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AND NATURAL HABITATS

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NATURE-BASED SOLUTIONS AND MANAGEMENT OF PROTECTED AREAS IN THE FACE OF CLIMATE CHANGE

Results, conclusions and recommendations resulting from a survey of policy and actions by Contracting Parties to the Bern Convention carried out in 2022

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Table of Contents

1. Introduction and context

As we understand more about the ways that climate change is impacting biodiversity, it becomes clear that we cannot tackle the two crises separately. Their interdependence requires us to address them together[1]. This was clear when the European Environment Agency (EEA) published the first of their '10 messages for 2010'. Both before and since then there have been a number of publications which demonstrate a clear and present impact on (for example) birds, butterflies and many plant species.

Often these results are not as we might expect, but illustrate the complex interaction between species, their food plants and their habitats. Thus (to give just one example), the Brown Argus Butterfly (*Aricia agrestis*) whose distribution covers much of Europe was historically, in the United Kingdom, largely restricted to a single plant species the common rockrose (*Helianthemum nummularium*). However, it was found that warmer summers have allowed it to complete its life cycle by eating wild Geranium plants. This plant is relatively widespread in the British countryside, and the change in diet has clearly allowed the butterfly to expand its range in Britain at (what the researchers quote as) "a surprisingly rapid rate"[2]. Over the past 30 years the butterfly has spread northwards and, at the point publication in 2012 its distribution had already increased by around 79 kilometres, and it has now become common in the countryside in much of southern England.

This quote from the lead author, places the response of the butterfly in context: "In the case of the Brown Argus butterfly, changes in interactions with its food plants have helped it to respond to climate change very rapidly. However, changes to interactions may hinder other species, potentially putting them at risk of extinction."[3] Whilst the northward expansion might have been expected, the ability to exploit new food plants in the context of increased temperature was not. If a study of a single species can reveal such complex and unexpected outcomes, this is likely to be the case for many other organisms, rare or otherwise.

Since then, there have been a multiplicity of publications and studies that further illustrate the complexity of the changes that we might expect and, the predominantly negative impacts that are likely to result. Thus, in 2021 the EEA were able to illustrate clearly that climate change is having significant impacts on the distribution of European flora and fauna, with distribution changes of several hundred kilometres projected over the 21st century. These impacts include northwards and uphill range shifts (as in the Brown Argus butterfly), as well as local and regional extinctions of species[4].

We can see that climate change impacts biodiversity through a complex interaction of species and their habitats. It is also clear that both the structure of habitats and their ecological functions will change in a new climate regime. However, the movement of species into or out of a community will also affect both the physical elements of the ecosystem and other species. The EEA therefore points out that climate change is likely to exacerbate the problem of invasive alien species in Europe. As climatic conditions change, some locations may become more favourable to previously harmless alien species, which then become invasive and have negative impacts on their new environments.

Changes to local conditions and resources will thus influence the ability of species to survive and, by extrapolation, we may expect to see changes in habitats and ecosystems, with some habitats becoming rare or even disappearing. If a species can no longer survive in a habitat or an ecosystem, it may be able to survive if it can disperse rapidly enough and an accessible and suitable alternative habitat exists; otherwise it will gradually disappear in different locations and eventually become extinct. Analysis of the current situation shows that the migration of many species is seen to be lagging behind the changes in climate owing to intrinsic limitations, habitat use and fragmentation, and other obstacles, suggesting that they are unable to keep pace with the speed of climate change.

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[1] Zisenis, M. (2010) *10 messages for 2010: Climate change and biodiversity* EEA, Copenhagen.
[2] Rachel M. Pateman, Jane K. Hill, David B. Roy, Richard Fox and Chris D. Thomas (2012) *Temperature-dependent alterations in host use drive rapid range expansion in a butterfly*' Science. Doi: 10.1126/science.1216980 https://www.science.org/doi/10.1126/science.1216980
[3] https://www.ceh.ac.uk/news-and-media/news/butterfly-expanding-northwards-warming-temperatures-and-changed-diet
[4] Indicator Assessment: Distribution shifts of plant and animal species. European Environment Agency, Copenhagen. Https://www.eea.europa.eu/data-and-maps/indicators/distribution-of-plant-species-2/assessment

Recognising the twin crises of biodiversity and climate change, Contracting Parties have therefore been tasked to take action to adapt to the impacts of climate change on biodiversity both in relation to protected areas and for the realisation of nature-based solutions. Biodiversity serves as a major keystone for human wellbeing as it provides us with a variety of services such as food, medicine, the purification of water, climate regulation, and cultural as well as recreational experiences. As both biodiversity loss and climate change are driven by human economic activities and mutually reinforce each other, neither of them can be resolved unless they are tackled together.

Recommendation No. 206 (2019) of the Standing Committee to the Bern Convention states that the Contracting Parties should report in 2022 on the progress made on the implementation of the Recommendation. To assist the Contracting Parties with the reporting, the Secretariat developed a questionnaire on biodiversity and climate change particularly focusing on the role of ecological networks. The survey was completed in March 2022 and provides the basis for identifying and sharing best practice, and therefore for encouraging further adaptation action for nature and for people. The questionnaire is structured into four blocks covering the topics of: Policy dimensions, Nature-based solutions, Management of protected areas in the face of climate change (including ecological networks), and Communication and capacity building. The headings which form the main chapters of the report that follows are therefore:

- Policy and strategy (Questions 1-6)
- Nature-based solutions in the face of climate change (Questions 7-16)
- Management of protected areas in the face of climate change (Questions 17-30)
- Communication and capacity building (Questions 31-43)

Annex 1 has the questionnaire in full as a point of reference for the reader; there were 43 questions in total. Of the 51 Contracting Parties that received the questionnaire, 20 provided responses (39%). The countries are given below (in alphabetical order):

1. Albania
2. Armenia
3. Bosnia and Herzegovina
4. Bulgaria
5. Estonia
6. Georgia
7. Greece
8. Monaco
9. Hungary
10. Iceland
11. Liechtenstein
12. Norway
13. Poland
14. Belarus
15. Serbia
16. Slovakia
17. Slovenia
18. Sweden
19. Turkey
20. United Kingdom

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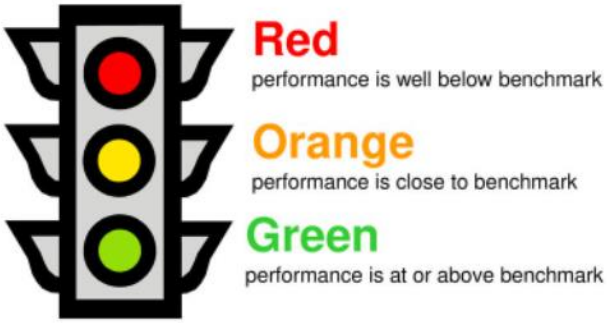
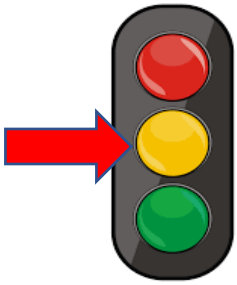




2. Summary of main findings and potential areas for action

Policy and strategy (Questions 1-6)

- The results are overall positive and there are no countries which are not planning to develop a strategy which addresses the relationship between climate change and biodiversity. Almost 80% have a ratified strategy, a completed strategy waiting for ratification, or a strategy in development.
- Among the ratified strategies, all of them have targets that should be delivered within 10 years or sooner.
- However, whilst there has been good progress in the preparation and ratification of the strategies the delivery of actions and the achievement of targets is highly variable (some cases are very good) and can be seen to relate, at least to a certain extent, to aspects such as capacity and the long-term engagement (or not) of certain countries in environmental issues and the associated development and implementation of relevant legislation.

Potential areas for action:

- Initiate and/or promote training in content and best practice in relation to the elaboration of strategies linking climate change and biodiversity for officers at national, regional and local level.
- Target cross ministry (and where relevant cross departmental within ministries) training and where possible use local experts to deliver content. Alternatively use guests from different countries to give masterclasses if this is appropriate in terms of culture and acceptability.
- Raise awareness among politicians and senior decision makers of economic and social benefits of taking measures for climate change and biodiversity (in the context of legislative requirements).

Nature-based solutions in the face of climate change (Questions 7-16)

- It can be seen that action will be required in terms of future reviews of national climate change strategies that do not, or have poor inclusion of measures for biodiversity. There are currently best practices in a number of countries in terms of content and, in some cases, actions and achievements of targets delivered within strategies that could be used to inform, support and improve such reviews.
- Furthermore, national level studies and initiatives are needed to generate greater knowledge of the likelihood and patterns of shifts in species distributions, and which species are most vulnerable to climate change. This would be helpful in allowing improvements to strategies and might also result in more focused action on the ground.
- There is relatively good integration of nature-based solutions in both climate change and biodiversity strategies and in some countries, they are already being delivered in practice.
- Cultural ecosystem services such as tourism/ecotourism and recreation are seen to improve under a changing climate, reflecting that 'better' weather may encourage tourists to visit foreign countries on holiday.
- In relation to financial subsidies most programmes enhancing nature-based solutions and ecosystem services are financially supported to some extent. In terms of values associated with biodiversity and

ecosystem services being integrated within economic analysis and decision-making processes most countries also said that this takes place to some extent.

- Agricultural subsidies were cited as damaging to biodiversity by every country. Subsidies associated with fisheries and forestry policy, transport and energy sectors were also mentioned as having a negative impact. On a positive note, in one country at least subsidy is no longer supported for ditching and there is ongoing review of subsidies such as planting or forest fertilisation in order to minimise negative consequences for biodiversity.

Potential areas for action:

- Initiate and/or promote national review of climate change strategies in relation to inclusion of measures for biodiversity. Where changes are agreed supplementary guidance/policy rather than full revision and republication of the strategies may be more desirable and achievable.
- Promote national level studies and initiatives to generate greater knowledge of the likelihood and patterns of shifts in species distributions, and which species are most vulnerable to climate change. This would be helpful in allowing improvements to strategies and might also result in more focused action on the ground. (Such issues could be linked to training and the involvement of experts).
- Initiate and/or promote national review of damaging subsidies to see if measures can be introduced to reduce or neutralise their impact (for instance through the promotion of nature inclusive components, particularly in relation to agriculture and fisheries).

Management of protected areas in the face of climate change (Questions 17-30)

- Generally, there has not (yet) been significant progress made in relation to monitoring of the impact of climate change on protected areas. Sites, habitats and species under particular threat or pressure have not yet been identified.
- In terms of climate change and biodiversity loss in site management plans, the majority of countries replied that management plans are not updated to respond to changes caused by climate change; and whilst national strategies are seen to contain detailed goals for addressing climate related issues, in many cases they have yet to be implemented.
- In relation to the implementation (already carried out or not) of measures to adapt to climate change in protected areas, the integration of these aspects is in general insufficient according to a clear majority of respondents.
- The situation in relation to adapting the network of protected areas has a set of contradictory outcomes. The great majority indicates that there is no assessment of how the network of protected areas responses to climate change and there are very few programmes in place to adapt the network of protected areas to climate change. However, most countries have plans to extend the network and improve the connectivity of their protected areas. Ecological corridors are largely integrated in land use planning processes and there is evidence of good cross-country cooperation on biodiversity and climate change.
- Problems include the lack of human and financial resources and the absence of sufficient data and information, especially on which species should be assessed.

Potential areas for action:

- Initiate and/or promote programmes for the review/update of protected areas management plans in relation to the need to respond to changes caused by climate change. Where changes are agreed, supplementary measures rather than full revision and republication of the strategies may be more desirable and achievable. (This needs to be combined with awareness raising and training).
- Explore and evaluate the issues in relation to monitoring of the impact of climate change on protected areas. This could be done at biogeographical level (or other above-country level) to establish generic issues and solutions before implementation at national level.
- Initiate and/or promote national level programmes for the monitoring of the impact of climate change on protected areas.
- The absence of sufficient data and information, especially on which species should be assessed should be addressed as a priority. (Could perhaps be linked to/combined with the recommendation above for promoting national level studies and initiatives to generate greater knowledge of the likelihood and patterns of shifts in species distributions).

Communication and capacity building (Questions 31-43)

- In relation to the awareness raising of public and decision makers, whilst a small number of countries do not yet engage in such activities, there is much awareness raising activity amongst the majority of countries, and there are broad public awareness campaigns that may even be supported by information provided by public television channels. Awareness raising is mainly delivered in relation to: 1) national initiatives; 2) regional-local initiatives; 3) project-related initiatives. In countries with limited resources communication via projects and programmes is particularly important.
- Where there are indigenous peoples in countries that responded, their knowledge is integrated within biodiversity and/or climate change programmes.
- In terms of education there is existing activity in relation to both school curricula and higher education programmes. In some cases, the actions are planned but have not yet been implemented. Agriculture and forestry are two sectors that have received attention in relation to awareness-raising campaigns.
- In relation to the training of practitioners, many countries simply lacked the information. The majority of the other part of respondents was carrying out or was planning to carry out training. It should be noted that training is often a component within funded projects and programmes from donors and this has already been identified as an important vehicle for awareness raising.
- The responses to questions in relation to participation were generally positive. In some cases, legislation requires public participation but many countries recognise the important role that local communities play in the management of protected areas. The majority of countries have therefore had national programmes encouraging the participation of local communities in the designation and management of protected areas.

Potential areas for action:

- Establish the extent to which training programmes are in place for practitioners and officials. On this basis explore and/or initiate programmes targeted at the most urgent sectors/groups.

