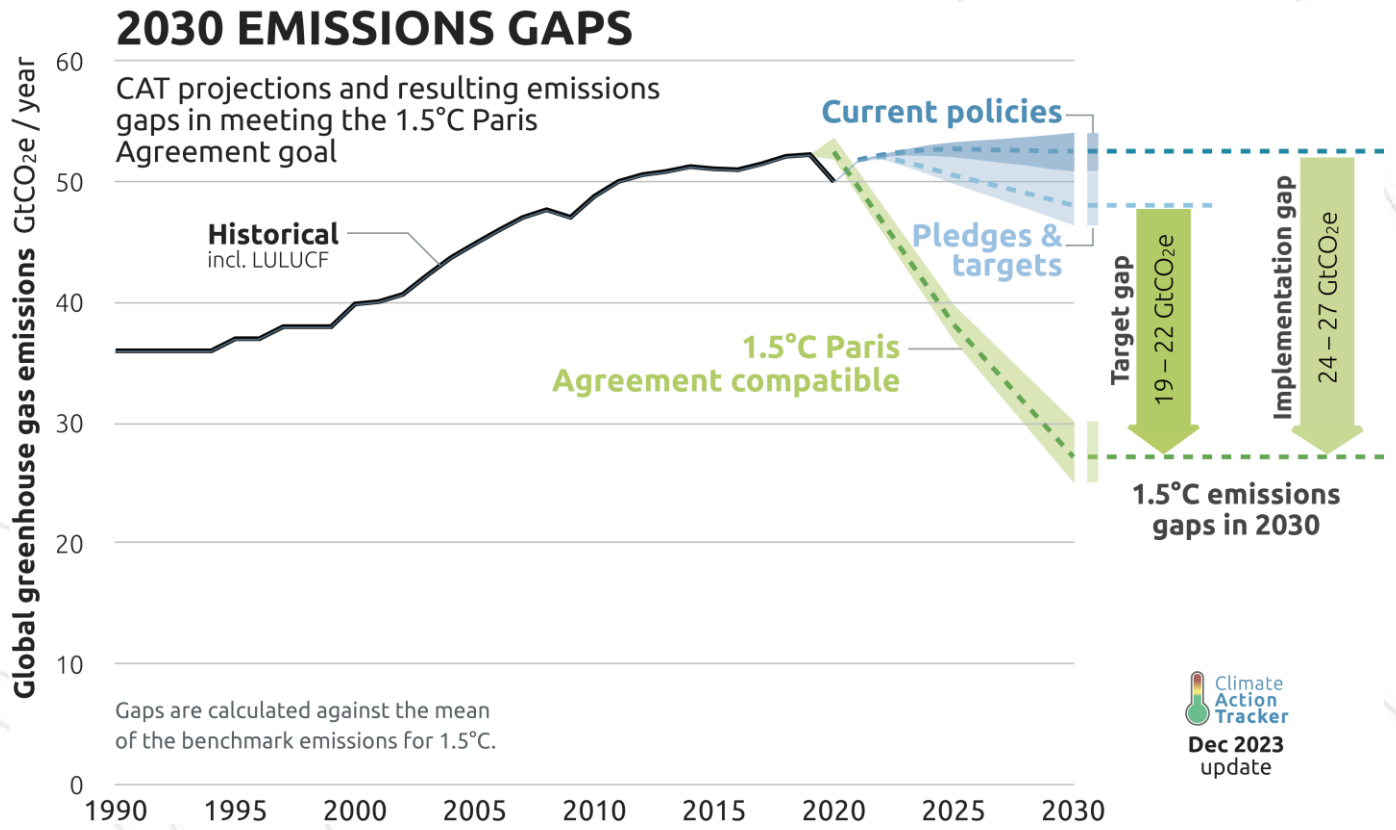
Temperatures above 40 degrees C © Olga Stock

Flooding in Morpeth © John Dal

Why adaptation is important to you

1. We will see impacts regardless of net zero efforts
2. Climate impacts are a thing of the present, not the future
3. Potential impacts on business continuity, health, and society
4. Policy and legislation
5. Opportunities and Co-benefits

1. We will see impacts regardless of net zero efforts

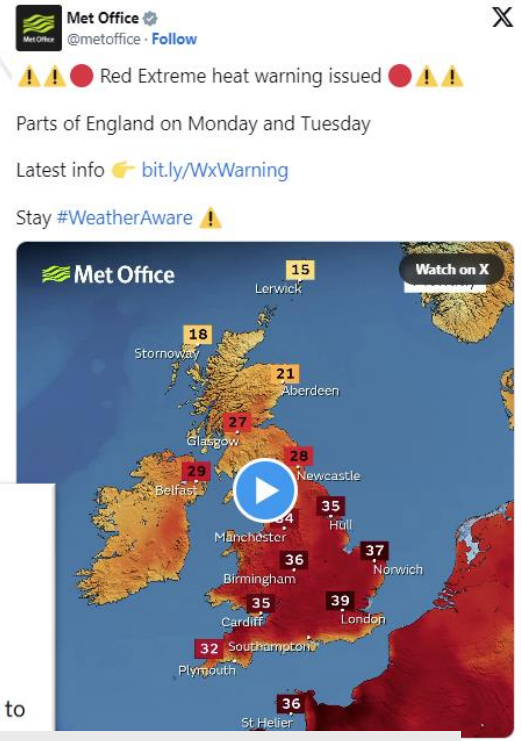


This graph shows that we are currently significantly above where we want to be in terms of global temperature rise, even with national and international net zero targets

