

# Examples of 'no-regret', 'low-regret' and 'win-win' adaptation actions

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## Summary

- Drawing upon definitions provided by the UK Adaptation Sub-Committee, UK Climate Change Impacts Programme and City of London Corporation no-regrets, low-regrets and win-win actions can be summarised as follows:
  - **No-regret actions** are cost-effective under current climate conditions and are consistent with addressing risks of climate change, they possess no hard trade-offs with other policy objectives.
  - **Low-regret actions** are relatively low cost and provide relatively large benefits under predicted future climates.
  - **Win-win actions** contribute to adaptation whilst also having other social, economic and environmental policy benefits, including those relating to mitigation.
- One of the **benefits** of identifying no-regret, low-regret and win-win actions is that it enables organisations and others to implement short-term adaptation actions and in doing so begin the adaptation process, rather than adopt a 'wait and see approach'.
- The ASC (2011) make use of **adaptation cost curves**, and standard appraisal techniques such as cost-benefit, cost-effectiveness and multi-criteria analysis can be used to identify low regret adaptation measures (ASC, 2011).
- No-regret, low-regret and win-win actions are identified across a range of sectors for example:
  - **Built environment:** improve water efficiency and help address drought risk e.g. by installing low flow taps, showers and toilets; address the risk of flooding e.g. by installing door guards and air brick covers, location electrical controls, cables and appliances at a higher than normal level; reduce internal heat gain especially during heat-waves e.g. by creating green roofs and walls.
  - **Land use and planning:** reduce the risk of flooding by avoiding building in high risk areas.
  - **Water:** improve water efficiency and help address drought risk e.g. by reducing leakage from water utility infrastructure.

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- **Agriculture:** reduce the risk of flooding e.g. by establish holding ditches for excess run-off, plants trees and shrubs to reduce run-off; reduce the risk of soil erosion e.g. by establishing hedgerows as a wind break and ground reinforcement measures to reduce soil damage and erosion caused by trampling; respond to the risk of wildfire e.g. by completing wildfire training and considering the establishment of a wildfire water resource pond.
- **Forestry:** review species suitability and diversity as management plans are renewed, maintain a number of different forest management systems where suitable sites and species and management objectives allow, review rotation and planting seasons.
- **Natural environment:** monitor climate change impacts on biodiversity, avoid fragmenting existing priority habitats.
- **Cross cutting:** assess the risk of extreme events and develop related contingency plans.
- **'On-the-ground' examples** of where no-regret, low-regret and win-win adaptation actions have been implemented are also identified for the agriculture and forestry sectors e.g. Cheviots Future project in Northumberland National Park ([www.cheviotfutures.co.uk](http://www.cheviotfutures.co.uk)) and Craik Forest in the Scottish Borders ([www.forestry.gov.uk/fr/INFD-7PNFBV](http://www.forestry.gov.uk/fr/INFD-7PNFBV)).

## Introduction

The Scottish Government would like to develop a list of no-regret, low-regret and win-win actions supported by 'on-the-ground' examples<sup>1</sup> which might be highlighted in the Scottish Adaptation Programme to inspire similar actions. This document collates examples of such actions that we have identified so far in the course of our work and also draws on the wider expertise of ClimateXChange's members.

One of the key benefits of organisations and others identifying no-regret, low-regret and win-win actions is the process, which in recognising the value of such actions, enables them to be prioritised and implemented and for adaptation to begin (rather than a 'wait and see approach' occurring).

A related report (Wreford, 2012) which may be of interest considers potential win-wins (and conflicts and trade-offs) between mitigation and adaptation policies.

## 1. The UK's Adaptation Sub-Committee (ASC)

**The ASC (July 2011) defines no-regrets and low-regrets measures as:**

'..measures that are cost effective to implement today, where the benefits are less sensitive to precise projections about the future climate, and where there are co-benefits or no hard trade-offs with other policy objectives'.

**ASC (July, 2011) identifies the following examples of no-regret and low-regret actions:**

### *Measures to improve water efficiency*

- Rain water harvesting
- Fitting of low-flow taps, showers and toilets, and low flow devices in washing machines and dish-washers

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On-the-ground examples provide a good starting point to inspire adaptation action however, the context specific nature of adaptation means that they need to be translated to the specific circumstances in which they may be applied.<sup>1</sup>

### *Measures to reduce damages from flooding*

- Airbrick covers
- Door guards
- Toilet-pan seals
- Re-pointing of walls
- Drainage bungs
- Non-return valves on sewer pipes
- Raised floor levels, use of resilient building materials and surface water run-off measures in new buildings and developments.