Learning points from the questionnaire

- Much of the literature suggests that response rates to voluntary surveys can vary (with a low point at around 5%) but usually between 25-40%[5]. However, much of this literature relates to client surveys by business, although there is some public service related information[6]. The response rate of 39% for this survey is therefore 'reasonable' in this context but perhaps disappointing in terms of what might have been hoped for in particular considering that climate change is high in the political agenda of the Council of Europe. In terms of improving the response to future surveys, particularly if the information is important for future policy and decision-making, then virtual (online, telephone) or face-to-face is significantly more effective, also in terms of content. Other factors include: the length of the survey; the time required to complete it; the extent to which reference to other sources of knowledge and expertise is required ("can I do it all myself?"); and the nature of the questions – simple, more complicated, multiple choice, yes-no, etc.
- However, the analysis also shows that the responses cover a broad spectrum of situations ranging from sophisticated and long-established approaches to the very early stages of strategy development and implementation. In this respect the survey can be seen to provide a representative cross-section of the current situation among countries.
- In some cases, in particular when the questions were relatively technical, respondents used the "don't know" answers. This was also seen in the bar chart responses when the orange columns, a neutral "neither agree nor disagree" answer, often dominated.

Potential areas for action:

- Consider virtual (online, telephone) or face-to-face interviews in future. This could also be for a representative cross-section of the countries involved.
- Perhaps there could be 'advanced warning' of the questionnaire so that respondents could block time in (already busy) agendas. If senior staff are aware of the questionnaire, they may also be able to help their staff to plan and can encourage them to complete/check on completion.

[5] See for example: https://peoplepulse.com/resources/useful-articles/survey-response-rates/
[6] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Sample_size_and_non-response_-_quarterly_statistics

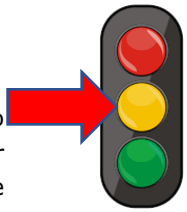
- In future with the bar charts it might be more valuable in terms of results to have only 'agree' or 'disagree' options (strongly or otherwise) and a 'don't know' option – rather than a neutral option.
- Perhaps respondents should be encouraged to consult experts over more technical questions. To make this easier the more technical questions could be repeated in a separate (much shorter file) that could be easily forwarded to experts by email. Alternatively different sections could have unique URLs that could be forwarded by the main respondent to experts and which would allow them to access only that part of the questionnaire.

Three areas for 'closer attention'

Three areas that suggest themselves for closer attention and future consideration in terms of the development of more and more accurate knowledge, exchange of best practice, training and communication. Specifically in the fields of: protected areas[7], data and information and strategy implementation.

[7] Note: In Europe, Réserves Naturelles de France, EUROPARC and eight partners have come together in a LIFE Climate Action project 'Natur'Adapt' which aims at triggering a transition towards the adaptive management of protected areas while laying the foundations of a dynamic collective learning process. https://www.europarc.org/about-us/europarc-projects/life-naturadapt/

3. Policy and strategy (Questions 1-6)



Summary

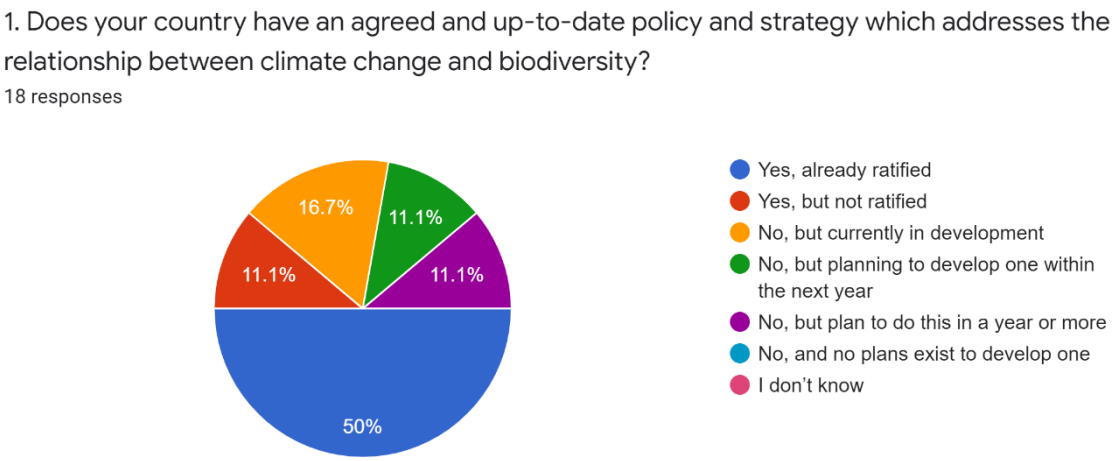
The results are overall positive and there are no countries which are not planning to develop a strategy. Almost 80% have a ratified strategy, a completed strategy waiting for ratification, or a strategy in development. Among the ratified strategies, all of them have targets that should be delivered within 10 years or sooner.

The delivery of the strategies is highly variable and can be seen to relate, at least to a certain extent, to aspects such as national GDP and the long-term engagement of certain countries in environmental issues and the associated development and implementation of relevant legislation.

Biodiversity seems to be better integrated into climate change strategies than the converse, climate in biodiversity strategies. However, in both cases there seems to be work to be done because a number disagree. On the positive side there is good cross-ministry cooperation on biodiversity and climate change.

Detailed results

This sub-section dealt with issues of policy and strategy. Specifically, it began with a question in relation to: "whether or not a given country has an agreed and up-to-date policy and strategy which addresses the relationship between climate change and biodiversity?". 50% of the respondents have a strategy that was already ratified and 11% are waiting for the strategy to be ratified. Thus, 61% of respondents can be seen to have a completed strategy. 17% have a strategy in development. Of the remaining 22% all are planning to develop one within the next year or in a year or more. There were no "don't know" replies and no countries have no plans to develop a strategy.



This gives a relatively positive picture in relation to the current alignment of countries towards the development of a strategy in relation to climate change and biodiversity. However, in relation to the follow-up questions: "If you responded to question 1 with yes, how widely and readily is the strategy accepted, integrated and being actioned? If you responded with no, what are the three key points each for barriers and triggers that affect the development of the strategy?", the picture is rather different and highly variable.

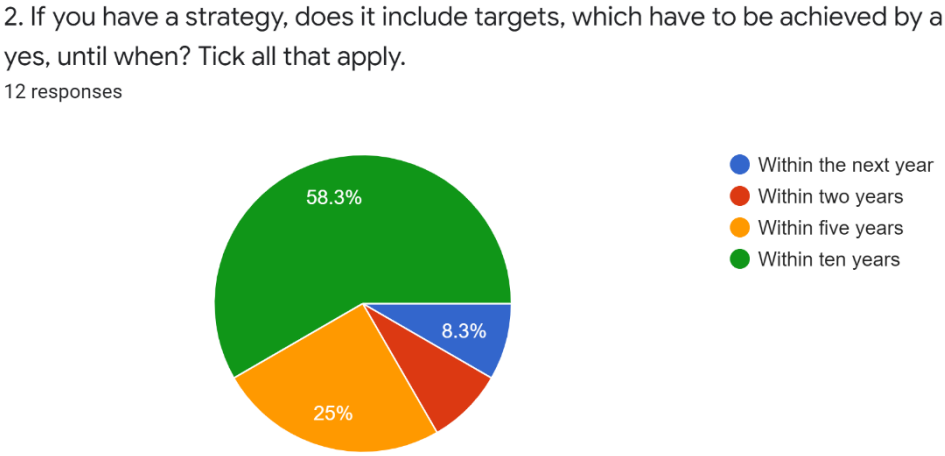
The answers provided by a (smaller) number of countries are unclear in relation to the content of the legislation they mention. Thus, it is not clear if a "ratified national biodiversity strategy (to 2030)" provides the necessary connections and links between climate change and biodiversity to allow for a policy framework within which integration and action can take place. In other cases a "no" in relation to the presence of strategy was often followed by a nil response to the question on integration and implementation. This uncertainty is evidenced in the responses to the questions that follow, often throughout the questionnaire.

Of those who answered "yes" a small number are highly advanced in relation to acceptance, integration and taking action. Thus, the United Kingdom implemented the UK Climate Change Act in 2008 and this now provides a legislative vehicle through which climate adaptation and national resilience to changing climate can be implemented. It is reviewed on a five-year cycle with associated targets and actions being set. Norway, whilst it does not have a specific policy and strategy on the relationships between climate change and biodiversity, does have several relevant national policies and strategies in which the relationships between climate change and biodiversity and the need for looking at these together are focused strongly upon across the sectors. The two approaches differ but are targeting the same outcomes.

These may be useful examples of best practice, but they should be presented in the context of aspects such as national GDP and the long-term engagement of certain countries in environmental issues and the associated development and implementation of relevant legislation; resource constraints and political history will have a bearing on the extent and speed with which many countries can progress on issues such as this.

Continuing with the "yes" category, several countries are taking things forward but on a gradual basis and they, together with many of those who answered with a "no", clearly recognise the relationships between climate change and biodiversity and the need for an integrated approach. In terms of barriers and triggers that affect the development of strategies, resource constraints (insufficient funding), insufficient cross ministry cooperation on biodiversity and climate change, and the fact that biodiversity protection is not or only superficially addressed in current climate strategies, are all recognised as issues.

In relation to those who have a strategy, they all appear to have targets, which represents a relatively positive outcome. The majority (almost 60% - 7 respondents) are intended to be achieved within 10 years. 25% should be achieved within five years, and the remaining 16-17% within two years or within the next year - representing only two respondents. The 10-year timescales are likely to reflect the simple practicalities of resorting and delivering a plan, many of which have been relatively recently ratified. Shorter term targets may relate to the implementation of action plans and mid-term reviews of existing strategies (as already mentioned above).

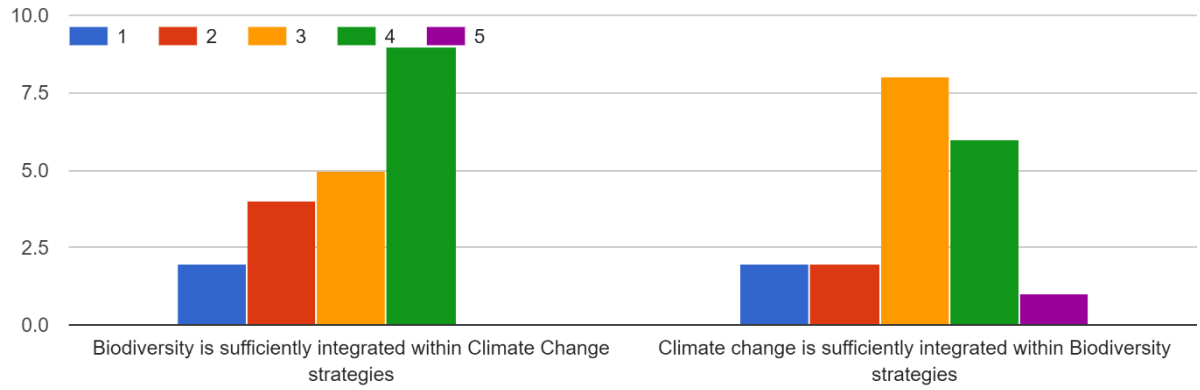


When it came to the question of whether "biodiversity is sufficiently integrated within climate change strategies" and, conversely, "whether climate change is sufficiently integrated within biodiversity strategies", the results were clearly different. The largest group believe that biodiversity is sufficiently integrated within their national climate change strategies (the green column - 9 respondents). However, 6 respondents disagree or fully disagree and five are neutral. In relation to whether climate change is sufficiently integrated within biodiversity strategy, the largest group "neither agree nor disagree" (the orange column - 8 respondents). 7 respondents agree (green + purple columns) and 4 disagree (blue + red columns).

The conclusion in relation to both questions is that biodiversity seems to be better integrated into climate change strategies than the converse, climate into biodiversity strategies. However, in both cases there seems to be work to be done because a number disagree or fully disagree and a large number are neutral.

Note: the orange columns - neutral "neither agree nor disagree" answers are strong in the first question and dominate in the second question. It is properly safest to attribute a 'nil response' to this, as it could simply mean there is some consideration but not enough to agree or disagree or it could also be a "don't know" or "not sufficiently familiar with the contents" answer.

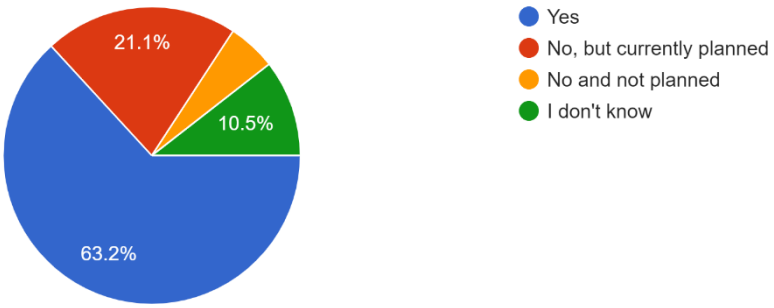
3. Please provide a score from 0 (fully disagree) to 5 (fully agree)



Finally, in response to the question over whether there are any programmes promoting cross-ministry cooperation on biodiversity and climate change, only a single respondent answered "no and not planned". Two respondents did not know but, of the rest, more than 60% (12 respondents) said "yes" and a further 21% (4 respondents) said that there were no programmes now but they were currently planned.

4. Are there any programmes promoting cross-ministry cooperation on biodiversity and climate change?

19 responses

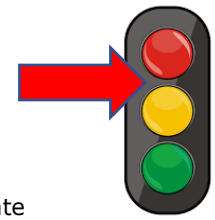


Those who responded to the question with a "yes", offered a number of vehicles and mechanisms by which the cross-ministry cooperation was achieved. These varied from having biodiversity and climate change in the same ministry, that they were linked in national strategies and were driven by targets in those strategies that require cooperation for the delivery. Other mechanisms included collaboration via funding schemes or instruments and measures (such as Common Agricultural Policy - CAP and rural development); the delivery of spatial plans, management plans and national programmes (for example) for water management and restoration. Finally, scientific committees and steering groups have been set up with cross-ministry involvement.

Those who responded with "no" were subsequently asked what the greatest gaps and barriers to implement such cooperation programmes are. A number of respondents suggested that "enhancement of cross ministry cooperation by reversing climate changes needed" and examples of the programmes and

strategies where this can take place were given. However, most were positive about how it can be achieved because they are already planning such collaboration.