2. Climate impacts are a thing of the present, not the future

Summer 2022 heatwave

- Record-breaking temperatures in England of over 40C
- UKHSA first ever Level-4 heat health alert
- 3,000 excess deaths in England




Press release

Heat-health advice issued for all regions of England

With temperatures rising to forecasted record levels this weekend, UKHSA and the Met Office is reminding people to take precautions to stay safe th


Excess mortality during heat-periods: 1 June to 31 August 2022

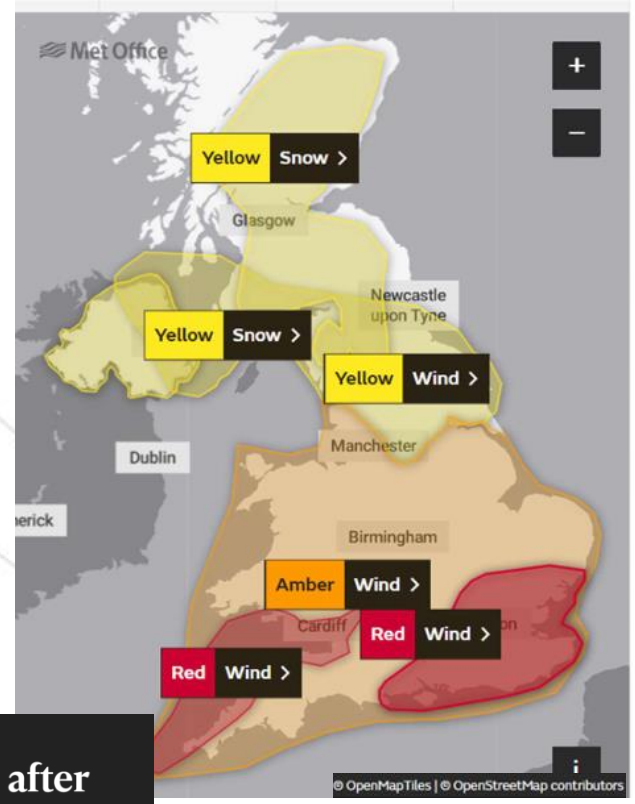
Joint analytical article between the Office for National Statistics (ONS) and UK Health Security Agency (UKHSA) on deaths during heat-periods in 2022.

https://www.carbonbrief.org/climate-change-made-2022s-uk-heatwave-at-least-10-times-more-likely/

2. Climate impacts are a thing of the present, not the future

Storms Eunice, Dudley and Franklin 2022

- Met office amber warning for wind in North East Somerset and red warning in Somerset
- 1.4 million homes lost power (21,748 in the region)
- Four people killed in Storm Eunice



Storm Eunice: Somerset and Gloucestershire declare weather emergencies

17 February 2022

Frustrated communities call for 'permanent solution' to flooding after three storms in one week

Around 400 properties have been flooded but heavy rain is putting more at risk

3. Potential impacts on business continuity, health, and society

Health

- Acute health issues
- Increase in diseases
- Occurrence of pests and non-native species

Society

- 6.3 million properties at risk of flooding
- Damage to properties and infrastructure
- Damage or changes to our natural environment
- People's trust in systems

People with existing vulnerabilities and deprivation are likely to be worst affected.

3. Potential impacts on business continuity, health, and society

Business continuity

- Damage
- Disruption to utilities and services
- Supply chain instability
- Staff wellbeing and productivity
- Costs
- Reputation

4. Policy and legislation

Adverse Weather and Health Plan

- Lays out who is responsible for addressing which areas of adaptation in the UK.

ICS: “The consideration of reasonable worst-case scenario and extreme events for adverse weather as a core component of community risk registers.”	Lead Local Flood Authority: County Council/Unitary Authorities. Manage local flood risk and coordinate between Risk Management Authorities.	Communications toolkits for Health and Social Care, Public Health, Community and Voluntary Organisations…	Heatwave Plan for England including actions recommended for Health and Social Care Commissioners, Healthcare providers, Community and Voluntary sector…

4. Policy and legislation

Adaptation Reporting Power

- Voluntary reporting on climate risks and planned adaptation
- Reporting organisations include Water companies, Energy companies, Road and rail, Defra agencies, NHS, Local Authorities…

Climate-related reporting requirements (TCFD)

- Required of many private companies and firms (depending on size)
- Disclose risks from climate change and financial cost/implications of these

4. Policy and legislation

Planning Regulations

- Flood Risk Assessments
- Sustainable drainage strategies
- Thermal Comfort, Energy Performance

Different councils may have different requirements, as may different sectors outside of standard Planning Regulations e.g., NHS

4. Policy and legislation

Private sector responsibilities

- Owning a watercourse
- Temperatures

Temperature in the workplace

1. Is it too cold or hot to work?
2. What the law says
3. Managing workplace temperature
4. How workers can help keep temperatures comfortable
5. Outdoor working
6. Dehydration
7. Heat stress
8. Cold stress

