

# Developing a framework for costing action on biodiversity in Scotland

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## Executive summary

Biodiversity is the variety of life on earth, underpinning the systems that provide things like food, medications, building materials and clothing. However, biodiversity is in decline worldwide, and Scotland has seen a loss of 15% in its species abundance in the last decade. The Scottish Biodiversity Strategy sets out the ambition to tackle the biodiversity crisis in Scotland and become Nature Positive by 2045. This fellowship had the objective to:

“Undertake research and evidence collation and analysis to produce a report that develops a framework for assigning costs for delivering biodiversity outputs, using a sample of actions drawn from the Scottish Biodiversity Strategy Delivery Plan.”

This was achieved through individual interviews with key stakeholders for each selected action, and a literature/evidence search where no costs data was identified by stakeholders. This was followed by a workshop to validate the costing framework (Figure 1).

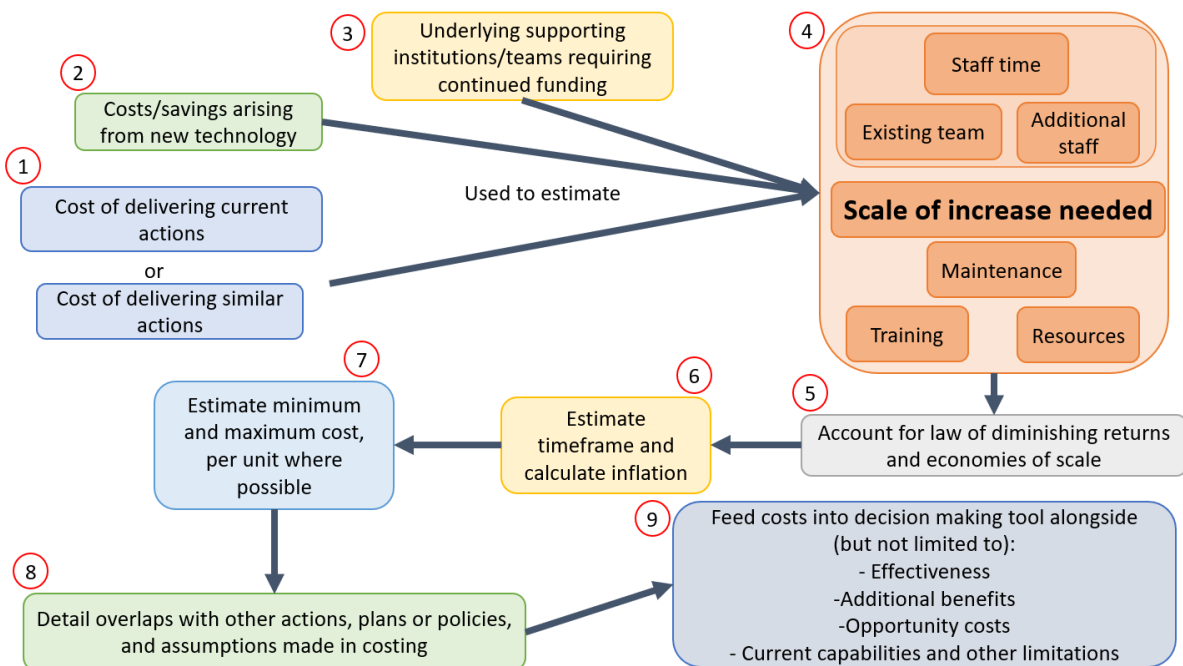


Figure 1 Framework for costing actions for biodiversity in Scotland

1. Costs of current actions, or similar actions, broken down into the most specific categories possible and presented as a per unit (e.g., ha, individual) cost. These costs will be most applicable where they can be sourced from organisations that will be responsible for delivering the action. Alternative sources of data may include similar actions carried out elsewhere in the UK or globally, or data from the scientific literature.
2. New technology costs, which may increase or decrease costs, depending on its specific nature. Including training where needed.
3. Existing capacity and skills within teams and institutions that underpin the new actions, although may not directly contribute. This includes benefits of legacy knowledge from long-term funding.
4. Based on these existing costs the scale of the increase needed can be estimated.
5. The scale of increase in costs may not be linear with the scale of increase in action:
  - a. The law of diminishing returns states that for each additional £ spent, the return is lower.