4. Nature-based solutions in the face of climate change (Questions 7-16)



Summary

It can be seen that action will be required in terms of future reviews of national climate change strategies do not, or have poor inclusion of measures for biodiversity. There are currently best practices in a number of countries in terms of content and delivery of strategies that could be used to inform, support and improve such reviews.

Furthermore, national level studies and initiatives are needed to generate greater knowledge of the likelihood and patterns of shifts in species distributions, and which species are most vulnerable to climate change. This would be helpful in allowing improvements to be made to strategies and might also result in more focused action on the ground.

There is relatively good integration of nature-based solutions in both climate and biodiversity strategies and in some countries, they are already being delivered in practice.

Whilst cultural ecosystem services such as tourism and ecotourism and recreation scored are seen to improve under a changing climate, reflecting that 'better' weather may encourage tourists to visit foreign countries on holiday.

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Detailed results

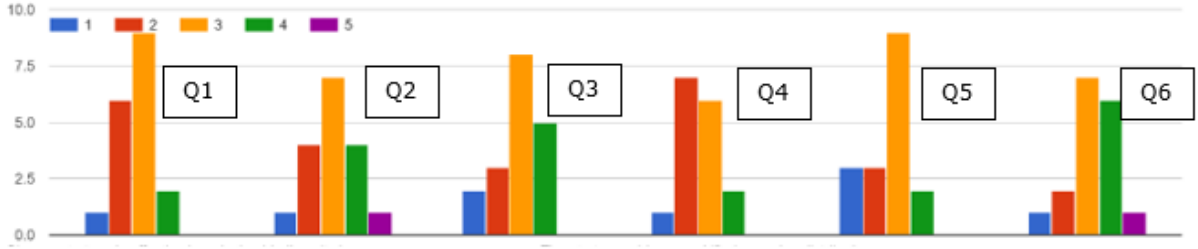
Biodiversity conservation

The first question required the respondents to provide a score from 0 (fully disagree) to 5 (fully agree) to a set of 'nested' questions as follows:

1. The Climate Change strategy is effective in reducing biodiversity loss
2. The Biodiversity strategy is effective in employing nature-based carbon reduction
3. The Biodiversity strategy is effective in providing a dynamic response to biodiversity change driven by climate change
4. The strategy addresses shifts in species distributions
5. The strategy identifies climate vulnerable species
6. Potential problems of climate-induced invasive species are identified

As can be seen from the results below the orange columns dominate the answers to each question; this represents a neutral "neither agree nor disagree" answer. A number of countries gave a "3" as the answer to all of these questions. It should be noted that questions require a level of technical knowledge that may be beyond the scope of the respondents; one strong possibility in this case is that they have therefore answered with a score of "3" because they do not know. Another explanation could be that the strategies are relatively new and have yet to be assessed in terms of their delivery in relation to these questions. It may also be because they and/or their colleagues lack the specific knowledge which, in some cases, might

need the input of researchers with access to relevant data, distribution maps for species and other supporting information.



If the orange columns are disregarded, then for response 1: "the climate change strategy is effective in reducing biodiversity loss", seven respondents disagree or fully disagree and only two agree. Thus, at this moment in time, their assessment is predominantly negative. This includes one of the countries that has a relatively well developed and long-established climate change strategy.

For response 2: "the biodiversity strategy is effective in employing nature-based carbon reduction", there is an even 5:5 balance between those who disagree and those who agree. There is therefore an indication that biodiversity strategies are more likely to encompass climate change issues than the other way around.

In relation to the third response, whether the "biodiversity strategy is effective in providing a dynamic response to biodiversity change driven by climate change", there is also an even 5:5 balance between those who disagree and those who agree.

For question 4 "the strategy addresses shifts in species distributions" there is a strong disagreement 8:2, and this is also the pattern seen for question 5 "the strategy identifies climate vulnerable species" which scores 6:2. Both questions require a relatively sophisticated level of knowledge in relation to species presence, abundance and distribution at country level. There are a number of Europe-wide studies that address shifts and species distributions and which identify which species are most likely to be most vulnerable to climate change, but often this information is lacking at country level. The studies are often based on trends analysis and are therefore rather generic and difficult to apply to specific countries and is the data and research capacity is available. It is perhaps not surprising that strategies are weak in these areas.

Conversely, in relation to the sixth response: "potential problems of climate-induced invasive species are identified" there is a strong agreement, 7:2 in favour. There has been a strong drive at European level to identify potential and existing invasive alien species and to develop measures at national and regional level to combat them. This is a subject area where a reasonable level of knowledge and information exists, and this is reflected in the responses to this specific question.

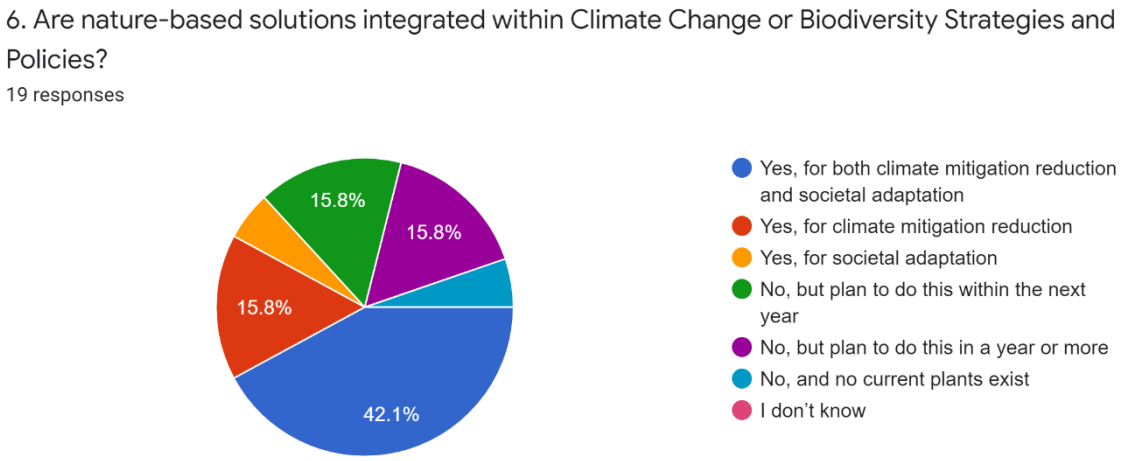
In conclusion, it can be seen that action will be required in terms of future reviews of national climate change strategies do not, or have poor inclusion of measures for biodiversity. There are currently best practices in a number of countries in terms of content and delivery of strategies that could be used to inform, support and improve such reviews.

Furthermore, national level studies and initiatives are needed to generate greater knowledge of the likelihood and patterns of shifts in species distributions, and which species are most vulnerable to climate change. This would be helpful in allowing improvements to be made to strategies and might also result in more focused action on the ground.

Assessment of the potential of nature-based solutions

This section begins with the question: "are nature-based solutions integrated within Climate Change or Biodiversity Strategies and Policies?"; just over 40% of countries gave a positive response for both climate mitigation reduction and societal adaptation, 15% recorded a positive response for climate mitigation reduction alone and 5% (1 country) for societal adaptation alone. A further 16% (3 countries) have plans to do this within the next year, 16% (3 countries) plan to do this in a year or more and only one country gave a negative response. This provides a relatively positive picture. Those countries who are in the

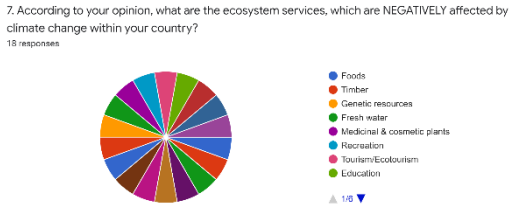
majority and already have nature-based solutions in policies or strategies could provide examples that might speed the process of integration for other countries.



The following question asked those countries who responded with a "yes" to the above question, to "provide the main nature-based solutions for both climate mitigation and societal adaptation within their strategies". There is some variation in the responses; from nature-based solutions being promoted within an upcoming national climate law, without however specifying what they might be, to more elaborated plans with 25-year goals that include restoration of natural habitats linked to action plans. In some cases, nature-based solutions are included implicitly in strategies as (for example) green infrastructure - a nature-based solution but not identified as such within the strategy. In other cases, practical examples are given; for instance, in Liechtenstein the recent construction in 2021 of a dam to retain water within the largest nature reserve and wetland in the country; the result of this was to improve the condition of the peatland and turn it from a source of greenhouse gas emissions to a sink for greenhouse gases.

Assessment of ecosystem services

In the first question of this subsection countries were asked for their opinion in relation to: "what are the ecosystem services which are negatively affected by climate change within your country?" Unfortunately, there seems to have been a problem in the multiple-choice question that only allowed (the majority of) countries to select one option from those listed (as opposed to multiple options which would have given a more heavily weighted answer). The output of the results therefore indicates that almost all of the ecosystem services are impacted equally.



However, readers interested in exploring this issue further could access this document from the perspective of the European Environment Agency as a starting point: Climate change, impacts and vulnerability in Europe 2016 - An indicator-based report[8]; the European Commission's Climate Action site[9]; and the IPCC report 'The regional impacts of climate change an assessment of vulnerability"[10] and specifically the European chapter[11].

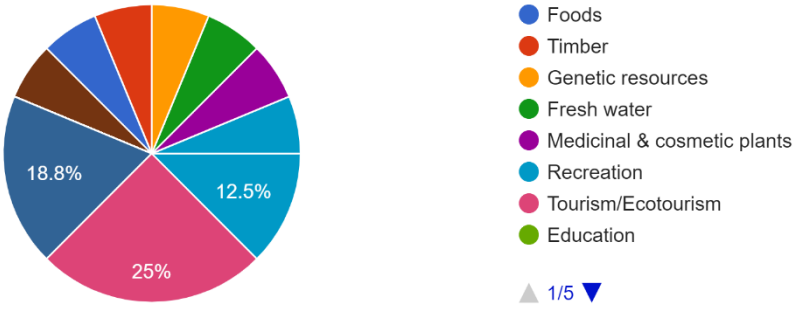
The second question about: "what are the ecosystem services which are positively affected by climate change within your country?" did give a more useful answer (although some countries reported similar problems to the previous question - so the results shown below have to be taken in the context). Nonetheless, cultural services such as tourism/ecotourism and recreation scored 25% and 12.5% respectively, 37.5% in total. This reflects the fact that 'better' weather may encourage motorists to visit

[8] European Environment Agency (2017) *Climate change, impacts and vulnerability in Europe 2016 - An indicator-based report*. 2017; 419 pp. https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016#tab-news-and-articles
[9] https://ec.europa.eu/clima/eu-action/adaptation-climate-change/how-will-we-be-affected_en
[10] https://www.ipcc.ch/site/assets/uploads/2020/11/The-Regional-Impact.pdf
[11] https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap23_FINAL.pdf

foreign countries on holiday. 18.8% (3 countries) suggested that scientific research would be positively affected by climate change.

8. According to your opinion, what are the ecosystem services, which are POSITIVELY affected by climate change within your country?

16 responses

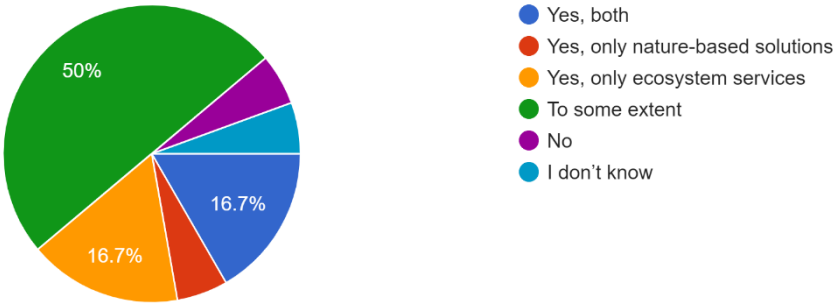


Financial subsidies and instruments

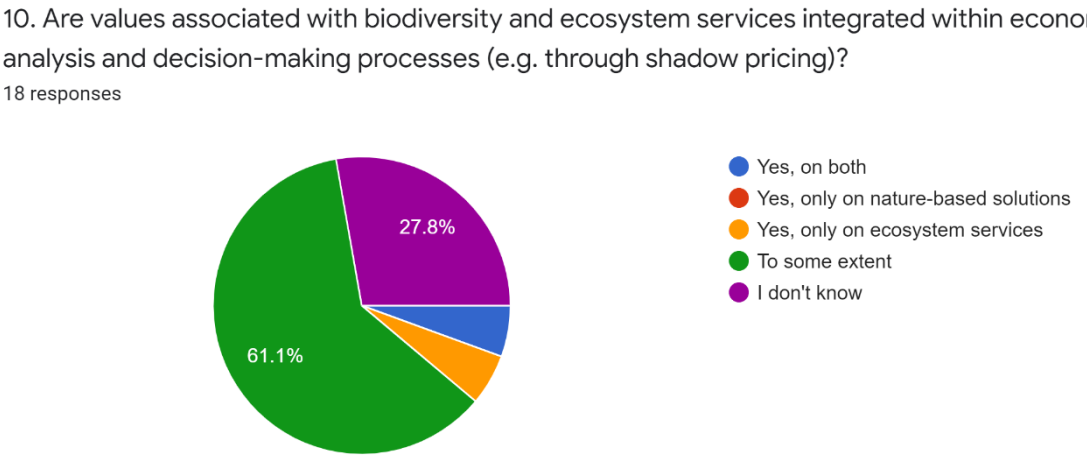
A number of questions addressed the issue of financial subsidies and instruments. The first of these focused on whether: "programmes are enhancing nature-based solutions and ecosystem services (are) financially supported". An encouraging 50% (9 countries) answered "to some extent". 16.7% (3 countries) provide financial support for both nature-based solutions and ecosystem services, 16.7% only to ecosystem services and 5.6% (a single country) only for nature-based solutions. One respondent did not know and another answered "no".