Guidance

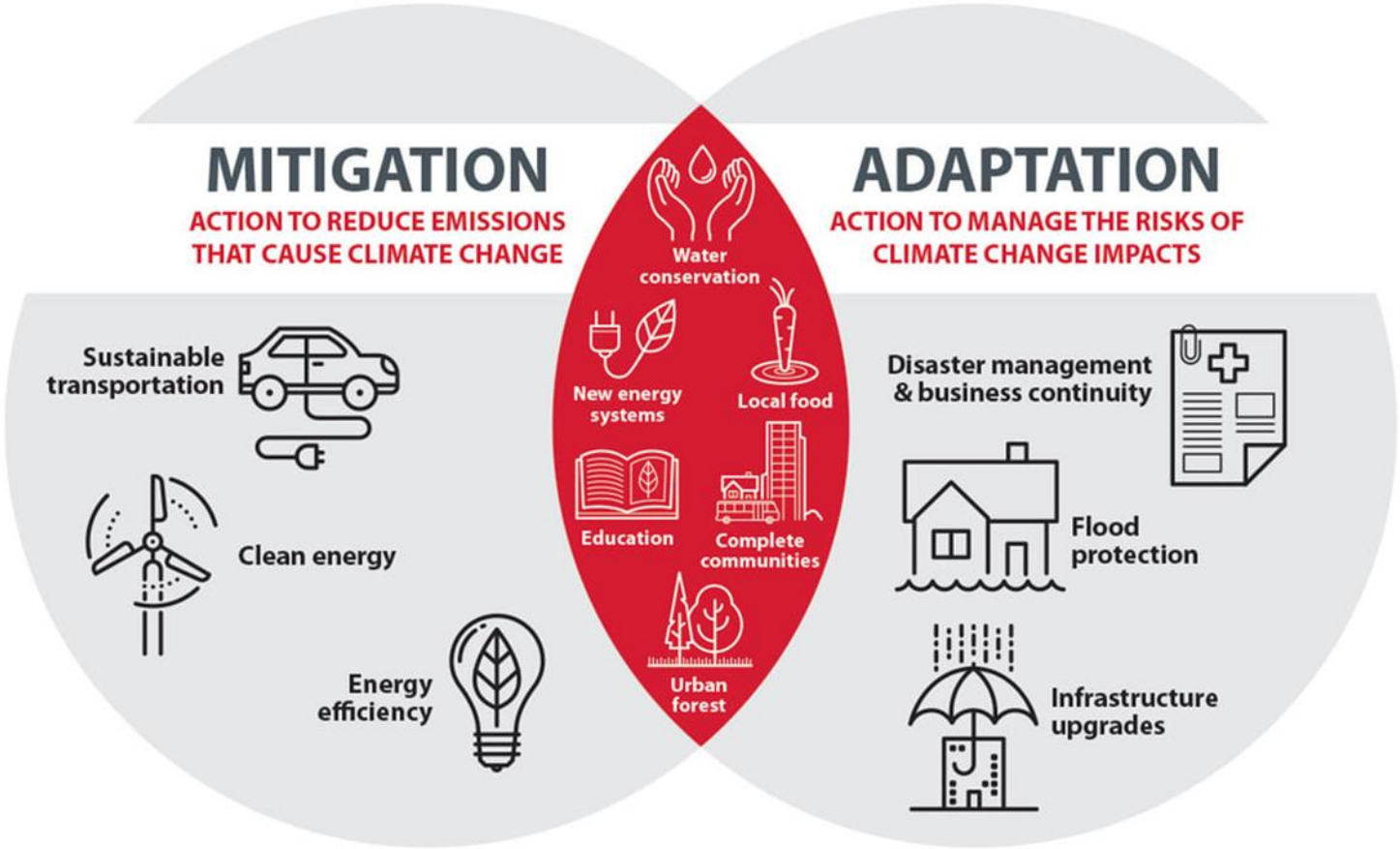
Owning a watercourse

Your responsibilities and rules to follow for watercourses on or near your property, and permissions you need to do work around them.

5. Opportunities and Co-benefits

Business resilience	Efficiencies	Service quality	Environmental Sustainability
Energy security	Energy and cost savings	Increased/secured accessibility of service	Nature Based Solutions also improving biodiversity, contributing to net zero.
Supply chain stability	Improved processes	Stronger relationships with suppliers, customers, public	Resource efficiency (reduced waste, water, energy…)
Improved staff wellbeing and productivity	Reduced maintenance	Reliability of service improving reputation, outcompeting competition	Reduced air and water pollution