- b. Economies of scale refers to the fact that it is often cheaper per unit (e.g., ha) to carry out an action over a larger area than a smaller area.
6. For longer term actions the time period over which the project will take place should be determined, including the period over which maintenance will be required (which may be in perpetuity). Inflation should then be added each year, based on an average of the Consumer Price Index from the Bank of England.
7. From this new cost estimate a per unit cost should be estimated.
8. Where overlaps or contradiction between actions occur these should be identified, enabling either coordination of spending, or prioritisation or adaptation of the most appropriate action.
9. Finally, this framework presents only costs of actions. Decisions must also take account of the effectiveness of the action, any additional benefits, including for wider policy aims, and current capabilities, training, and resource availability.

### Key points

- Costs of new actions would benefit from incorporating long-term funding for underlying teams or expertise, to ensure they can be most cost-effectively and efficiently implemented.
- Actions which are more tangible, and connected to or build on existing actions, are easier to estimate costs for. Including well defined targets and timeframes will improve cost estimates.
- There are large overlaps between actions, and cost and efficiency savings will likely arise where connections and overlaps between actions can be realised.
- Estimations of costs need to be flexible to allow for external unpredictable shocks (e.g., climate change).
- Wider coordination costs also need to be considered to enable actions to be coordinated and implemented efficiently. This is especially true for cross-organisation actions.
- Ability to complete actions is limited by current capabilities and resources. Continued investment in training and development would increase potential for actions to be completed.

### Future use of the framework

The framework presented in this report is designed for use when costing actions which deliver biodiversity outcomes e.g. in the Scottish Biodiversity Strategy and delivery plan, with potential use for a much wider set of environmental and land use policy and practice across Scotland. It is most suited for use with policies or strategies that are incremental improvements to current actions and provides a common approach for estimating costs to be incorporated into decision making. In addition to being used to estimate costs, the framework also identifies where costs or associated data cannot be estimated, and therefore where actions may need refining, or further work done to understand costs, and therefore implementation. This is the first presentation of this framework, and continued development to incorporate other elements of cost is encouraged.

## 1. Introduction

Biodiversity is the variety of life on earth, underpinning the systems that provide things necessary for human life, like food, medications, building materials and clothing. Biodiversity is also good for our wellbeing, provides us with opportunities for recreation and enjoyment, and creating links to history and culture. Moreover, ecosystems with higher biodiversity are more resilient to change, and can support mitigation of climate change impacts. However, biodiversity is in decline worldwide, driven by land use change, climate change, pollution, natural resource exploitation, and invasive species (IPBES, 2019). In Scotland a 15% decline in species abundance has been recorded in the last decade (State of Nature Partnership, 2023).

The Scottish Biodiversity Strategy sets out the ambition to tackle the biodiversity crisis in Scotland, and become Nature Positive by 2045 (Scottish Government, 2022). The Strategy, underpinned by the Delivery Plan contains 26 key actions which will:

1. Accelerate restoration and regeneration
2. Expand and connect protected areas and improve their conditions
3. Support nature-friendly farming, fishing and forestry
4. Recover and protect vulnerable and important species and
5. Generate the investment needed to support nature recovery
6. Take action on indirect drivers of biodiversity loss.

The Scottish Biodiversity Investment Plan will set out how different types of funding and finance can be used to help deliver the aims of the Scottish Biodiversity Strategy, specifically focused on land-based actions. Land-based actions were selected as the basis for this work as they represented an initial focused step towards developing a costing methodology. As part of the costs estimation, it is important to understand the costs involved in delivering actions that support our biodiversity objectives so that these can inform funding and finance decisions. To support future cost assessments developing a common methodology that can be applied in different scenarios is key, including in relation to supporting budget processes, assessing land management costs and informing investment strategies. Understanding the current state of knowledge through this framework could assist with developing a shared understanding of costs and inform further discussions of cost estimates. This work intends to develop such a methodology based on working with representatives from Scottish Government and governmental and non-governmental organisations.