9. Are programmes on enhancing nature-based solutions and ecosystem services financially supported?

18 responses

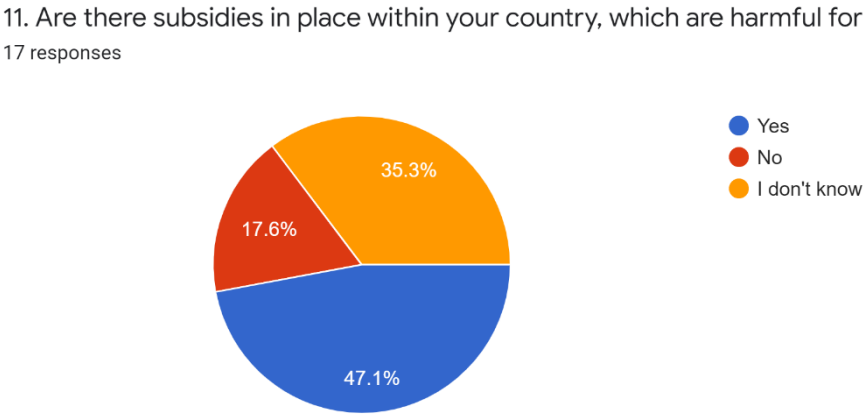


In answer to the question: "are values associated with biodiversity and ecosystem services integrated within economic analysis and decision-making processes", 61% (11 countries) said that this takes place "to some extent", one country answered "yes, both" and one "only on ecosystem services". A significant number of countries, 5 - 29%, did not know.



The relatively high figure for "don't know" may relate to the fact that such decisions are likely to be taken in other departments and the respondents may therefore not have direct knowledge. "To some extent" may also reflect only partial knowledge in relation to both questions. Only three countries therefore provide replies to the question: "what are the three main aspects that are integrated into economic and financial plans and delivery?" In one case assessments include both monetary and non-monetary values and there is work going on to establish how to integrate a possible system for ecosystem accounting. In a second example compensation is required for harmful effects on animals and/or their habitat, and natural capital has been calculated at national level. In the third country best practice guidance is available which sets out how to appraise and evaluate policies, projects and programmes, including how to value natural capital. Here there is also an expert group whose objective is to provide supplementary guidance on biodiversity valuation.

In response to the question: "are there subsidies in place within your country, which are harmful for biodiversity?", 47% (8 countries) replied "yes", 35% (6 countries) said that they did not know, and 18% (3 countries) said "no".



Respondents who replied to this question with a "yes", were asked to: "specify the three most important subsidies and also specify for each subsidy if there are plans in place to end these subsidies". Agricultural subsidies were cited as damaging to biodiversity in every response; some cases specific examples were given in relation to grazing, the use of chemicals and the promotion of drainage. Subsidies associated with fisheries and forestry policy, transport and energy sectors (including fossil fuel subsidies, in general but also specifically in relation to exploration and extraction, and the financing of the construction of linear structures) were also mentioned. Three countries made reference to subsidies and finance directed towards the development of peat deposits, including ditching of mires for forest plantation. However, on a positive note, in one country at least subsidy is no longer supported for ditching and there is ongoing review of subsidies such as planting or forest fertilisation in order to minimise negative consequences for biodiversity.

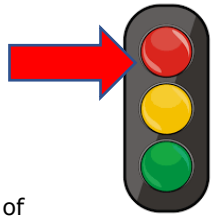
Respondents were then asked if they had any further comments on this block. Suggestions and responses were:

- One country (Slovakia) mentioned that there were some ecosystem services evaluations (that did not 'fit' within the question responses) as part of different project outcomes in 5 pilot areas – national parks. Other economic analyses were referenced including an economic analysis of costs of enlarging areas without management intervention in national Parks[12].

- To replace question 11 ("According to your opinion, what are the ecosystem services, which are positively affected by climate change within your country?") with a list of best practices and concrete examples subsidies supporting biodiversity, which might be useful for further assessment of their long-term effects or for conserving biodiversity.

- In relation to a number of the questions requiring multiple choices, comment was made that some were difficult to provide knowledge-based answers to, and that different parties may do the evaluations in different ways. Caution was therefore requested when comparing between parties.

5. Management of protected areas in the face of climate change (Questions 17-30)



Summary

Generally, there has not (yet) been significant progress made in relation to monitoring of the impact of climate change on protected areas. Sites, habitats and species under particular threat or pressure have not yet been identified.

In terms of climate change and biodiversity loss in site management plans, the majority of countries replied that management plans are not updated to respond to changes caused by climate change; and whilst national strategies are seen to contain detailed goals for addressing climate related issues, in many cases they have yet to be implemented.

In relation to the implementation (already carried out or not) of measures to adapt to climate change in protected areas, the integration of these aspects is in general insufficient according to a clear majority of respondents.

The situation in relation to adapting the network of protected areas has a set of contradictory outcomes. The great majority indicate that there is no assessment of how the network of protected areas response to climate change and there are very few programmes in place to adapt the network of protected areas to climate change. However, most countries have plans to extend the network and improve the connectivity of their protected areas. Ecological corridors are largely integrated in land use planning processes and there is evidence of good cross-country cooperation on biodiversity and climate change.

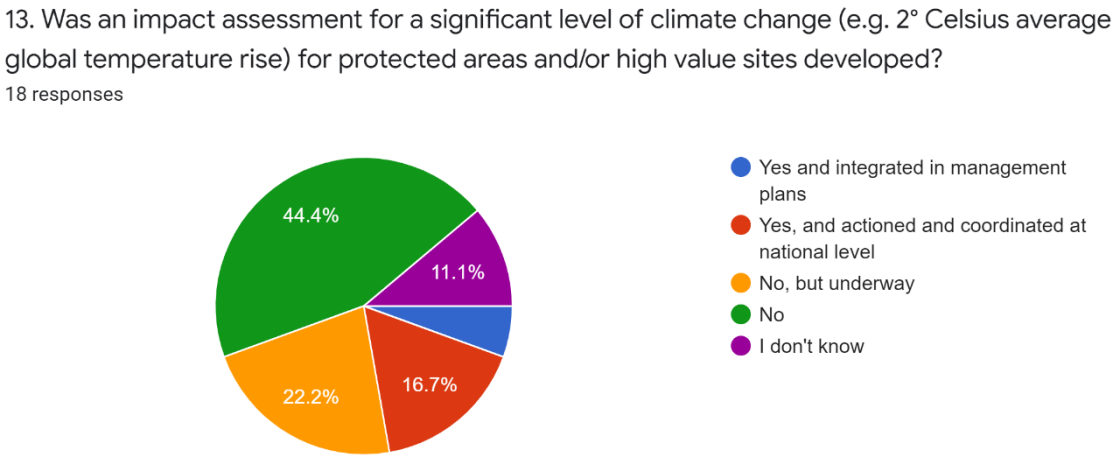
Problems include the lack of human and financial resources and the absence of sufficient data and information, especially on which species should be assessed as a priority.

[12] https://www.minzp.sk/files/iep/kolko_stoji_divocina.pdf

Detailed results

Monitoring on the impact of climate change on protected areas

The first question in this section asked: "Was an impact assessment for a significant level of climate change (e.g. 2° Celsius average global temperature rise) for protected areas and/or high value sites developed?" 44% (8 countries) replied "no". Only one country replied positively and had integrated the results into management plans; three countries (16.7%) replied "yes" and had actioned and coordinated at national level. For countries (22%) get a negative response but said that the process was underway. Two respondents (11%) did not know.

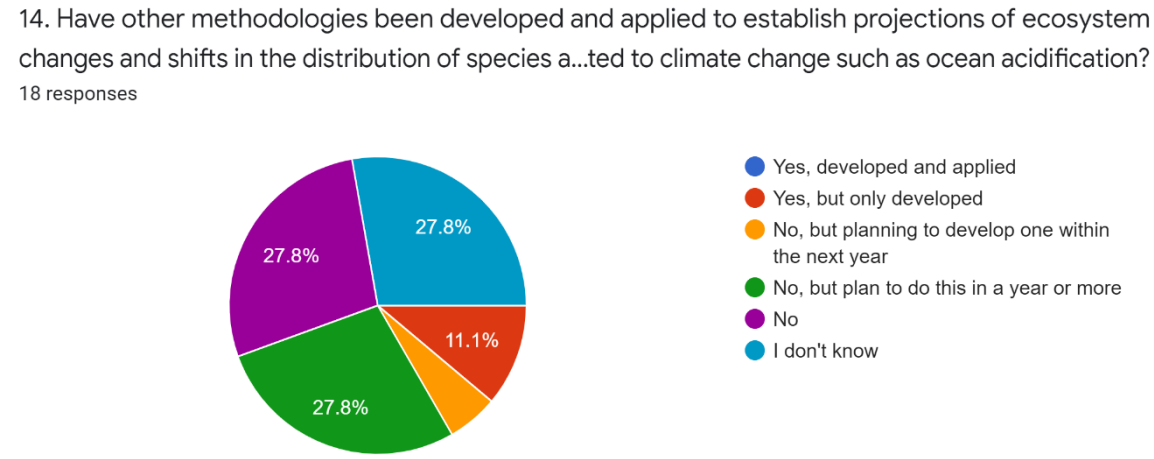


Those who responded to the question with a "no" were asked: "what are the three greatest gaps and barriers to develop this impact assessment within your country?" The replies were varied but can be summarised as follows:

- The traditional 'static' approach to conserving individual features rather than ecosystem function.
- Some countries are simply too small to conduct such research.
- Strategies contain measures but are too 'new' to have been implemented yet.
- A lack of human resources, funding and skills – some newly founded units are not yet competent to handle such issues in a comprehensive manner.
- Those responsible for taking forward such actions had not been asked.
- A lack of data and knowledge in relation to the biology of species (the bio-ecology of many species, lack of adequate species distribution models) and which species should be assessed as priority.
- Cumulative effects: the impact of climate change must be considered in conjunction with other threats.

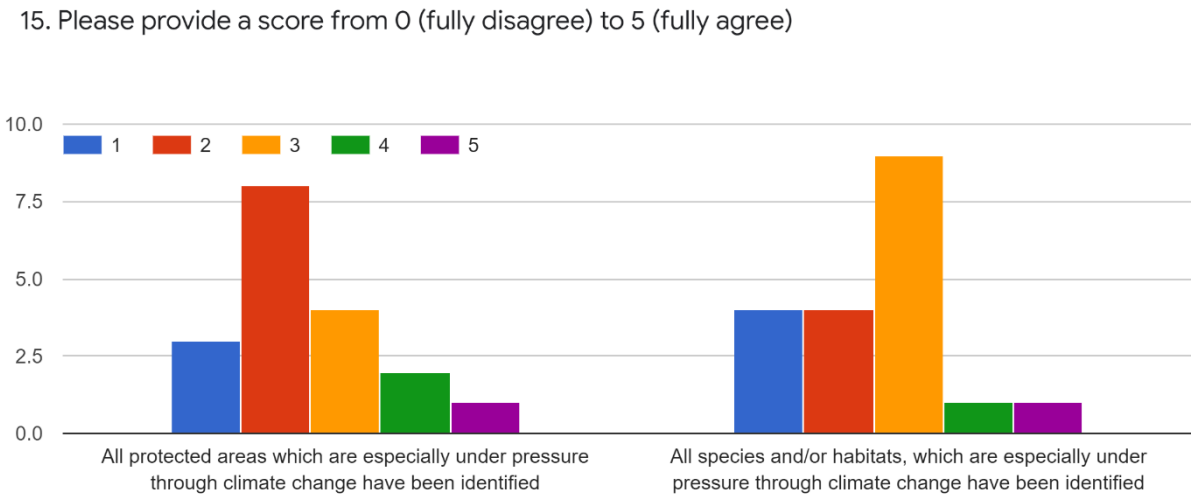
However, a number of positive comments were also made representing examples of best practice that could potentially be disseminated amongst the Contracting Parties as illustrations of what might be done. These include requests to site managers to assess the contribution (direct or indirect) that climate change is making to reasons for adverse or unfavourable site condition, and that the impact of climate change is incorporated into management of national nature reserves. In other cases papers and reports have considered issues such as the impact of climate change on coastal zone vulnerability and adaptation. Participation in research of neighbouring countries is possible and has been actioned by smaller countries, and where abiotic and biotic conditions are similar, results of research can be transferred and applied to protected areas management.

In relation to the question: "have other methodologies been developed and applied to establish projections of ecosystem changes and shifts in the distribution of species and/or habitats due to climate change or related to climate change such as ocean acidification?" 56% of respondents (10 countries) answered either "no" or "I don't know". The latter answer may reflect the rather specialised nature of the knowledge required to answer the question. Furthermore, no country has yet applied any of these methodologies and only two countries (11%) have developed them. One country is planning to develop one within the next year and a further 5 countries (28%) plan to do this in a year or more.



Three countries replied to the request to "provide further information on three most important methodologies". One country forecasted the climate change impact on forests during the development of a strategy for the adaptation of forestry to climate change; another provided an assessment of conservation areas and their functions as ecological networks and tolerance to climate change; and a third identified the four most important methodologies as: spatially explicit, fine resolution climate envelope modelling; fine resolution climate refugia modelling; expert based assessment (Delphi derived) of habitat sensitivity; and ecological connectivity modelling.

Respondents were then asked to disagree-agree with the statements: "all protected areas which are especially under pressure through climate change have been identified" and "all species and/or habitats which are especially under pressure through climate change have been identified". Disregarding the "neither agree nor disagree" orange column, the majority (11 countries for the first question, 8 countries for the second question) disagreed. Three countries agreed with the first question and only two countries agreed with the second question. We can therefore conclude that, at this stage, there is no clear picture of the protected areas, species and/or habitats which are under pressure through climate change atcountry level. One country provided additional information[13].