5. Opportunities and Co-benefits



So, what can we do? Delivering climate change adaptation

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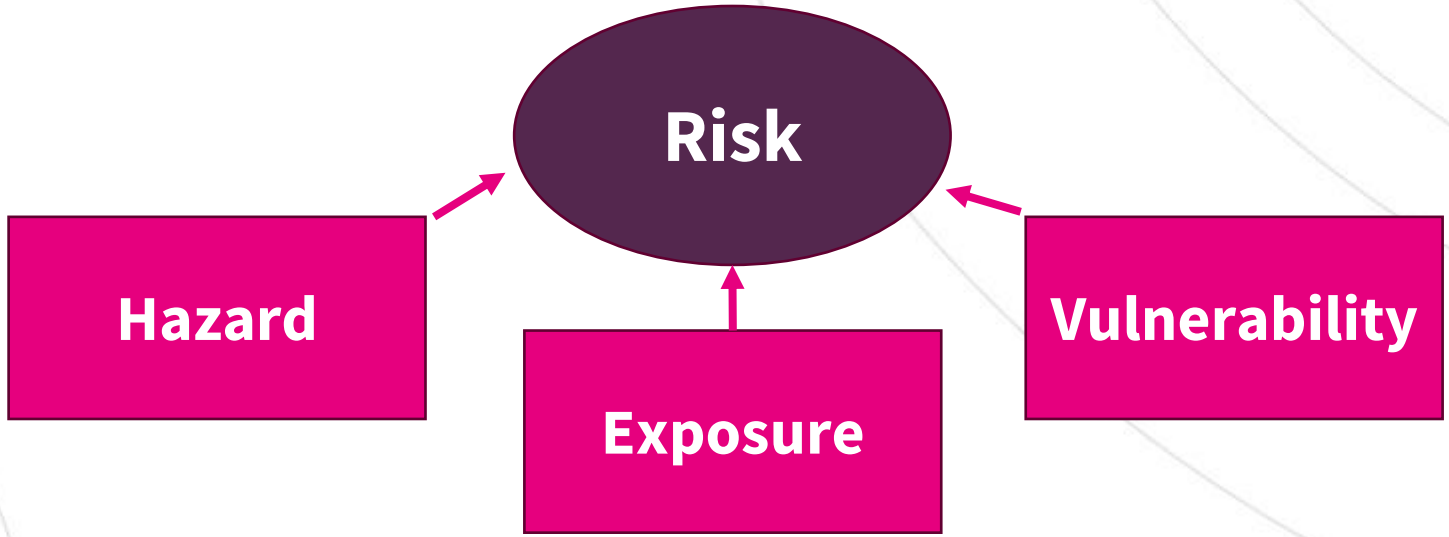
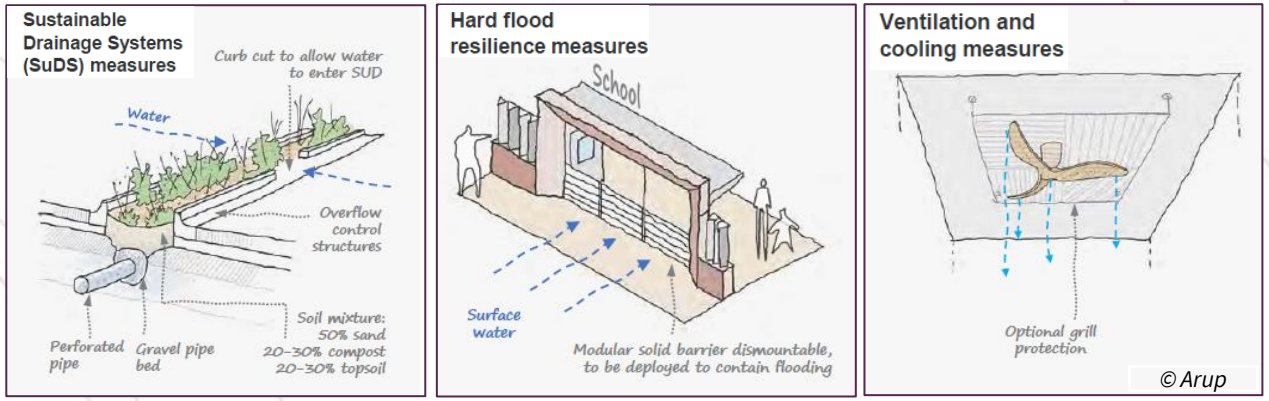
Climate Change Adaptation

- Adaptation includes any action to reduce **vulnerability or exposure** to the actual or expected impacts of climate change.
- We need to **alter** our places, systems, and behaviours to **prepare** our assets, businesses, people, and environment from the worst projected impacts of climate change.



What sort of actions do we need to take?

- **Hard interventions**
  - Building modifications and infrastructure strengthening
- **Nature-based solutions**
  - Such as Natural Flood Management, tree cover for cooling and shading…
- **Planning and Strategy**
  - Embedding adaptation into existing policy and procedure or producing climate risk assessments and adaptation plans



Leaky barrier in the River Lymn NFM project ©South & East Lincs Climate Action Network

Flood barriers in Oxford ©Environment Agency

So, what can you do?

1. Understand your own risk
2. Consider your adaptation options
3. Identify opportunities to embed adaptation
4. Share learnings and activities with others

Free Resources

- **All sectors** – UK Climate Change Risk Assessment (CCRA) summary and sector briefings
- **Businesses** – Weathering the Storm guide to saving and making money in a changing climate
- **Local Authorities** – Practical examples of adaptation

Free Resources

- **The NHS** – A Climate Adaptation Framework and Adapt to Survive for completing your own risk assessment and adaptation plan
- **Agriculture** – Weathering the Storm for Agriculture
- Existing adaptation plans as examples/templates
  - West Midlands 2021-26

Free resources

- Check your long-term Flood Risk
- Sign up for the Environment Agency's Flood Warnings
- Sign up to the Met Office Weather Health Alerting System
- Local Climate Summaries from the Met Office
- Local Climate Adaptation Tool (LCAT) and Introduction to Local Climate Adaptation Toolkit
- Climate Just for mapping climate change projections compared with indices of deprivation and inequalities

Keep in touch

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Climate Adaptation

Innovation & Technology

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Introduction

Georgia Rolfe

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cambridgeconsultants
Part of Capgemini Invent

Cambridge Consultants is the deep tech powerhouse of Capgemini – spearheading transformative projects that solve the toughest scientific and engineering challenges.