## 2. Methods

We carried out consultation with key individuals from organisations involved in development or delivery of the Scottish Biodiversity Strategy Delivery Plan. Consultation either took place through virtual interviews or, where time constraints did not allow this, via email. The cost components for actions relevant to individuals were discussed, including:

- Availability of existing cost estimates
- Cost of current related actions
- Staffing and training needs
- Exploration of additional services/institutions needed to deliver the actions
- Any additional cost components to be considered.

From these discussions a first version of the framework was created. This framework was further developed in a workshop held with representatives from: Scottish Government, NatureScot, Greenspace Scotland, and Scottish Forestry (Appendix A). In this workshop each component of the framework was discussed for clarity and suitability, and additions to the framework considered. Further development also took place with representatives from the Park Managers Forum, including Local Authorities.

### 3. Costing Framework

The final framework consisted of nine components, and in addition to the direct costs of delivering actions for biodiversity includes consideration of new technology, underlying support costs, and the role of costs in wider decision making (Figure 2). The framework illustrates the components needed to understand the full costs of biodiversity actions, with applicability not just to the Scottish Biodiversity Strategy, but potential to be used across environmental and connected policy areas. The anticipated users for this framework are policy, however the framework could be applied by any organisation or individual carrying out large-scale or long-term biodiversity or environmental management. The costs detailed in the framework should not be limited to public sector costs, but include those incurred by the private sector as well. Use of the framework would be alongside assessing effectiveness of activity, additional benefits, relationships to other plans and current capability and limitations.