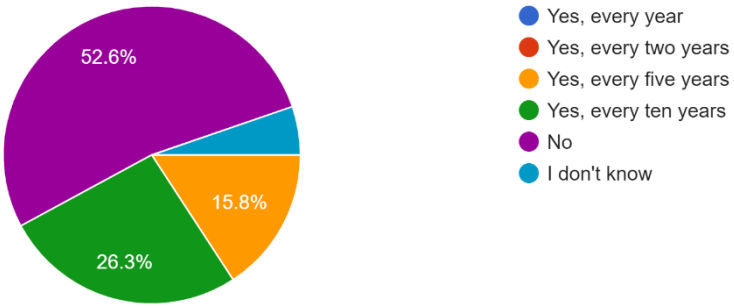


[13] Report NINA 1666 (Effects of supplementary protected areas on the function of current protected areas as ecological network and their tolerance for climate change). NEAs recommendation to MoCE: supplement to existing network of Protected Areas: "Supplerende vern fase I". MoEC: Assignment (July 2020) to carry out supplemental plans for protected areas, confined to 600 km2.

Climate change and biodiversity loss in site management plans

53% of respondents (10 countries) replied "no" in relation to the question: "are management plans constantly updated to respond to changes caused by climate change?" One respondent did not know and the remainder 26% (5 countries) updated every 10 years, 16% (3 countries) every 5 years.

16. Are management plans constantly updated to respond to changes caused by climate change?
19 responses



Those who responded positively were asked to "briefly explain the three most important methods", and those with a negative response should list "the three greatest gaps and barriers to implement adaptation management for nature sites".

The positive responses varied from specific examples (which could provide useful case studies and learning points for other countries) and reference to funding programmes (such as INTERREG, EUSALP) within which projects or initiatives can be developed. Bilateral agreements between countries were mentioned and, specifically (by Hungary), the five-sided Mura-Danube-Drava Biosphere Reserve as a good example of best practice as it is based on cooperation between five countries connected by the three rivers following an extended ecological corridor.

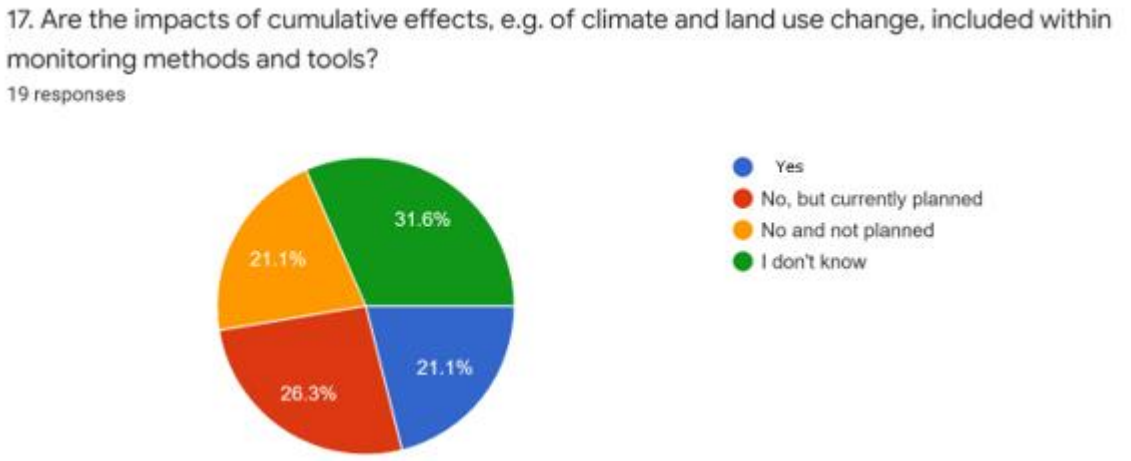
National strategies (e.g. for biodiversity 2030) are seen to contain detailed goals for addressing climate related issues, in some cases yet to be implemented. Monitoring in protected areas can result in action being taken to stop the decline or promote certain species through adaptation to the management (and modification to management plan). In some cases research is being carried out[14].

Barriers mentioned included: a lack of knowledge and expertise, or methodological guidance; the absence of laws or regulations, or obligations for ensuring climate change issues are included in the development of management plans. An absence of inter-ministerial cooperation, and between sectors and "responsible holders of measures" was also referred to as a barrier.

A lack of data about the biology of species, and on which species to focus on as indicators. Lack of information in relation to practices, especially in the context of climate change, was also referenced. Often modifications take place to reflect national and international policy and the results of individual researches and climate change impact, but these are not translated into a defined methodology for implementation at a country or site-specific level.

[14] Restaurering av myr. Potensialet for karbonlagring og reduksjon av klimagassutslipp (M-628): An investigation of whether the rewetting of peatlands can restore the carbon sink function of these ecosystems, and simultaneously reduce greenhouse gas emissions. Naturstrategi for våtmark (Nature stratgy for wetlands) ISBN PDF 978-82-457-0530-0:

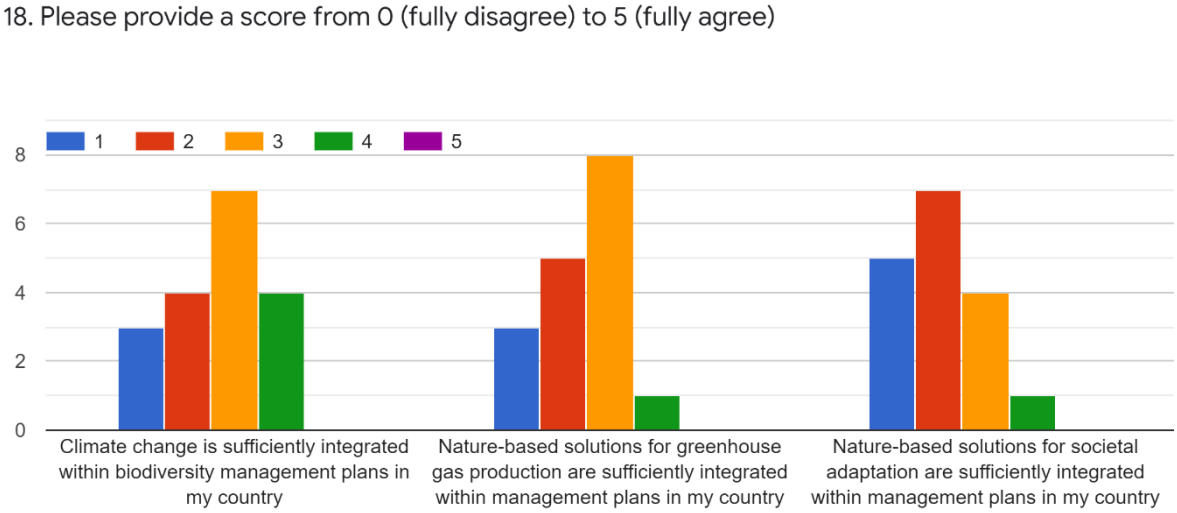
Finally for this subsection respondents were asked to answer the question: "are the impacts of cumulative effects, e.g. of climate and land use change, included within monitoring methods and tools?" Six countries (the majority at 32%) replied that they did not know; another four (21%) replied "no not planned". Four countries (21%) replied "yes" and five countries (26%) replied "no, but currently planned".



Measures to adapt to climate change already implemented

Three nested questions were then asked in relation to the implementation of measures for climate change adaptation: 1) Climate change is sufficiently integrated within biodiversity management plans in my country; 2) Nature-based solutions for greenhouse gas production are sufficiently integrated within management plans in my country; 3) and nature-based solutions for societal adaptation are sufficiently integrated within management plans in my country.

Four countries gave a positive response to the first question, one to the second and onto the third (the green columns). If we do not consider the orange columns, then seven, eight and twelve countries respectively disagreed with questions. We can conclude therefore that the integration of these aspects is in general insufficient according to the majority of respondents.

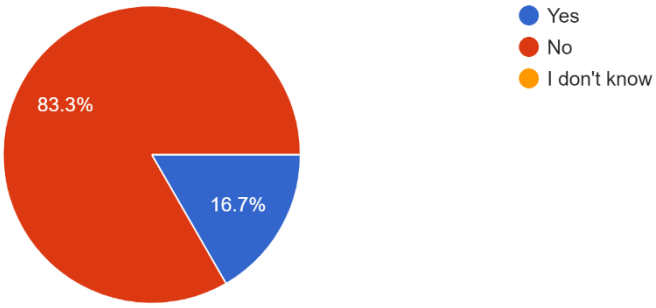


Adapting the network of protected areas

For the question: "does a strategic assessment on how the network of protected areas responds to climate change exist?" a majority of countries (83% - 15) replied "no"; three (17%) gave a positive response.

19. Does a strategic assessment on how the network of protected areas responds to climate change exist?

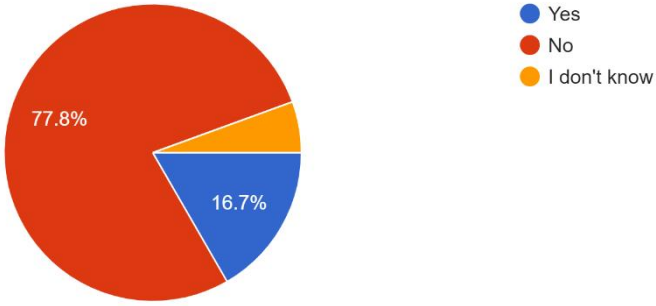
18 responses



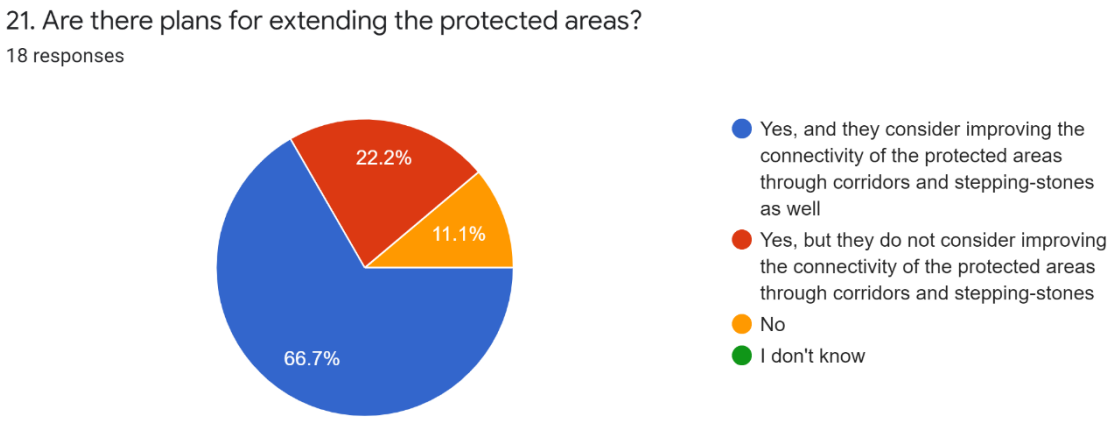
Then, for the question: "are there programmes in place to adapt the network of Protected areas to climate change?" a very similar result was obtained. Three countries answered "yes" and of the remainder one didn't know, the rest answered "no".

20. Are there programmes in place to adapt the network of protected areas to climate change?

18 responses



Finally in this set, respondents were asked: "are there plans for extending protected areas?" 67% (12 countries) said "yes, and they also consider improving the connectivity of the protected areas through corridors and stepping stones"; 22% (4 countries) said "yes, but they do not consider improving the connectivity of the protected areas through corridors and stepping stones"; and 11% (2 countries) said "no".



Those who responded with "yes", but whose country didn't consider corridors and stepping-stones, were asked to provide their opinions on the three greatest gaps and barriers that could improve the connectivity of the protected areas network sites within their countries. For a "no" response, respondents were asked to give the three greatest gaps and barriers for expanding these sites within their countries.

The answers to these questions were extensive and relatively varied. Several countries are in the process of implementing more or less detailed plans for ecological network establishment in the context of newly published biodiversity strategies, or in conjunction with existing strategies, and the details of these are given in their relatively lengthy answers. Corridors and steppingstones are considered in revisions to the protected area network and also form part of the Emerald Network (e.g. Albania, 2021). In Bulgaria spatial planning includes provision for increasing the network of protected areas in those areas and regions of the country where they have the smallest relative share; in the National Concept for Spatial Development of Bulgaria for the period 2013-2025 it is envisaged to expand the National Ecological Network with regard to protected areas declared according to the national legislation – Protected areas Act.

The reflections on the barriers were also extensive. It was suggested that the content management implementation needs to be considered at all levels (national, regional and municipal). There were shortfalls in data and where comprehensive studies or analyses exist, they are not used in practice yet (in this context telemetry studies on the movement of large carnivores were referred to by Slovakia).

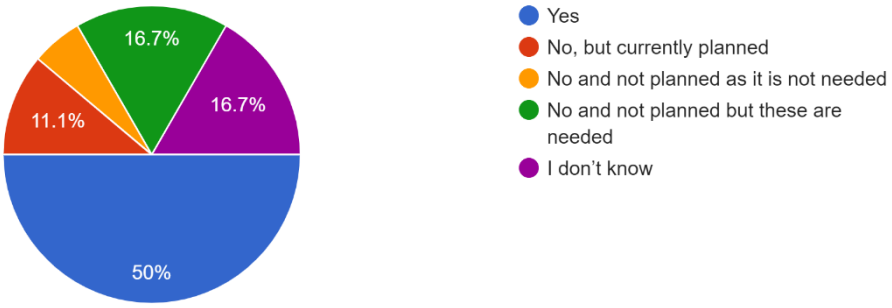
Spatial planners should be better informed, including in relation to good practice, and about the importance of ecological corridors, stepping stones and the need to include these in nature conservation guidelines. In some cases, there is no legislation for landscape planning (but in preparation and at least in one country) and some of the published documents are not binding. In some countries the process of designating protected areas and corridors is challenging, for example it may need a legal consent from municipalities when their territory overlaps with the site proposals (and there may be many and not all of them willing).

Several examples of successful eco-corridor projects were given some of which involved cooperation with ministries of transport and public companies (e.g. Slovakia). Elsewhere (e.g. Bulgaria) the current priorities for declaring protected areas (according to national legislation) are aimed at protecting river basins; the enlargement of the network in the marine off-shore part is also expected as the current coverage is very limited. Here, the main limiting factor given was the availability of relevant recent data and knowledge.