Why is innovation and technology so important for climate adaptation?

Economic imperative

The Global Commission on Adaptation found that a $1.8 trillion investment in adaptation actions by 2030 could yield more than $7 trillion in economic benefits and avoided costs.

The new normal

The Earth's climate system, particularly the oceans, has a large heat capacity, meaning it takes time to respond to changes in energy balance.

This inertia means that the warming effects of past emissions will continue to influence global temperatures for decades.

Lifesaving Potential

Climate adaptation technologies can save lives by improving early warning systems, building resilient infrastructure, predicting events and enhancing disaster response.

5 key areas for innovation and technology focus

Resilient Infrastructure

Health

Agriculture

Ecosystem Management

Artificial Intelligence (AI)

Modelling and Prediction is used to support all areas of climate change adaptation

Artificial Intelligence (AI)

Climate change adaptation is supported by AI. It involves using advanced techniques and tools to anticipate the impact of climate change and inform on adaptation strategies .

Climate modelling and impact assessment to predict future climate conditions and assess potential impacts

Risk mapping of areas at risk from hazards (flooding, drought, sea level rise, disease etc)

Scenario analysis informs on the range of possibilities based on the input of varying impact factors

Gather, complete and process data

Strengthen planning and decision making

Optimise processes in real time

Power discovery processes

Nudge adaptive behaviours

Supporting technologies

Drones

Aerial data collection of land and physical assets

Earth Observation

Satellite enabled data collection

Planetary intelligence

IoT

Distributed data collection

real-time information for informed decision making

Smart Grids & Energy Storage

Energy continuity

Integration of renewable energy

Advanced Computing

Powers intelligence.

Quantum computing

Key adaptation areas supported by AI

Resilient Infrastructure

Designing, constructing and retrofitting to withstand extreme events and changes to conditions.

Critical National Infrastructure: energy, water, transportation, telecommunications, data centres

Understanding risks, planning and preparation. Suitable Early Warning Systems (EWS)

Nature based solutions, flood barriers, advanced cooling technology, off-grid energy etc

Health

Preparing and adjusting health systems and communities to minimise the adverse health impacts of climate change.

Heatwave preparedness, management and mitigation

Disease and vector control.

Crisis management and humanitarian support

Agriculture

Adjusting practices, processes, and structures to minimize the negative impacts of climate change and take advantage of any potential benefits.

Soil and water conservation: restoring natural practices to reduce erosion, improve health and reduce irrigation

Precision and smart farming.

Crop diversification: diverse genetic and species planting and heat-resistant varieties

Ecosystem Management

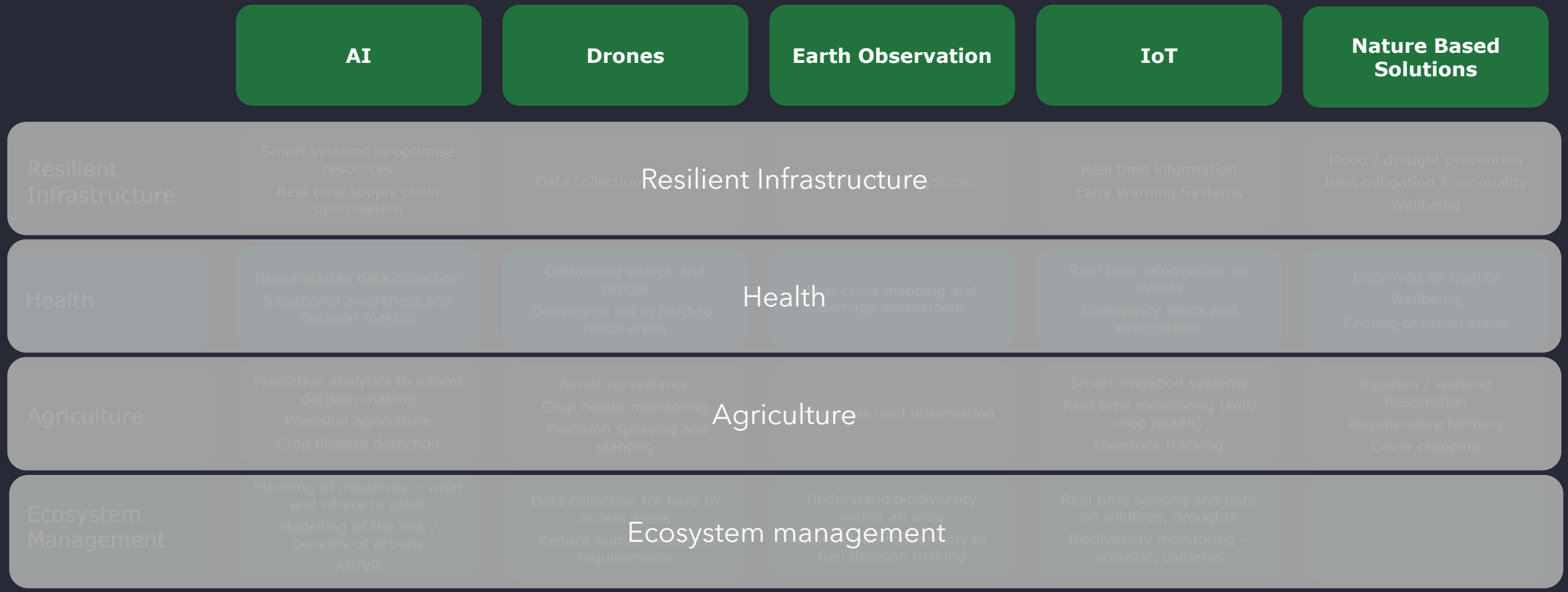
Strategies that enhance the resilience of ecosystems to climate change impacts and adapt to changing conditions.