### *Measures to reduce internal heat-gain*

- Window shading e.g. via curtains or tinted film
- Energy efficient devices to reduce waste heat

### *Land use planning measures*

- Incorporation of greenspace, permeable paving and sustainable drainage systems into urban developments.

ASC (July 2011) makes use of adaptation cost curves to identify low-regret adaptation measures, and notes that standard appraisal techniques such as cost-benefit, cost-effectiveness and multi-criteria analysis can be used to identify low-regret adaptation options.

## **2. UK Climate Change Impacts Programme**

The UK Climate Change Impacts Programme (UKCIP) also define and provide examples of no-regrets, low-regrets and win-win adaptation options in their 'Identifying Adaptation Options report (UKCIP, no date).

### **UKCIP (no date) defines no-regrets, low-regrets and win-win options as:**

- *No-regrets options:* 'adaptive measures that are worth-while (i.e. they deliver net socio-economic benefits) whatever the extent of future climate change. These types of measures include those justified (cost-effective) under current climate conditions (including those addressing its variability and extremes) and are further justified when their introduction is consistent with addressing risks associated with projected climate changes' (p. 15).

UKCIP highlight that the feasibility of implementing no-regrets options needs to take account of existing barriers and potential conflicts but that in focussing on the short-term these options can provide obvious and immediate benefit and experience on which further climate change adaptation can be assessed.

- *Low-regrets options:* 'adaptive measures for which the associated costs are relatively low and for which the benefits, although primarily realised under projected future climate changes, may be relatively large' (p. 16).
- *Win-win options:* minimise the climate risks or exploit potential opportunities whilst also having other social, environmental or economic benefits. They often address climate impacts but also contribute to mitigation objectives. These risks include those primarily driven by non-climate risks but which also deliver adaptation benefits.

In addition and in contrast to no-regrets, low-regret and win-win options, UKCIP also distinguish 'flexible or adaptive management options' which involve 'putting in place incremental adaptation options rather than

undertaking large-scale adaptation in one fell swoop....Measures are introduced through an assessment of what makes sense today, but are designed to allow for incremental change, including changing tack, as knowledge, experience and technology evolve' (p. 17).

## **UKCIP (no date) provide the following examples of no-regrets, low-regrets and win-win adaptation options:**

### *Examples of no-regrets options:*

- Actions or activities directed at building adaptive capacity as part of an overall adaptive strategy;
- Avoiding building in high risk areas (e.g. flood plains) when locating;
- Reducing leakage from water utility infrastructure;
- Building/designing property and buildings to minimise over-heating in summer months;
- Reducing the consequences of flooding through the use of water-resistant materials for floors, walls and fixtures, and the siting of electrical controls, cables and appliances at higher than normal level; and
- Introducing multiple season recreation facilities.

### *Examples of low-regrets options*

- Building extra climate headroom in new developments to allow for further modifications (e.g. increased ventilation, drainage) consistent with projected changes in temperature and precipitation;
- Restricting the type and extent of development in flood-prone areas;
- Promoting the creation and preservation of space (e.g. verges, agricultural land, and green urban areas, including roofs) in support of biodiversity goals;
- Sharing in developing and operating additional water storage facilities (e.g. water groups building and operating a joint water reservoir).

### *Examples of win-win options*

- Flood management that includes creating or re-establishing flood plains which increase flood management capacity and support biodiversity and habitat conservation objectives;
- Improving preparedness and contingency planning to deal with risks (including climate);
- Improving the cooling capacity of building through increased shading and/or alternative less energy intensive cooling strategies; and
- Green roofs and greens walls which have multiple benefits in terms of reducing building temperature and rainfall runoff, and reducing energy use for heating and cooling.

Further examples of no-regrets, low-regrets and win-win options are provided by UKCIP (no date) in Tables 1-10 (p. 19-31).

### 3. City of London Corporation

#### City of London Corporation (2010) defines no-regrets, low-regrets and win-win actions (or measures) as:

- *No-regrets* measures deliver benefits that exceed their costs, whatever the extent of climate change.
- *Low-regrets* measures are low cost, and have potentially large benefits under climate change.
- *Win-win measures* are measures that contribute to climate adaptation and also deliver other benefits.

The City of London Plan identifies '*Flexible actions*' which are defined as 'measures are useful for dealing with uncertainties in the extent of longer-term climate change'. Although of all of the actions identified by the plan, only two actions are noted as falling into this category.