In response to the question: "are there any programmes promoting cross-country cooperation on biodiversity and climate change?", half of the countries that responded (50% - 9 countries) gave a positive response to this question. A further two countries (11%) gave a negative response but confirmed that these are currently planned. Three countries said "no, but these are needed" and one country "no and not planned as it is not meet". Three countries (17%) did not know.

22. Are there any programmes promoting cross-country cooperation on biodiversity and climate change?

18 responses



The countries that responded with "yes" were asked to specify these cooperation programmes and, if "no", to provide information on the three greatest gaps and barriers to implementing such cooperation programmes.

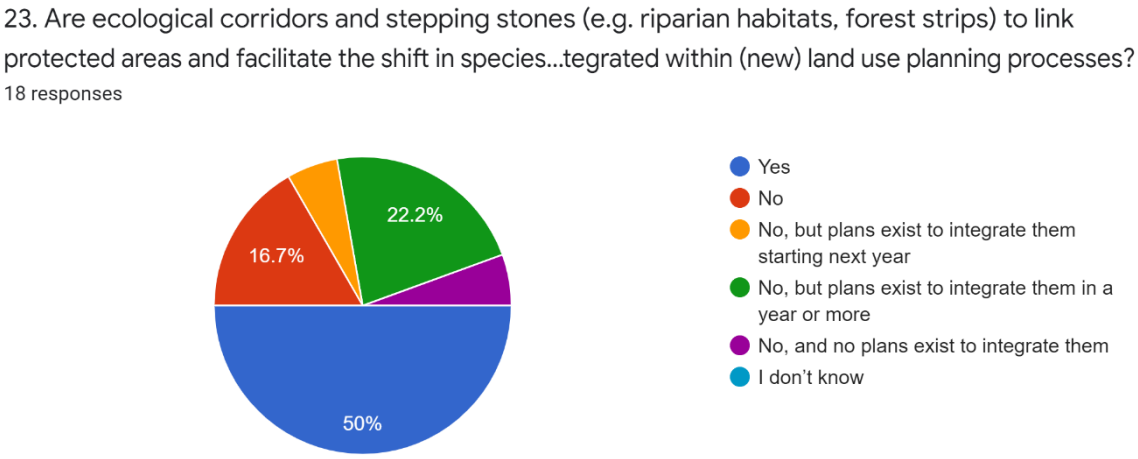
It is clear from the responses that a large number of the cooperation opportunities are driven by funding programmes. Those mentioned include: Biodiversa, Horizon Europe, EU Interegional & Trans-national Programmes (INTERREG) and EUSALP. In addition, the European Financial mechanism also supports ecosystem services (tourism and recreational) and climate change actions. Several of the funding programmes delivered by countries (e.g. GIZ) promote cross-country regional projects which address climate change and which can incorporate biodiversity issues.

Individual research projects can also provide a basis for cooperation between countries, for example research by Swiss Cantons, co-supported by Liechtenstein, on meadows in protected areas. The five-sided Mura-Danube-Drava Biosphere Reserve (also mentioned above) is also given as a "perfect" example by Hungary, as it is based on a cooperation between five countries connected by the three rivers forming an extended ecological corridor. Efforts have begun in Slovakia to measure climate impacts on beech forests in Eastern Slovakia within the frame of and Interreg project, and this is linked to a UNESCO initiative that is trying to evaluate and monitor the climate change impacts on natural heritage.

A number of countries have bilateral cooperation with other countries with the objective of contributing to the development of effective environmental authorities, in particular in the field of environmental protection. In many cases the Environmental Protection Agencies of countries participate in regional and international cooperation efforts. Examples (given by Sweden) include the Arctic Council, the Barents Euro-Arctic Council, the Nordic Cooperation and the UN Economic Commission for Europe. There is also cooperation between the countries that make up the Baltic Sea region. Other frameworks within which relevant cooperation could take place are given as: the Organisation for Economic Co-Operation and Development (OECD), the World Health Organisation (WHO), the United Nations Framework Convention on Climate Change (UNFCCC) and several other international conventions.

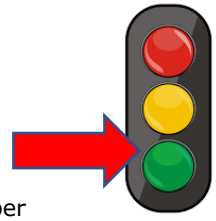
The final question in this section was: "Are ecological corridors and stepping stones (e.g. riparian habitats, woodland strips) to link protected areas and facilitate the shift in species distributions integrated within (new) land use planning processes?"

Nine countries (50%) replied positively. A single country replied "no" but plans exist to integrate them starting next year and four countries (22%) replied "no" but plans exist to integrate them in a year or more. Three countries (17%) replied "no" and no plans exist to integrate them and one country did not know. Almost 80% of respondents therefore plan to integrate measures for ecological corridors and stepping stones into upcoming land-use planning processes.



Respondents were finally asked if they have any further comments on this block. A number of the answers have been inserted in sections above where they are more relevant. One comment was made that some questions are difficult to give neutral, knowledge-based answers to; that different Parties will therefore probably evaluate and answer in different ways, and caution is requested if comparisons are made between Parties[15].

6. Communication and capacity building (Questions 31-43)



Summary

In relation to the awareness raising of public and decision makers, whilst a small number of countries do not yet engage in such activities, there is much awareness raising activity amongst the majority of countries, and there are broad public awareness campaigns that may even be supported by information provided by public television channels. Awareness raising is mainly delivered in relation to: 1) national initiatives; 2) regional-local initiatives; 3) project-related initiatives. In countries with limited resources, communication via projects and programmes is particularly important.

Where indigenous people in countries responded to the survey, their knowledge is integrated within biodiversity and/or climate change programmes.

In terms of education there is existing activity in relation to both school curricula and higher education programmes. In some cases the actions are planned but have not yet been implemented. Agriculture and forestry are two sectors that have received attention in relation to awareness-raising campaigns.

In relation to the training of practitioners, many countries simply lacked the information. The majority of the rest were carrying out or were planning to carry out training. It should be noted that training is often a component within funded projects and programmes from donors and this has already been identified as an important vehicle for awareness raising.

The responses to questions in relation to participation were generally positive. In some cases legislation requires public participation but many countries recognise the important role that local communities play in the management of protected areas. The majority of countries have therefore had national programmes encouraging the participation of local communities in the designation and management of protected areas.

[15] Note: comparisons are specifically avoided within this report; examples of good practice are associated with the countries that provided them because this may be a future use in terms of sharing knowledge and learning points.

Detailed results

Awareness raising of public and decision makers

This section begins with a question in relation to whether there: "are programmes in place strengthening local and regional knowledge on the relationship of biodiversity and climate change?". If "yes", respondents were asked to specify the three most important programmes? If "no", the three greatest gaps and barriers to implement such programmes were requested. Many lengthy and detailed replies were given and they are summarised here. The responses can be clustered into four main groups: 1) national initiatives; 2) regional-local initiatives; 3) project-related initiatives; 4) no programmes in place.

National level initiatives include the provision of environmental education information portals focused on various environmental themes including climate change[16]. These include publicly available information sources that allow the public to look at climate change risks and potential impacts in their local areas, in at least one case illustrating what future climate change might look like in people's local areas, linked to a postcode tool. Other tools support the selection of tree species which will be most appropriate to future clients and how habitats are vulnerable to climate change. In a number of countries guidelines and books are available with the aim to build capacity in community-based organisations (CBOs) and media and to raise environmental literacy of the general public on a range of climate and biodiversity -related subjects (e.g. Armenia, UK). Capacity building has been further improved through development of environmental education programmes, integration of distance learning mechanisms into existing training programmes and introducing face-to-face environmental training for decision-makers.

Elsewhere, where new strategies are in place or seem to be ratified and new national units will be set up, they require the preparation of (for example) strategic action plans for environmental education and the delivery of related programmes (see for instance Armenia[17]). The Nature Protection Programme of Serbia has identified specific objectives that include: "improving the public policy for the nature protection and biodiversity conservation and public participation in decision-making processes".

Much of the reported activity is at regional-local level. In some cases, at regional level, administrative structures are tasked with coordinating the work on climate adaptation, requiring the involvement of different sectors and stakeholders, including indigenous people, and applying multidisciplinary and social equality criteria to their operations. The regions and counties are also active in climate adaptation efforts (e.g. Sweden, Norway).

National information and methodology support (e.g. in relation to nature-based solutions and other climate and biodiversity related topics) for municipalities and the public are also made available[18]. In the same way that strategy at national level can drive communication and education programmes, action is also included within regional and local level plans, including for sectors such as water.

For many countries projects provide important means for communication[19]. Often, they can be widely reported in the media and gain positive publicity and public attention. Respondents reflect that: "Projects like this are a good way to communicate the connections between climate change and nature conservation or biodiversity to the general public" (Liechtenstein).

Some local initiatives are undertaken with the involvement of national institutions.

Several countries gave a negative response. The barriers mentioned included: improving the public policy framework as well as the institutional and financial framework; capacity (human and financial resources);

[16] EWOBOX – https://www.ewobox.sk/home
[17] *National Strategy on development of Ecological Education and Upbringing*; developed and approved by the Republic of Armenia (RoA) government http://www.irtek.am/views/act.aspx?aid=93900
[18] https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/zelena-infrastruktura-v-procese-adaptacie-na-zmenu-klimy/
[19] Specific programmes include: a GEF-UNEP project on the resilience of Kune-Vain lagoon 2017-2021 and an IPA CBC project at Karaburun-Sazan for the preparation of a Climate Change adaptation plan (both in Albania); a project on the knowledge base on climate change and adapting to climate change impacts, together with knowledge dissemination channels (Poland).

mainstreaming of biodiversity and climate change at all levels of society; inter-sectoral cooperation; no comprehensive programmes in place to reach relevant groups of society (adults) to strengthen the knowledge and understanding of the relationship between biodiversity and climate change and possible solutions; lack of specialists with the appropriate knowledge.

The following, related, question was: "Have guidance materials been developed for local and regional authorities on the relationship of biodiversity and climate change and on how they can make use of ecosystem services in their climate change adaptation work?" Indeed, several of the answers above are directly relevant to this question.

Amongst those who provided a positive response to the question, several mentioned national guidance, for instance in relation to nature-based solutions or specifically on how to consider both climate and biodiversity in the planning and implementation of development schemes, that was also included in national portals. Other national guidance covered green network planning guidance, general planning guidance and guidelines for the preparation of local climate and energy plans. One example may be found on the Polish national website: The assessment of the influence of climate change on biological diversity and guidance for nature protection administration actions to 2030[20]. The UK has a government website page, which brings together all the relevant information for local councils on climate change and the environment[21].Likewise, the Local Government Association in the UK also has a dedicated page on climate change[22] and provides support for councils to address climate change and environmental sustainability.

Other countries, like Slovakia, have best practice/model cases available. Some cities and regions have own adaptation strategies and action plans (Bratislava Region, Trnava City)[23].

A number of countries referenced projects mentioned in answers to the question above. Thus, as part of these projects, guidance materials such as leaflets, posters and brochures have been developed for local authorities, stakeholders and interested public. Furthermore, projects may also include educational tasks to deliver the necessary knowledge on climate change and in relation to the needs and options for adaptation to the consequences of these changes. These actions often address a wide group of recipients and their expected results are to improve the effectiveness of implementing adaptation measures. It was mentioned that donor support is important to realise these outcomes.

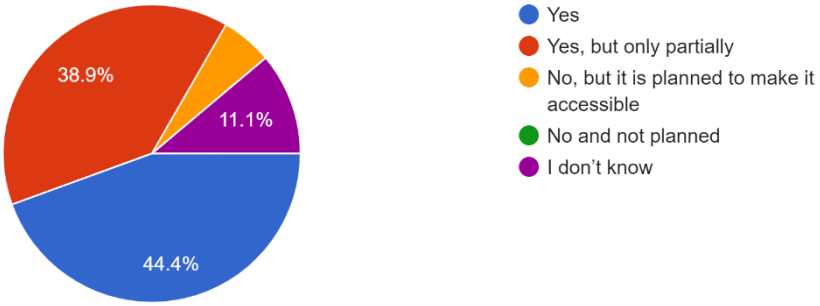
Several countries gave a negative response. Liechtenstein responded that it is too small to develop guidance documents for local and regional authorities; however, the national climate adaptation strategy can in this case be applied throughout the whole country. For the rest, there are no plans yet due to lack of capacity, resources and the priority that is given to the subjects. In one case the answer was "not yet but it is under consideration".

In relation to the question: "is data on climate change in relation to nature and information accessible for the public and for decision makers (except for sensitive data)?" 44% (8 countries) replied "yes", 39% (7 countries) "yes, but only partially" and one country replied "no, but it is planned to make it accessible". The remaining two countries replied that they did not know. This suggests that most countries are making all or some information accessible to the public and decision makers.

[20] https://ochronaprzyrody.gdos.gov.pl/files/artykuly/5478/Raport_bioroznorodnosc.pdf
[21] https://www.gov.uk/government/collections/local-government-climate-change-and-the-environment
[22] https://www.local.gov.uk/our-support/climate-change-hub
[23] Case studies, adaptation strategies on climate change and action plans are available on websites: https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/adaptacne-strategie-na-zmenu-klimy-a-akcne-plany-modelove-studie.html; https://www.minzp.sk/klima/adaptacia-zmenu-klimy/; https://www.enviroportal.sk/spravy/kat21

27. Is data on climate change in relation to nature and information accessible for the public and for decision makers (except for sensitive data)?