Mangrove forests for storm surge protection and erosion prevention

Wetland restoration for biodiversity, flood, fire and drought protection

Grassland/forest restoration for biodiversity, soil health, wildfire prevention and water conservation

There are core technologies that support climate adaptation



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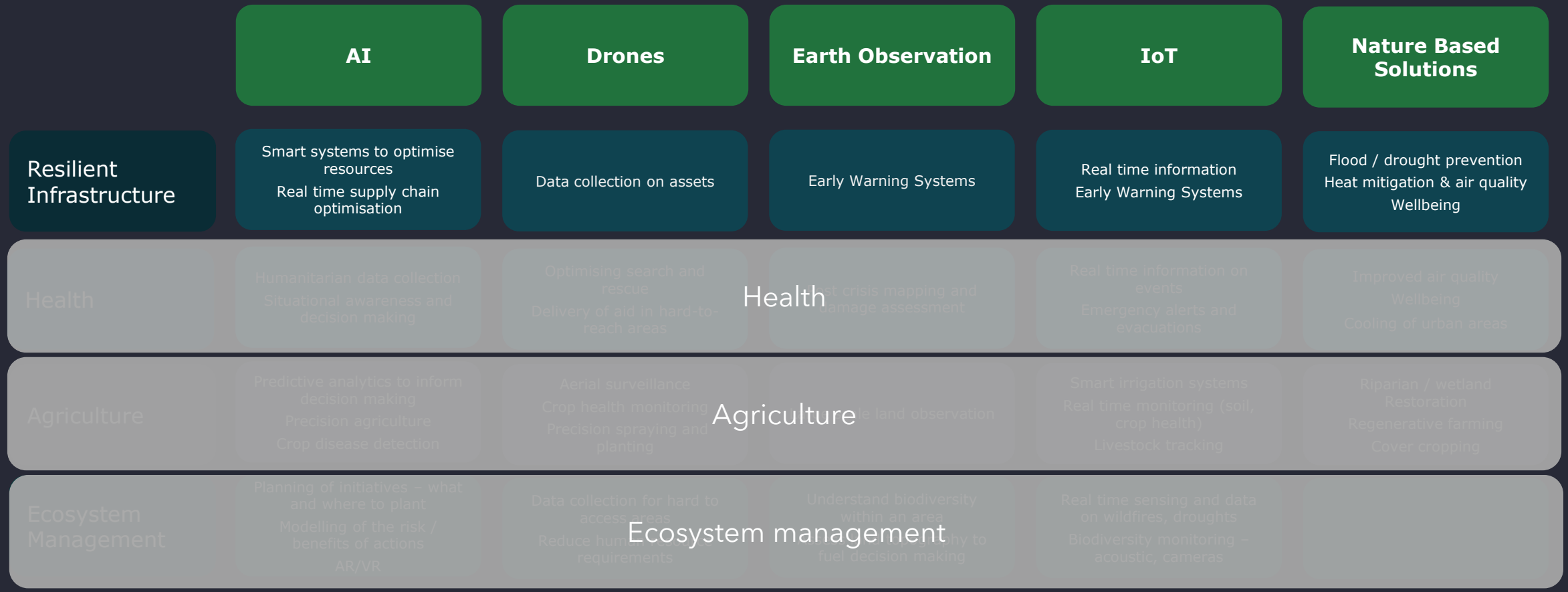