The plan categorises actions according to whether they relate to 'research and monitoring', 'policy' or 'practical actions'.

#### City of London Corporation (2010) identifies the following no-regrets, low-regrets and win-win actions:

Note that the actions identified by the City of London Corporation relate mainly to the role of public bodies, although some actions refer to other stakeholders who might or should be encouraged to take action. The examples have been adjusted to make them generic to situations outside of the City of London.

##### *Flooding*

###### *Research and monitoring*

- No-regret: Identify and map flash flood 'hotspots' and assign responsibility for coordination and liaison on flood risk management in order to ensure its practical implementation.
- Low-regret: Improve the monitoring and recording of gully overflows linked to heavy rainfall events and assess the capacity of sewers to cope with increasing rainfall.

###### *Policy*

- No-regret: Promote the use of sustainable drainage systems in developments and street enhancements. Sustainable drainage systems include:
  - Preventive measures, e.g. good maintenance, rainwater harvesting, green roofs and water butts,
  - Filter strips and swales - vegetated landscape features with smooth surfaces and a gentle downhill gradient to drain water evenly off impermeable surfaces,
  - Infiltration devices like soakaways which allow water to drain directly into the ground,
  - Permeable and porous pavements,
  - Basins, reed beds and ponds designed to hold water when it rains.
- No-regret: Sustainable drainage systems such as green roofs should be encouraged as part of new developments, redevelopments and major refurbishments. Planning agreements should be used to secure long-term commitment to the management and maintenance of SuDs.
- Low-regret: Ensure a requirement that drainage systems in all developments have the capacity to cope with heavier rainfall events expected over their lifetimes, taking account of climate change.

###### *Practical actions*

- Low-regret: Encourage businesses to consider relocating flood-sensitive IT equipment and archives to areas with low risk of flooding.
- Low-regret: Encourage businesses with assets and equipment that need to be on-site to move them away from locations at higher risk of flooding, such as basements.
- No-regret: Developers should be encouraged to install sustainable drainage systems and green roofs in targeted flash flood 'hotspots' for new developments, redevelopments or major refurbishments.
- Both no-regret and win-win: Consider installing sustainable drainage systems, green roofs or green walls in council car parks and buildings, when they are refurbished or replaced.
- Low-regret: Examine a range of incentives to encourage sustainable drainage systems and green roofs.

### *Managing water resources*

#### *Policy*

- No-regret: Draft core strategy policies on Utilities Infrastructure and Sustainable Development; and Climate Change and Flood Risk include the requirement for buildings to incorporate measures such as rain water harvesting systems, grey-water recycling and, reducing water use to conserve water resources (and reduce impact on the drainage system). Water reduction measures noted are:
  - Install dual-flush and low-flush toilets. This can save more than half the water used for flushing toilets and cut household water use by up to 20%,
  - Install waterless urinals,
  - Install water efficient showers and smaller baths,
  - Use water-efficient devices, such as 'A-rated' washing machines and dishwashers,
  - Install spray taps,
  - Minimise the amount of piping between boiler/hot water tank and tap, to reduce the need to 'run' the water,
  - Install leak detection systems for major supplies.
- No-regret: Investigate the feasibility and cost of incorporating rainwater harvesting systems in its operational properties, gardens and large open spaces where appropriate.
- Low-regret: Require rainwater harvesting and grey-water recycling, where appropriate, in all new developments.

#### *Practical actions*

- No-regret: Develop a coordinated and sustained awareness-raising campaign aimed at businesses, property developers and residents regarding water use and water efficiency.
- No-regret: Work with water utilities companies to discuss contingency planning for vital area-wide functions in times of extreme drought.
- Win-win: Investigate the feasibility of installing rainwater harvesting systems in buildings, gardens and large open spaces.
- No-regret: Developers should, where feasible, design and install drought-resistant landscaping schemes and 'low water gardens' in open spaces that require minimal irrigation.
- No-regret: Open Spaces Departments should investigate opportunities to improve water efficiency and ensure that drought-tolerant species are planted in appropriate places.

- No-regret: Consider the use of 'bio-bombs' or barley straw in water courses when needed to absorb nutrients and prevent algal blooms.