18 responses

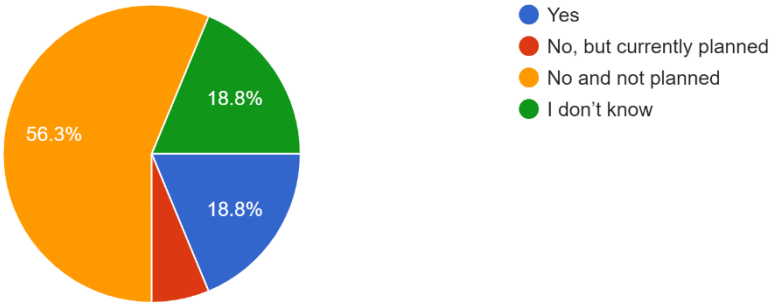


Three countries (19%) gave a positive response to the question: "is indigenous knowledge integrated within biodiversity and/or climate change programmes?" One country replied: "no, but currently planned". Nine countries (56%) replied: "no and not planned". It should be noted that many countries do not consider that they have indigenous people and/or indigenous knowledge, or they do not have a national definition that encompasses a group or groups that might be termed 'indigenous'. For example, in the general comments at the end of this section Estonia replied that it "does not have indigenous communities in the sense of CBD – Convention on Biological Diversity".

Thus, the relatively small number of countries which gave a positive response are those where there are recognised indigenous people who hold indigenous knowledge.

28. Is indigenous knowledge integrated within biodiversity and/or climate change programmes?

16 responses



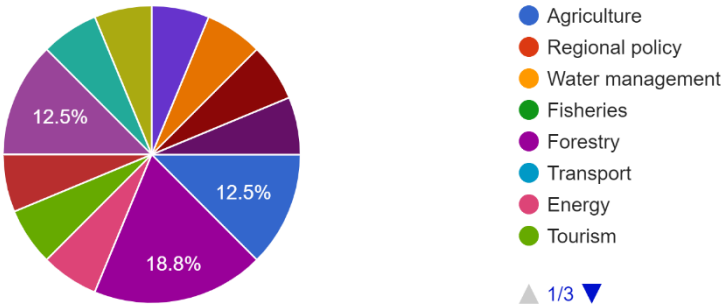
Of the countries that replied positively to the question: "are there programmes in place that raise the awareness of the public on the value of ecosystem functions and services?", several were able to supply details of up to 3 projects. However, they are rather extensive and, in order to save space they are presented in Annex 2. In summary a number of studies are mentioned by several different countries that set out to provide information (directly related to the subject of the question) that can support better decision-making in relation to integration of biodiversity and climate change measures. There is much awareness raising activity, and there are broad public awareness campaigns that may even be supported by information provided by public television channels.

Education

This section begins with the question: "Are there any programmes or campaigns that raise the awareness of different economic sectors on the link between climate change and biodiversity? If yes, could you specify

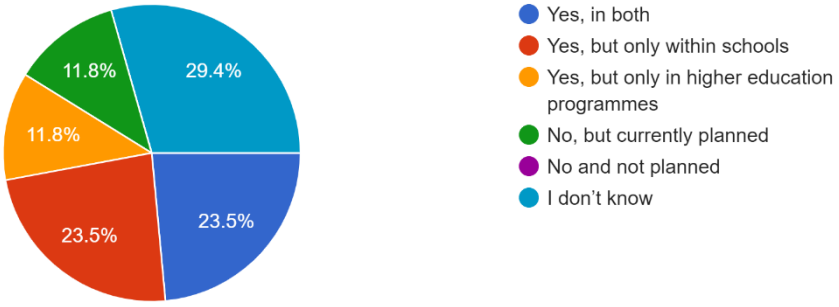
the sector". Agriculture and forestry were most frequently mentioned (but only 2 and 3 countries respectively) and the other sector with 12.5% was "none of the above-mentioned".

30. Are there any programmes or campaigns that raise the awareness of different economic sectors on the link between climate change and bio...s, could you specify the sector. (multiple choice)
16 responses



Next, respondents were asked: "Is the relationship of biodiversity and climate change integrated within educational programmes in school curricula as well as in higher education programmes?" The majority (5 countries – 29%) did not know. 39% (10 countries) gave positive answers: 23.5% (4 countries) said "yes in both", 23.5% (4) said "yes but only within schools" and 12% (2) said "yes but only in higher education". 12% said "no, but it is currently planned". Representing an overall relatively positive result.

31. Is the relationship of biodiversity and climate change integrated within educational programmes in school curricula as well as in higher education programmes?
17 responses

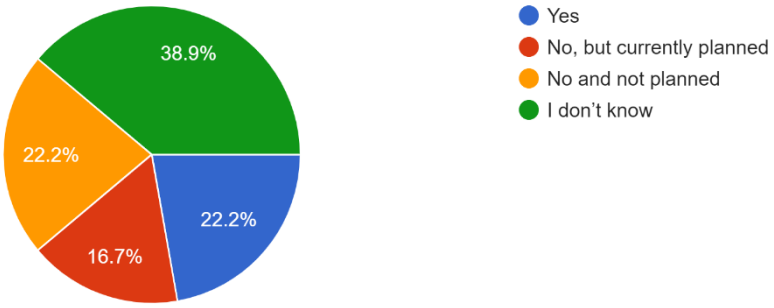


Training of practitioners

In terms of direct training for practitioners, respondents were asked: "Are there programmes in place for practitioners, which address the link between climate change and biodiversity?" The majority, 39% (7 countries) did not know. Of the rest 22% (4 countries) replied "no" and were not planning to do so; 22% (4 countries) said "yes" and 17% (3) replied "no" but training was currently planned.

32. Are there programmes in place for practitioners, which address the link between climate change and biodiversity?

18 responses



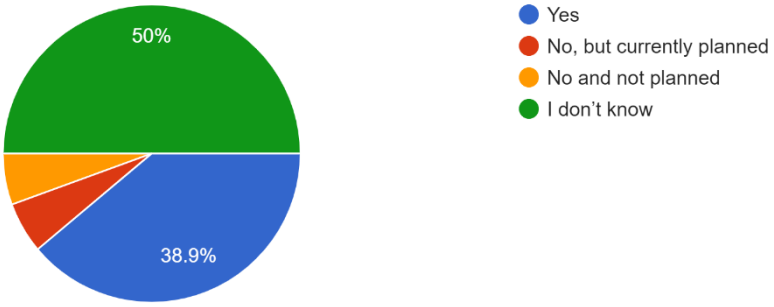
There were very few further comments on this block; one country replied that they did not have the information in house and were not able to collect answers at a local level, and were therefore not able to give very thorough answers to this block.

Participation

In relation to participation, the first question was: "Are there programmes, which foster bottom-up solutions promoting climate and environmental actions from citizens?" The majority (50% - 9 countries) answered "I don't know". 39% (7 countries) answered "yes" which, in spite of the 'don't knows' is a positive return, two counties answered "no" but one was planning to do so in the future.

34. Are there programmes, which foster bottom-up solutions promoting climate and environmental actions from citizens?

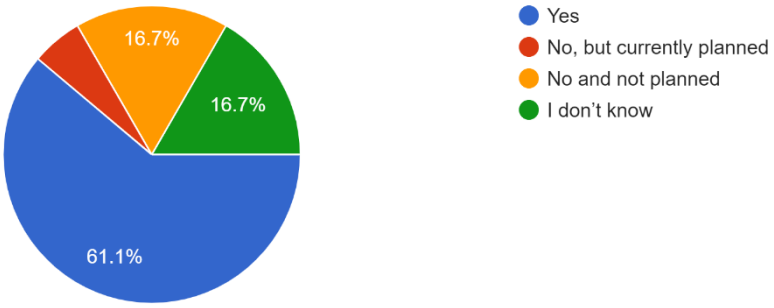
18 responses



In relation to the more general question: "Are there programmes in place encouraging the participation of local communities in the management of protected areas?" a large majority of 61% of respondents (11 countries) said "yes" and one country was planning to. 17% (3 countries) said "no" and the same number said they did not know.

35. Are there programmes in place encouraging the participation of local communities in the management of protected areas?

18 responses



In terms of exploring the detail of these last two results, respondents were asked that if they responded with "yes" to specify the most important programmes and, if "no", to give the three greatest gaps and barriers to implement such programmes. Again, the results were lengthy and are given in full in Annex 2 for the interested reader. The paragraphs below summarise the main points.

The role of legal provisions was mentioned; for instance, that require public participation, mandatory consultations with local communities and in some cases public discussion in the management planning process, development and/or updating of management plans for protected areas, as well as establishment of new protected areas, both for Natura 2000 sites and for protected areas designated according to national legislation. These can drive changes in national legislation that may enhance participation of local communities in the management of protected areas.

Many countries recognise the important role that local communities play in the management of protected areas. Several countries have therefore had national programmes encouraging the participation of local communities in the designation and management of protected areas.

Within the framework of some projects, activities are carried out that are aimed at increasing the involvement of the local population in the management of specially protected natural areas and the establishment of ecotourism clusters based on them. In some countries there has been devolution of responsibility for the management of National Parks (e.g. in Iceland where Vatnajokull NP is a decentralised park managed by regional councils). It should be noted that in countries/regions such as Scotland, the majority of protected areas are in private ownership, so there can be resistance to community involvement in management decision making and actions.

Elsewhere programmes for encouraging citizen involvement in actions for climate or biodiversity are delivered by a range of organisations: environmental Non-Government Organisations, some of which are financially supported from the public sector, youth councils (e.g. Youth Environmental Council - Noorte keskkonnanõukogu, in Estonia), Cooperation Councils of National Parks. As part of the (Polish) Programme of Conservation and Sustainable Use of Biodiversity, the objectives include Activation of the society for the protection of biodiversity. As part of this objective, systems of cooperation with volunteers were created in national parks. Other countries have community protected areas/or Municipality PAs. There are some land properties/parcels in PAs owned by non-governmental environmental organisations which are responsible for further management and they provide it in very effective way, etc.

Concluding remarks

Concluding remarks were provided by the respondents based on the question: "Do you think that all important topics have been mentioned in this questionnaire or is something missing?" Several reported that they were satisfied. The remaining answers are as follows:

- This questionnaire was very useful for us and thank you for that.

- There could have some questions regarding development of knowledge base. In Norway we have focus and emphasis on how to develop holistic knowledge that can provide information on consequences for both climate and biodiversity.

- This topic goes much wider than just nature conservation. To complete the necessary integration requires moving beyond individual linked policies to combined delivery across land use and sea use - a huge challenge.

- The taxonomy and sustainable finance in terms of climate change and biodiversity restoration are missing. And linked to this: It will be helpful to provide possibilities for financing in relation to best available practises and some study documents with some information to share to other countries. Also: We believe that more connections on the budgetary, administrative and participatory aspects of climate change and biodiversity should be made by international projects.

- It is very important for many sectors to improve their knowledge and understanding through the exchange of relevant information (on biodiversity especially when there are missing data, arguments, experts, studies) to develop common goals, ideas and for them to have the will to cooperate in adaptation and mitigation of climate change.

- Maybe it will be helpful to have obligations from different sides increase the uptake of climate change adaptation and mitigation in urbanisation, agriculture, forestry, water management and other sectors; also to provide a necessity for including nature-based solutions, biodiversity issues, green infrastructure measures, etc.

ANNEX 1: The Questionnaire in full

Questionnaire on nature-based solutions and management of protected areas in the face of climate change

(Note: the numbers of the questions below do not fully correspond with the numbers given in illustrations in the report as they changed when they were transposed into 'Google' format)

Introduction

Recognising the twin crises of biodiversity and climate change, Contracting Parties are tasked to take action to adapt to the impacts of climate change on biodiversity both at protected areas and for nature-based solutions. Biodiversity serves as a major keystone for human wellbeing as it provides us with a variety of services such as food, medicine, the purification of water, climate regulation, and cultural as well as recreational experiences. As both biodiversity loss and climate change are driven by human economic activities and mutually reinforce each other, neither of them can be resolved unless they are tackled together. This survey aims to monitor progress on nature-based solutions and management of protected areas, to identify and share best practice, and to encourage further adaptation action for nature and for people.

Recommendation No. 206 (2019) of the Bern Convention states that the Contracting Parties should report in 2022 on the progress made on the implementation of the Recommendation. To assist the Contracting Parties with the reporting, the Secretariat developed a questionnaire on biodiversity and climate change particularly focusing on the role of ecological networks. The questionnaire is structured into four blocks covering the topics "Nature-based solutions and management of protected areas in the face of climate change, Ecological networks, Policy dimensions, Communication and Capacity Building".

The online survey will take approximately 40 minutes and will remain active until end of January 2022. By filling out this questionnaire you agree that the Bern Convention Secretariat will process your data and make the results of the questionnaire available to the other Contracting Parties of the Bern Convention.

Information on the respondent

Name and capacity:
Country:
Date:
Institution:
Department:
E-mail:
Other participants:

Name	Institution & Department

Policy and Strategy

1. Does your country have an agreed and up-to-date policy and strategy which addresses the relationship between climate change and biodiversity?
   - ☐ Yes, already ratified
   - ☐ Yes, but not ratified
   - ☐ No, but currently in development
   - ☐ No, but planning to develop one within the next year
   - ☐ No, but plan to do this in a year or more
   - ☐ No, and no plans exist to develop one
   - ☐ I don't know

2. If you responded to question 1 with yes, how widely and readily is the strategy accepted, integrated and being actioned? If you responded with no, what are the three key points each for barriers and triggers that affect the development of the strategy?

3. If you have a strategy, does it include targets, which have to be achieved by a certain date? If yes, until when? Tick all that apply.
   - ☐ Within the next year
   - ☐ Within two years
   - ☐ Within five years
   - ☐ Within ten years

4. Please provide a score from 0 (fully disagree) to 5 (fully agree)

Biodiversity is sufficiently integrated within Climate Change strategies	
Climate change is sufficiently integrated within Biodiversity strategies	

5. Are there any programmes promoting cross-ministry cooperation on biodiversity and climate change?
   - ☐ Yes
   - ☐ No, but currently planned
   - ☐ No and not planned
   - ☐ I don't know

6. If you responded to question 5 with yes, could you specify these cooperation programmes? If you responded with no, what are the greatest gaps and barriers to implement such cooperation programmes?