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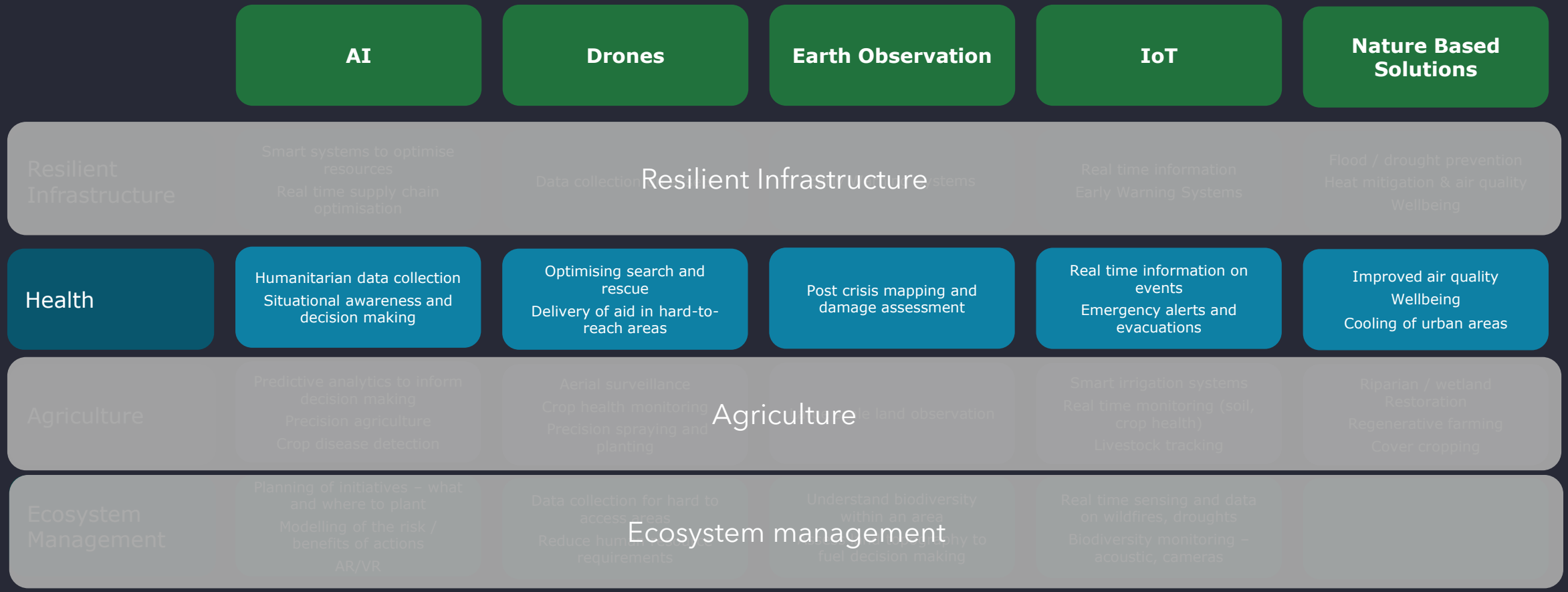

There are core technologies that support climate adaptation

	AI	Drones	Earth Observation	IoT	Nature Based Solutions
Resilient Infrastructure	Smart systems to optimise resources Real time supply chain optimisation	Data collection	Resilient Infrastructure	Real time information Early Warning Systems	Flood / drought prevention Heat mitigation & air quality Wellbeing
Health	Humanitarian data collection Situational awareness and decision making	Optimising search and rescue Delivery of aid in hard-to-reach areas	Health	Real time information on events Emergency alerts and evacuations	Improved air quality Wellbeing Cooling of urban areas
Agriculture	Predictive analytics to inform decision making Precision agriculture Crop disease detection	Aerial surveillance Crop health monitoring Precision spraying and planting	Large scale land observation	Smart irrigation systems Real time monitoring (soil, crop health) Livestock tracking	Riparian / wetland Restoration Regenerative farming Cover cropping
Ecosystem Management	Planning of initiatives – what and where to plant Modelling of the risk / benefits of actions AR/VR	Data collection for hard to access areas Reduce human resource requirements	Understand biodiversity within an area Ecosystem Management	Real time sensing and data on wildfires, droughts Biodiversity monitoring – acoustic, cameras	

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Resilient Infrastructure

Flood Warning Systems for UK Highway.

Hydro-Logic® Smart Monitoring systems offer **early flood warnings** to reduce risks for road users by providing accurate, **real-time information on flood levels** in rivers, streams, reservoirs, lakes, and ponds. **Alerts are triggered** when water levels reach pre-set points, and notifications are sent via text message and email to key personnel, such as maintenance teams and traffic control, to ensure timely responses.

Health

Exploring the use of UAV (unmanned aerial vehicles – drones)

For health workers in remote areas and regions with complex geography, transportation challenges can disrupt the provision of quality care to children and pose constraints to early diagnosis.

Unmanned aerial vehicles, or ‘drone’-based technologies and services are demonstrating the ability to deliver life-saving materials, and in so doing, generate substantial social benefits.

Agriculture

YARD STICK Soil Carbon Revealed

Soil carbon sequestration efforts to date have been significantly hampered by the complexity and cost of measuring soil organic carbon (SOC) authoritatively and affordably.

Developing a novel handheld spectroscopic based tool which can quickly measure the soil organic content in situ in the field, Yard stick are reducing the cost of high-quality SOC measurement by 90%+

Ecosystem Management

The Devon Rewilding Network, run by Ambios since it began in 2021, has been awarded a Rewilding Britain Innovation Fund grant to use **Artificial Intelligence (AI) to visualise different futures for some of the landscape along the banks of the River Dart**.

The **AI uses drone flight images** and produces realistic impressions of the future in nature recovery.