### *Heat risks and air pollution*

#### *Research and monitoring*

- No-regret: Investigate risks of heat stress to residents of corporation/council-owned housing. Identify residents who are most vulnerable to heat stress (elderly, young and those with existing health problems) and ensure that they are regularly visited during heatwaves.
- No-regret: Open Spaces Departments should work with the Emergency Services to undertake an analysis of the relationship between weather conditions and fire risk in open spaces and parks and investigate the prevalence of these conditions now and in the future with climate change.

#### *Policy*

- Low-regret: Set in place requirements to ensure the highest viable standards of sustainability are integrated into the design of each proposed development.
- Low-regret: As part of sustainable design, buildings should be designed to provide a comfortable internal environment with the least use of energy over their lifetimes, taking account of rising temperatures due to climate change. Cooling systems should maximise use of natural ventilation and low-carbon cooling techniques.

#### *Practical actions*

- Win-win: Ensure that where possible enhancements to biodiversity include increased planting for shade in open spaces.
- No-regret: Do everything possible to manage high temperatures on the Underground and make the Underground environment more comfortable
- No-regret: Liaise with electricity providers to ensure security of supply for buildings and infrastructure, taking account of climate impacts on seasonal demands.
- No-regret: Examine the provision of 'cool' centres (cooled public buildings) during heatwaves, with extended opening hours for vulnerable people, and should include them in emergency plans.
- No-regret: Work with strategic health authorities and primary care trusts to implement a local heatwave plan and to include actions to manage air pollution health risks in these plans, as high air pollution levels often coincide with heatwaves.
- No-regret: Build awareness among workers and residents over the wider impacts of high temperatures, such as increased risk of bacterial contamination of fresh food and the greater potential for noise due to increased use of outdoor space in warm temperatures.

### *Risks to ground conditions*

#### *Practical actions*

- No-regret: When designing landscaping, public authorities and developers should choose the types and locations of trees carefully, considering how subsidence and root penetration will be affected by climate change.

- No-regret: Keep a watching brief on the incidence of subsidence in council-owned property to ascertain whether the problem increases as the climate changes.
- No-regret: When underpinning existing buildings already affected by subsidence, building owners should ensure the underpinning is sufficient to cope with climate change.

### *Cross-cutting actions*

#### *Policy*

- No-regret: Review design standards and codes of practice for assets, infrastructure and services, to identify those that include climatic factors. Based on the outcome of the review consider upgrading design standards and codes of practice where required to take account of projected climate changes.
- No-regret: Encourage emergency planners, emergency services, and other stakeholders to assess and prioritise extreme events risks (e.g. flood, heatwave) taking account of climate change, and develop and implement related contingency plans.
- Flexible: Develop Supplementary Planning Guidance that focuses specifically on climate change adaptation (if not adequately addressed in other guidance).
- Low-regret: Integrate adaptation considerations into purchasing and tendering decisions.
- No-regret: Review existing measures in place for managing health and safety risks to people when they are outside, to see whether they provide sufficient protection against changing climate risks, such as educating outside staff on sun safety and ensuring that clothing has a sufficient sun protection factor (SPF), or providing shade in school playgrounds.
- No-regret: Monitor climate change impacts on biodiversity and link in to research on the issue.
- Flexible: Ensure that resourcing and delivery of waste management services is appropriate to cope with the added threats from climate change.

## **4. Agriculture sector**

### **Examples of no-regrets, low-regrets and win-win actions**

The following examples are taken from the Cheviots Future pilot project (detailed below):

#### *Flooding/water management:*

- Plant trees and shrubs to alleviate flooding.
- Establish features to enhance the storage capacity of floodplains. E.g. bunds in streams and ditches to back up storm waters.
- Establish features that will store/reduce run-off – e.g. a farm pond designed to provide additional storage capacity for excess flows in times of flood.
- Establish holding ditches and depressions (sometime called swales) to store excess run-off and allow water to slowly infiltrate the soil.

#### *Soil protection and diffuse pollution:*

- Place sediment traps within ponds and water features to assist the management of diffuse pollution and sediment movement from farm drainage systems.

- Establish/reinstate hedgerows to act as a wind break, reduce soil erosion and diffuse pollution. Also to provide shelter for livestock in warmer temperatures and from extreme weather.
- Establish 'green bank protection' measures (e.g. Engineered Log Jam designs, compost filled socks and willow stakes to repair and protect eroded sections of riverbanks.
- Implement ground reinforcement measures to reduce soil damage (and resulting erosion) caused by trampling (particularly in wet conditions) around ring feeders.

*In areas of wildfire risk:*

- Consider developing a wildfire water resource pond.
- Complete wildfire training.