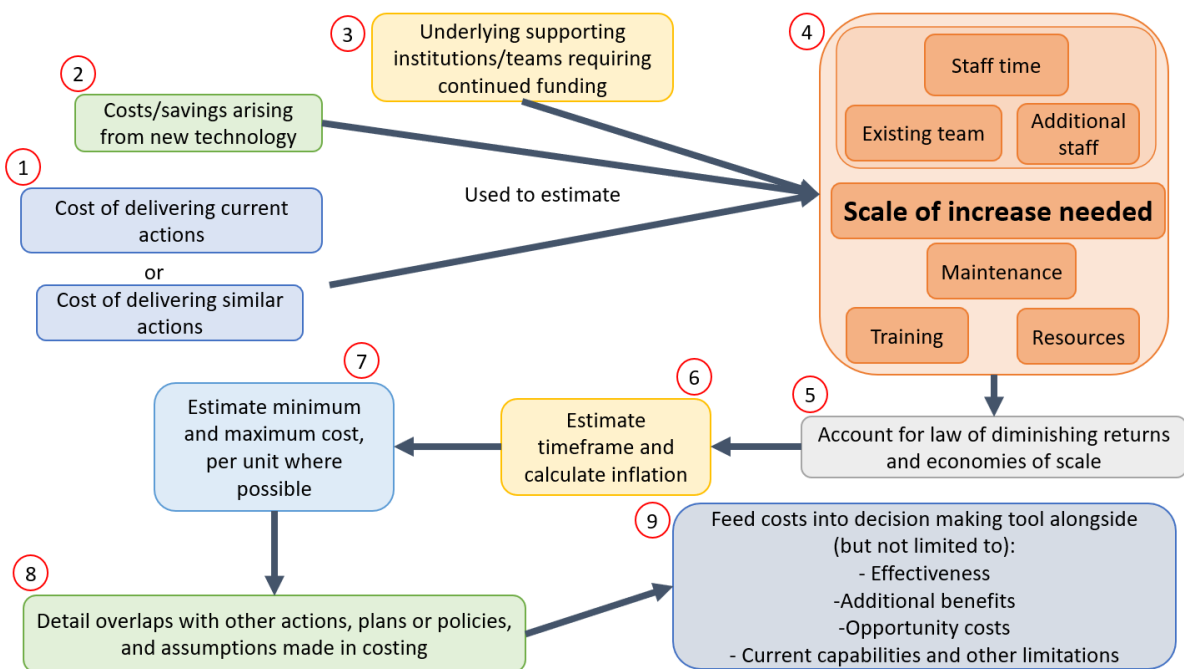


Figure 2 Framework for costing actions for biodiversity in Scotland

1. Costs of current actions, or similar actions, provide the basis for estimating the costs of new actions. Where possible these costs should be broken down into the most specific categories possible (e.g., accounting for habitat type, management technique, accessibility, equipment, weather) and be presented as a per unit (e.g., ha, individual) cost. These costs will be most applicable where they can be sourced from organisations that will be responsible for delivering the action. However, if this is a new action, and no local costs are available alternative sources of data may include similar actions carried out elsewhere in the UK or globally, or data from the scientific literature.

2. Because the policy relating to biodiversity is concerned with future actions, we also need to consider new technology. New technology may increase or decrease costs, depending on its specific nature. When using costs of new technology considerations of access and training needed to use the technology should also be considered (e.g., availability of new satellite imaging, that may have a cost in access and training for use).
3. In order for new actions to be delivered it is also necessary to consider existing capacity and skills within teams and institutions that underpin the new actions, although may not directly contribute to their delivery. These institutions and teams also carry legacy knowledge, and so long-term maintenance of these should be factored into all new developments. This may include calculating the specific staff input into the new action, but also the lowest critical threshold for institutions to persist over the long-term.
4. Based on these existing costs the scale of the increase needed can be estimated. This should include consideration of staff time, including both maintaining the existing team and any new staff needed to support delivery of the action (as well as the management structures needed to support them). Staff needs may include short-term or contract workers, as well as long term posts. Training for new or existing staff needs to be considered, as well as the underlying support of those able to provide the training. Material resources should be costed, and finally ongoing maintenance of the outcomes of the action over time to ensure successful persistence of the outcome in the long term.
5. The scale of increase in costs may not be linear with the scale of increase in action, and so account must be taken of the law of diminishing returns and economies of scale:
  - a. The law of diminishing returns states that for each additional £ spent, the return is lower. In the context of environmental management this may relate to the first areas that are restored being those that are more easily accessible or have clear management options (e.g., clearly identified drains to block in peatland restoration), and so are cheaper per ha to restore than the more distant sites which are harder to access and have more limited management options. For example, in the case of control of deer or invasive non-native species the first individuals are more easily caught, and therefore cheaper, than the final individuals who are generally trap-shy or frequent less accessible areas, and so require more specialised techniques to remove. Careful consideration therefore needs to be made on what the current costs were estimated from, and whether additional funds should be added to account for these increased costs. (NOTE: As is the case throughout, this considers only costs, and decisions must also account for scale of benefit gained)
  - b. Economies of scale refers to the fact that it is often cheaper per unit (e.g., ha) to carry out an action over a larger area than a smaller area, due to costs such as infrastructure and support remaining similar, and ability to purchase materials in bulk. It is likely that not accounting for economies of scale will lead to an overestimate of cost, however care must be taken not to misjudge the savings that are possible over a larger area.
6. For longer term actions the time period over which the project will take place should be determined, including the period over which maintenance will be required (which may be in perpetuity). Inflation should then be added each year, based on the best available forecast. Because inflation cannot be estimated perfectly some buffer to account for higher than expected inflation should also be added.
7. From this new cost estimate a per unit cost should be estimated. The most appropriate unit (e.g., per ha, per deer) will depend on the action. Where possible minimum (e.g., for the easiest area to restore, or the most accessible deer population) and maximum (e.g., for

remote areas or populations) unit costs should be presented, to allow for the most transparent understanding of total range of costs. As with the current costs used at the start of the framework the more detailed these estimates can be the more useful they will be for estimating true costs. Where the action includes clear targets a total cost could also be estimated, however this is not possible for all actions.