The overlapping technologies that support climate adaptation allow for focused innovation

Examples of barriers and areas for innovation

Artificial Intelligence (AI)

Power and energy consumption
- Data centres
- High energy demand: significant emissions and impact ad infrastructure strain

Water
- Cooling requirements and resource management

Cybersecurity
- Vulnerability to attacks and data privacy

Nature based solutions

Technical integration
- Complexity of integrating advanced technology and natural systems

Barriers to entry
- High initial costs
- Developing regulatory landscape

Monitoring and Evaluation
- Developing reliable metrics to assess performance is complex
- Continuous monitoring and adaptive management required

Internet of Things (IoT)

Sensor / hardware accuracy
- Precision, reliability, calibration and maintenance

Availability and scalability
- Supply chain, compatibility and standardisation issues
- Scalability requires robust infrastructure and management

Environmental factors
- Performance over temperature ranges and in harsh conditions

The time for innovation and climate adaptation is now

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Sustainable Technologies || Climate Adaptation and Resilie...

Appendix

Artificial Intelligence (AI)

Climate change adaptation is supported by AI. It involves using advanced techniques and tools to anticipate the impact of climate change and inform on adaptation strategies .

Climate modelling and impact assessment to predict future climate conditions and assess potential impacts

Risk mapping of areas at risk from hazards (flooding, drought, sea level rise, disease etc)

Scenario analysis informs on the range of possibilities based on the input of varying impact factors

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Energy continuity

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Powers intelligence.

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Resilient Infrastructure

Climate change adaptation for resilient infrastructure involves designing, constructing and retrofitting to withstand extreme events and changes to conditions.

Critical National Infrastructure: energy and water supply, transportation, health, telecommunications, data centres

Understanding risks, planning and preparation.
Suitable Early Warning Systems (EWS)

Nature based solutions, flood barriers, advanced cooling technology, off-grid energy etc

Supporting technologies

Smart Grids & Energy Storage

Enhanced resilience

Microgrids

Facilitate the integration of renewable energy

Demand management

Nature Based Solutions

Flood management and drought resilience

Heat mitigation

Air quality

Wellbeing

AI

Smart sewer / water systems that optimise flows etc

Supply chain optimisation - dynamic readjustment following disruption

Earth Observation

Early Warning Systems

IoT

Real time information

Early Warning Systems

Health

Climate change adaptation in terms of health involves preparing and adjusting health systems and communities to minimise the adverse health impacts of climate change.

Heatwave preparedness, management and mitigation

Disease and vector control.

Crisis management and humanitarian support

Supporting technologies

IoT

Early Warning Systems

Real time information on events: emergency alerts and evacuations

Direct people to safe spaces during events

Nature Based Solutions

Improved air quality

Wellbeing

Cooling of urban areas

AI

Humanitarian data collection

Situational awareness and decision making

Optimising evacuations and mobility

Drones

Optimising search and rescue
Delivery of aid in hard-to-reach areas

Earth Observation

Post crisis mapping and damage assessment

Agriculture

Climate change adaptation in terms of agriculture and natural resources involves adjusting practices, processes, and structures to minimize the negative impacts of climate change and take advantage of any potential benefits.

Precision and smart farming.

Soil and water conservation: restoring natural practices to reduce erosion, improve health and reduce irrigation

Crop diversification: diverse genetic and species planting, drought and heat-resistant varieties

Supporting technologies

Nature Based Solutions

Riparian / wetland Restoration

Regenerative farming

Agroforestry / permaculture

Cover cropping

Drones

Aerial surveillance

Crop health monitoring (pests, invasive species, diseases etc)

Precision spraying

Precision planting

AI

Predictive analytics to inform decision making

Precision agriculture

Crop disease detection

Yield prediction

IoT

Smart irrigation systems

Real time monitoring

Livestock tracking

Earth Observation

Large scale land observation

Ecosystem Management

Climate change adaptation encompasses ecosystem management through various strategies that enhance the resilience of ecosystems to climate change impacts and adapt to changing conditions.

Grassland/forest restoration for biodiversity, soil health, wildfire prevention and water conservation

Wetland restoration for biodiversity, flood, fire and drought protection

Mangrove forests for storm surge protection and erosion prevention

Supporting technologies

Earth Observation

Understand biodiversity within an area

Assess land topography to fuel decision making

IoT

Real time sensing and data on wildfires

Biodiversity monitoring – acoustic, cameras

AI

Planning of initiatives – what and where to plant etc

Modelling of the risk / benefits of actions

AR/VR

Drones

Data collection for hard to access areas

Reduce human resource requirements

Nature Based Solutions

Evidence Pack

The Global Commission on Adaptation

The Cost of Inaction: A CEO Guide to Navigating Climate Risk

Tech for Climate Adaptation

Adapt now: a global call for leadership on climate resilience

Innovation and Adaptation in the Climate Crisis: Technology for the New Normal

Future proofing digital infrastructure

Adapting to climate change can saves lives and livelihoods

GIS and climate change

Climate research group of Environmental Research Laboratory

Nature-based solutions implementation

Challenges to realising the potential of nature-based solutions

What is AIs role in the climate transition and how can it drive growth?

Adaptation: natural resources conservation service

Examples

Hydro International

UNICEF drones

Yard Stick

AMBIOS / DRN

UK ▪ USA ▪ SINGAPORE ▪ JAPAN

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