## **On-the-ground example of low-regret, no-regret and win-win actions in the agricultural sector**

*Cheviot Futures, Northumberland National Park*

Cheviot Futures ([www.cheviotfutures.co.uk](http://www.cheviotfutures.co.uk)) is a pilot project using 'farm resilience planning' to demonstrate practical climate change adaptation measures for the agricultural sector. It showcases real-life examples of climate change adaptation in the rural communities of the Cheviots and the surrounding Tweed Catchment.

## **5. Forestry sector**

### **Examples of no-regrets, low-regrets and win-win actions**

These are taken or developed from the Forests and Climate Change Guidelines accompanying the UK Forest Standard (Forestry Commission, 2011), the Climate Change Risk Assessment report produced by Forestry Commission England (Forestry Commission England, 2012) and from expert opinion in the forestry sector.

*Forest Planning*

- Review species suitability and diversity over time as forest management plans are renewed and seek to diversify age, species and stand structure at the forest level
- Maintain a number of different forest management systems where suitable sites and species combinations allow and management objectives are compatible
- Develop contingency plans and longer term forest design measures to deal with risks to the forest, including for wind, fire, flooding and pest and disease outbreaks, and review as further evidence becomes available.
- Consider projections of changes to rainfall patterns when specifying designs for culverts, drainage systems and roads.
- Improve condition of native woodlands as a means of increasing resilience to climate change

*Adaptive management*

- Review forest rotation lengths in response to changing productivity and wind risks
- Review planting seasons in response to changing conditions and establishment success (and promote natural regeneration)

- Increase awareness among on-the-ground staff about how to recognise the impacts of a range of likely stress factors such as pests and diseases, temperature, water availability and wind.

#### *Species selection*

- Consult the relevant climate change guidance on species choice and risk of new pests and diseases when selecting species.
- Choose trees or shrubs which are well adapted to the site and are drawn from a sufficiently wide genetic base of parent trees to promote future adaptation.
- Encourage natural regeneration of native tree and shrub species to promote natural selection and climate change adaptation, and conserve distinctive genetic patterns –especially in and around semi-natural woodlands

#### *Adaptation and landscape ecology*

- Avoid fragmenting existing priority habitats and consider the impacts of new woodland on the ecology of adjacent sites
- Control or remove populations of problem invasive non-native species from woodland and their surroundings

#### *Environmental protection*

- Plan drainage and banks of water courses (riparian areas) in accordance with the Forest and Water Guidelines
- When establishing new woodland, consider the potential benefits in relation to flood alleviation, improvement of water quality and other ecosystem services.
- On steep slopes where there is a risk of slope failure or serious erosion, consider alternatives to clear felling.
- In urban situations, consider the potential benefits of woodland and trees in reducing the impacts of climate change.

### **On-the-ground example of low-regret, no-regret and win-win actions in the forestry sector**

#### *Galloway Forest District, Southern Scotland*

Incorporation of species diversification into the Forest District Strategic Plan to increase resilience of the forest to climate change whilst also maintaining future production targets for the district.

#### *Craik Forest, Scottish Borders*

'ForeSTClim' ([www.forestry.gov.uk/fr/INFD-7PNFBV](http://www.forestry.gov.uk/fr/INFD-7PNFBV)) is a European research project developing climate change adaptation strategies for forests. Craik forest in the Scottish Borders is the UK case study looking at the needs and options for climate change adaptation in a productive upland Sitka spruce forest. Using future climate projections they are assessing options for species choice (amongst other things) which may lead to adaptation within local forest design plans.

### *Gwydr forest and Clocaenog forest in Wales*

As part of the EU 'Motive' project ([www.motive-project.net](http://www.motive-project.net)), Gwydr forest and Clocaenog forest in Wales are implementing a range of low/no regret and win-win adaptation actions. Actions will initially concentrate on using tools and models to help diversify species choice and identify alternative forms of forest management to be incorporated into forest design plans. They will also carry out a risk analysis for climate hazards such as drought, frost and wind.

### *The National Tree Collection at Kilmun*

Demonstrates a number of novel species growing in a plantation setting. This will help demonstrate the potential of alternative species.

### *River Tay catchment, Scotland*

Example of the use of floodplain woodland to mitigate downstream flooding impacts.

### *Central Scotland Green Network*

Use of greenspace to provide shade, shelter and 'green lungs', improving quality of life and health in a warmer climate.

## 6. References

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## 7. Acknowledgements

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