8. Actions may overlap with each other, as well as with actions or objectives of other policies, plans, legislation, or strategies. Conversely, some actions may contradict other guidance or previously accepted best practise. Where overlaps or contradiction occur these should be identified, enabling with either coordination of spending, or prioritisation or adaptation of the most appropriate action.
9. Finally, this framework presents only costs of actions. Decisions must also take account of the effectiveness of the action, any additional benefits (i.e. the return on investment), including for wider policy aims, and current capabilities, training and resource availability.

#### 4. Discussion

In applying the framework, urban actions most often had existing data on costs, followed by agricultural actions. For both of these landscapes actions also more often fell within general operations. Urban actions were typically extensions to the work already carried out by Local Authorities (e.g., amenity grassland management or surface water flood mitigation), and therefore existing costs could easily be identified. Similarly agricultural actions predominantly sit within the agricultural payments framework, and are extensions on current good agricultural practice. An important consideration for urban actions in particular is the need for long-term continuous funding for underlying biodiversity capacity within Local Authorities, to ensure that the people with the skills to complete the actions are available in house. Hiring external contractors would likely increase the costs estimated for urban actions.

**Takeaway:** Costs of new actions would benefit from incorporating long-term funding for underlying teams or expertise, to ensure they can be most cost-effectively and efficiently implemented.

Contrastingly, overarching actions were the least likely to have costs data available. This is likely because this landscape includes the larger, more intangible actions, and actions that are new and outside of the existing scope of biodiversity work. Soils related actions are particularly lacking in related costs data. These actions are more often concerned with monitoring and awareness raising, and the lack of costs here may point to comparatively lower understanding of soil and its contribution to biodiversity, or the lower visibility of the soil resource.

Actions which included direct management (e.g., Establish a national deer management programme including monitoring capacity) were the action type which most frequently had available costs data. These actions were also generally the most tangible, with the most well-defined targets, and so that costing would be easier for these actions is not surprising. On the other hand, funding actions (e.g., Maintain and seek to increase investment in nature restoration through our £65 million Nature Restoration Fund) were the least often costed, because they are outcome rather than target driven, and do not have an associated tangible actions (e.g., no specific action given for how maintaining and increasing investment would be achieved). Actions which have defined timelines and targets are also easier to cost, as the boundaries of the action are clearly defined. Those actions with clear targets (e.g., number of ha restored) can not only be more easily costed in total, but the ability to cost per



unit (e.g., cost per ha) means that actions can be scaled to meet available funding more efficiently. Notably, this assessment was undertaken prior to the Scottish Biodiversity Strategy Delivery Plan being revised to increase the measurability of actions following consultation feedback on the draft SBS Delivery Plan.

**Takeaway:** Actions which are more tangible, and connected to or build on existing actions, are easier to estimate costs for. Including well defined targets and timeframes will improve cost estimates.

There are a number of additional considerations for each action which may impact costs. Many of the actions do not have specific targets or methods, but are rather an aim that requires co-ordination of a series of actions, which means the costs are harder to estimate. As final methods and actions become more defined it will be possible to reduce the variables in estimating costs. Many of the actions also have full or partial overlap in costs with other actions, or could have overlap depending on how actions are prioritised. This is particularly the case for Nature Networks and 30x30 actions, which cover large spatial areas. These actions could therefore overlap with all other actions relating to habitat or ecosystem restoration if the restoration activities are prioritised with Nature Network or 30x30 areas. Deer and invasive non-native species actions costs also overlap with the landscape scale restoration actions, because they are necessary to ensure successful restoration.

**Takeaway:** There are large overlaps between actions, and cost and efficiency savings will likely arise where connections and overlaps between actions can be realised.

External factors can lead to variability in costing. Climate change will have a large and unpredictable impact on the ease of delivering actions, as well as impacting costs of materials and altering national and global priorities, particularly in relation to food production. Other global events, such as war or natural disasters with impacts on supply chains will also increase prices. Recent experiences with Covid-19 have demonstrated the effects that global level disruption can have on biodiversity, and including a buffer of funding to account for these costs would be essential for delivery.

**Takeaway:** Estimations of costs need to be flexible to allow for external unpredictable shocks.

#### 4.1 Limitations

Much of the available costs data considers only the costs for the “status quo” way of working. That is, costs are based on the currently available data, and that is biased towards the current methods employed. Other methods that deliver cost-effective outcomes could be considered, such as new techniques or technology. Although estimating the costs of new techniques or technologies is likely to be challenging, this should be considered for complete costs of the actions.

Actions in this report have been considered as standalone actions, albeit with connections to other actions highlighted. There will be an additional cost in coordinating, monitoring, and adapting the delivery of the SBS Delivery Plan as a whole, with potentially significant costs incurred through coordinating actions delivered by many different partners. This cross-organisation coordination was also highlighted as a cost for actions where the responsibility for delivery did not lie with a single

organisation. Therefore, the framework presented here may be better suited to the costing of individual actions, with further development needed for combining these costs to estimate total of large scale strategies such as the Scottish Biodiversity Strategy. In this way, the framework may sit alongside and feed into existing policy appraisal, such as that outlined in The Green Book (HM Treasury 2023). While this was strategic to allow for the widest range of actions to be costed during the project timeframe, private sector costs may differ significantly, and these data should be sought for full costing.

**Takeaway:** Wider coordination costs also need to be considered to enable actions to be coordinated and implemented efficiently. This is especially true for cross-organisation actions.

The framework for costing presented represents only part of the decision-making framework. Decisions on actions to protect biodiversity should not be made only on their cost, but include their effectiveness, to ensure that the largest impact is possible with the limited resources available. Further considerations include any additional benefits that may arise from implementing the actions, both for biodiversity and other priorities, including climate change. Opportunity costs (i.e., the cost of the land management excluding other uses) should also be accounted for. For many of the actions there are limitations to the extent that the action can be achieved without further investment in training and equipment, and so short-term actions may be limited by existing capabilities and resources. Green finance may also offer a potential option for funding and resourcing. Because green finance is more suited to some actions than others this may influence final decision making to take advantage of funding opportunities.

**Takeaway:** Ability to complete actions is limited by current capabilities and resources. Continued investment in training and development would increase potential for actions to be completed.

#### 4.2 Future framework use

The framework presented in this report sets out the potential components of costs for actions on biodiversity in Scotland, with potential use for environmental and land use policy and practises across Scotland. As a result, it is most suited for use with policies or strategies that are incremental improvements to current actions, however, where costs from similar actions are available from elsewhere in the UK or worldwide these may also be used with appropriate caution. The framework provides a common tool for use for estimating the costs of actions on biodiversity. In addition to being used to estimate costs, the framework also identifies where costs or associated data cannot be estimated (through identifying costs/data gaps), and therefore where actions may need refining, or further work done to understand costs, and therefore implementation. This is the first presentation of this framework, and continued development to incorporate other elements of cost is encouraged.

## 5. References

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## Appendix A – Workshop details

A workshop was held on 17<sup>th</sup> January at Victoria Quay with representatives from: Scottish Government, NatureScot, Greenspace Scotland, and Scottish Forestry. After an introduction to the project a 20 minute discussion on the costing framework was had, with a focus on additions and clarifications of the framework. Following this participants spent an hour providing validation and updates to the highest priority action costs, focused on the questions:

- Is the scale of the costs as expected?
- Can you improve on the estimate? Including data or contact person where possible.
- Is there anything else we should be considering for this action? Any links to other actions?

Finally, the workshop finished with a discussion on focused on the questions:

- How can you see the cost framework being used?
- What other work/policies/projects will this link to?
- Are there any other related questions you want to highlight?