Nature-based solutions in the face of climate change

Biodiversity conservation

7. Please provide a score from 0 (fully disagree) to 5 (fully agree)

The Climate Change strategy is effective in reducing biodiversity loss	
The Biodiversity strategy is effective in employing nature-based carbon reduction	

The Biodiversity strategy is effective in providing a dynamic response to biodiversity change driven by climate change	
The strategy addresses shifts in species distributions	
The strategy identifies climate vulnerable species	
Potential problems of climate-induced invasive species are identified	

Assessment of the potential of nature-based solutions

8. Are nature-based solutions integrated within Climate Change or Biodiversity Strategies and Policies?
   - □ Yes, for both climate mitigation reduction and societal adaptation
   - □ Yes, for climate mitigation reduction
   - □ Yes, for societal adaptation
   - □ No, but plan to do this within the next year
   - □ No, but plan to do this in a year or more
   - □ No, and no current plants exist
   - □ I don't know

9. If you responded to question 8 with yes, could you provide the three main nature-based solutions for both climate mitigation as well as for societal adaptation within the Climate Change or Biodiversity Strategies and Policies of your country?

Assessment of ecosystem services

10. According to your opinion, what are the ecosystem services, which are negatively affected by climate change within your country?

- Provisioning services
- ☐ Foods
- □ Timber
- □ Genetic resources
- □ Fresh water
- □ Medicinal & cosmetic plants

- Cultural services
- ☐ Recreation
- □ Tourism/Ecotourism
- □ Education
- □ Landscape beauty
- □ Scientific research
- □ Traditional Ecological Knowledge
- □ Cultural heritage
- □ Religious/Spiritual

- Regulating services
- ☐ Soil retention & Erosion control
- □ Hydrological regulation
- □ Pollination for useful plants
- □ Climate regulation
- □ Soil purification
- □ Waste treatment
- □ Water purification
- □ Flood buffering
- □ Pest prevention
- □ Invasive species prevention
- □ Air quality

□ Habitat maintenance
□ Food web maintenance
□ Nursery
□ Saline equilibrium
□ Climate regulation
☐ Seed dispersal
☐ Disease regulation

11. According to your opinion, what are the ecosystem services, which are positively affected by climate change within your country?

- Provisioning services
☐ Foods
□ Timber
□ Genetic resources
□ Fresh water
□ Medicinal & cosmetic plants

- Cultural services
☐ Recreation
□ Tourism/Ecotourism
□ Education
□ Landscape beauty
□ Scientific research
□ Traditional Ecological Knowledge
□ Cultural heritage
□ Religious/Spiritual

- Regulating services
☐ Soil retention & Erosion control
□ Hydrological regulation
□ Pollination for useful plants
□ Climate regulation
□ Soil purification
□ Waste treatment
□ Water purification
□ Flood buffering
□ Pest prevention
□ Invasive species prevention
□ Air quality
□ Habitat maintenance
□ Food web maintenance
□ Nursery
□ Saline equilibrium
□ Climate regulation
☐ Seed dispersal
☐ Disease regulation

Financial subsidies and instruments

12. Are programmes on enhancing nature-based solutions and ecosystem services financially supported?
□ Yes, both
□ Yes, only nature-based solutions
□ Yes, only ecosystem services
□ To some extent
□ No
□ I don't know

13. Are values associated with nature-based solutions and ecosystem services integrated within economic analysis and decision-making processes (e.g. through shadow pricing)?
□ Yes, on both
□ Yes, only on nature-based solutions
□ Yes, only on ecosystem services

- □ To some extent
- □ No
- □ I don't know

14. If you responded to question 13 with yes, what are the three main aspects that are integrated into economic and financial plans and delivery?

15. Are there subsidies in place within your country, which are harmful for biodiversity?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know

    15.1. If you responded to question 15 with yes, please specify the three most important subsidies and also specify for each subsidy if there are plans in place to end these subsidies.

16. Do you have any further comments on this block?

Management of protected areas in the face of climate change

Monitoring on the impact of Climate Change on protected areas

17. Was an impact assessment for a significant level of climate change (e.g. 2° Celsius average global temperature rise) for protected areas and/or high value sites developed?
    - ☐ Yes and integrated in management plans
    - ☐ Yes, and actioned and coordinated at national level
    - ☐ No, but underway
    - ☐ No
    - ☐ I don't know

    17.1. If you responded to question 17 with no, what are the three greatest gaps and barriers to develop this impact assessment within your country.

18. Have other methodologies been developed and applied to establish projections of ecosystem changes and shifts in the distribution of species and/or habitats due to climate change or related to climate change such as ocean acidification?

    - □ Yes, developed and applied
    - □ Yes, but only developed
    - □ No, but planning to develop one within the next year
    - □ No, but plan to do this in a year or more
    - □ No
    - □ I don't know

19. If you responded to question 18 with yes, could you provide further information on the three most important methodologies?

20. Please provide a score from 0 (fully disagree) to 5 (fully agree)	
All protected areas which are especially under pressure through climate change have been identified	
All species and/or habitats, which are especially under pressure through climate change have been identified	

Climate change and biodiversity loss in site management plans

21. Are management plans regularly updated to respond to changes caused by climate change?
    - ☐ Yes, every year
    - ☐ Yes, every two years
    - ☐ Yes, every five years
    - ☐ Yes, every ten years
    - ☐ Yes, every twenty years
    - ☐ No
    - ☐ I don't know

22. If you responded to question 21 with yes, could you briefly explain the three most important methods? If no, what are the three greatest gaps and barriers to implement adaptation management for nature sites within your country.

23. Are the impacts of cumulative effects, e.g. of climate and land use change, included within monitoring methods and tools?
    - □ Yes
    - ☐ No, but currently planned
    - ☐ No and not planned
    - ☐ I don't know

Measures to adapt to climate change already implemented

24. Please provide a score from 0 (fully disagree) to 5 (fully agree)	
Climate change is sufficiently integrated within biodiversity management plans in my country	
Nature-based solutions for greenhouse gas production are sufficiently integrated within management plans in my country	
Nature-based solutions for societal adaptation are sufficiently integrated within management plans in my country	

Adapting the network of protected areas

25. Does a strategic assessment on how the network of Protected areas responds to climate change exist?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know

26. Are there programmes in place to adapt the network of Protected areas to climate change?
    - ☐ Yes
    - ☐ No
    - ☐ I don't know

26.1. If you responded to question 26 with yes, could you specify these programmes? If you responded with no, what are the three greatest gaps and barriers to implement such programmes?

27. Are there plans for extending the protected areas?
    - ☐ Yes, and they consider improving the connectivity of the protected areas through corridors and stepping-stones as well
    - ☐ Yes, but they do not consider improving the connectivity of the protected areas through corridors and stepping-stones
    - ☐ No
    - ☐ I don't know

27.1. If you responded to question 27 with yes, but your country didn't consider corridors and stepping-stones, what are the three greatest gaps and barriers to improve the connectivity of the protected areas network sites within your country? If you responded to question 27 with no, what are the three greatest gaps and barriers to expand these sites within your country?

28. Are there any programmes promoting cross-country cooperation on biodiversity and climate change?
    - ☐ Yes
    - ☐ No, but currently planned
    - ☐ No and not planned as it is not needed
    - ☐ No and not planned but these are needed
    - ☐ I don't know

28.1. If you responded to question 28 with yes, could you specify these cooperation programmes? If you responded with no, what are the three greatest gaps and barriers to implement such cooperation programmes?

29. Are ecological corridors and stepping stones (e.g. riparian habitats, woodland strips) to link protected areas and facilitate the shift in species distributions integrated within (new) land use planning processes?
    - □ Yes
    - □ No, but plans exist to integrate them starting next year
    - □ No, but plans exist to integrate them in a year or more
    - □ No, and no plans exist to integrate them
    - □ I don't know

30. Do you have any further comments on this block?

Communication and Capacity Building

Awareness raising of public and decision makers

31. Are there programmes in place strengthening local and regional knowledge on the relationship of biodiversity and climate change? If yes, could you specify the three most important programmes? If you responded with no, what are the three greatest gaps and barriers to implement such programmes?

32. Have guidance materials been developed for local and regional authorities on the relationship of biodiversity and climate change and on how they can make use of ecosystem services in their climate change adaptation work? If yes, could you specify the most important materials? If you responded with no, what are the three greatest gaps and barriers to develop such guidance materials?

33. Is data on climate change in relation to nature and information accessible for the public and for decision makers (except for sensitive data)?
    - □ Yes
    - □ Yes, but only partially
    - □ No, but it is planned to make it accessible
    - □ No and not planned
    - □ I don't know

34. Is indigenous knowledge integrated within biodiversity and/or climate change programmes?
    - □ Yes
    - □ No, but currently planned
    - □ No and not planned
    - □ I don't know

35. Are there programmes in place that raise the awareness of the public on the value of ecosystem functions and services? If yes, could you elaborate further on the three most important programmes?

Education

36. Are there any programmes or campaigns that raise the awareness of different economic sectors on the link between climate change and biodiversity? If yes, could you specify the sector. (multiple choice)
    - ☐ Agriculture
    - □ Regional policy
    - □ Water management
    - □ Fisheries
    - □ Forestry
    - □ Transport
    - □ Energy
    - □ Tourism
    - □ Development policy
    - □ Health
    - □ None of the above mentioned
    - □ Others:

37. Is the relationship of biodiversity and climate change integrated within educational programmes in school curricula as well as in higher education programmes?
    - □ Yes, in both
    - □ Yes, but only within schools
    - □ Yes, but only in higher education programmes
    - □ No, but currently planned
    - □ No and not planned
    - □ I don't know

Training of practitioners

38. Are there programmes in place for practitioners, which address the link between climate change and biodiversity?
    - □ Yes
    - □ No, but currently planned
    - □ No and not planned
    - □ I don't know

39. Do you have any further comments on this block?

40. Do you think that all important topics have been mentioned in this questionnaire or is something missing?

Participation

41. Are there programmes, which foster bottom-up solutions promoting climate and environmental actions from citizens?
    - □ Yes
    - □ No, but currently planned
    - □ No and not planned
    - □ I don't know

42. Are there programmes in place encouraging the participation of local communities in the management of protected areas?
    - □ Yes
    - □ No, but currently planned
    - □ No and not planned
    - □ I don't know

43. If you responded to either question 41 or question 42 with yes, could you please specify the most important programmes? If you responded with no, what are the three greatest gaps and barriers to implement such programmes?

ANNEX 2: Positive responses to the questions

1) "Are there programmes in place that raise the awareness of the public on the value of ecosystem functions and services? If yes, could you elaborate further on the three most important programmes?"

2) In relation to participation: please specify the most important programmes; if you responded with no, what are the three greatest gaps and barriers to implement such programmes?

Country	Are there programmes in place that raise the awareness of the public on the value of ecosystem functions and services?	In relation to participation: please specify the most important programmes? If you responded with no, what are the three greatest gaps and barriers to implement such programmes
Norway	In this regard some projects have been already implemented or are planned for the future. For example: Within the planning period 2009 - 2014: 1 Projects under Open call BG03.02 Ecosystem services mapping and assessment, Programme BG03 Biodiversity and ecosystems Within the projects were developed 9 methodologies (agricultural ecosystems; grassland ecosystems; shrub and ericoid ecosystems; marine ecosystems; territories with scarce vegetation and without vegetatioon; rivers and lakes; wetlands; forest and shrub ecosystems and urban ecosystems). Mapping and assessment of ecosystems and biophysical assessment of ecosystem services outside Natura 2000) 2. Project BG03.PDP2 Methodological assistance for ecosystems assessment and biophysical valuation (MetEcoSMAP) Project The project was with beneficiery – Ministry of environment and water of Bulgaria (MoEW) And with partners: 1. Norwegian Institute for Natural Research (NINA); 2. Institute for Biological Diversity and Ecosystem Research at BAS (IBEI); 3. Executive Forest Agency (EFA) Funding was ensured by the Financial Mechanism of the European Economic Area 2009-2014 Within the planning period 2014 - 2021: 3. Pre-defined Project Valuation and implementation of ecosystems services (VAIES) Beneficiery - MoEW With Donor Partner: Norwegian Institute for Nature Research (NINA) Funding will be ensured by the Financial Mechanism of the European Economic Area 2014 - 2021	Local communities play a very important role in the management of protected areas: Municipal boards has management authority for all the National Parks (on mainland Norway), most Protected Landscapes and some Nature Reserves. Around 60 municipalities have management authority for their respective Protected Areas.

	Within the framework of these projects, activities related to raising awareness regarding ecosystem services and functions have been implemented and are envisaged.	
Belarus	There is no special program to strengthen knowledge in this area, separate activities are carried out within the framework of various programs and projects.	When drafting management plans for specially protected natural areas, including in the framework of the State Programme «Environmental Protection and Sustainable Use of Natural Resources», public discussion is mandatory. Within the framework of the UNDP project «Ecotourism», activities are carried out aimed at increasing the involvement of the local population in the management of specially protected natural areas and the establishment of ecotourism clusters based on them.
Slovenia	In preparation : Ecosystem services and landscape features IP LIFE Natura	
UK	Scotland has broad public awareness campaigns e.g. Make Space for Nature JNCC with Natural England, Natural Resources Wales, Nature Scot and the Northern Ireland Environment Agency have published Nature Positive 2030 to mark the anniversary of the Leader's pledge made at COP 26 and identify how the UK can achieve these commitments and ensure that nature recovery plays its critical role in achieving net zero. Natural Resources Wales (NRW)'s Natur a Ni (Nature and Us) project looks at setting out the value of ecosystems and ecosystem services, so that they are recognised and communicated. The BBC also provides information on climate change and programmes exploring different aspects of climate change and how they can be addressed.	Programmes for encouraging citizen involvement in actions for climate or biodiversity largely delivered by environmental Non-Government Organisations, some of which is financially supported from the public sector. The majority of protected areas in Scotland are in private ownership, so there can be resistance to community involvement in management decision making and actions. Community initiatives are being supported by Adaptation Scotland The Welsh Government's Sustainable Management projects i.e. Gwent levels and the Nature Networks Fund projects all have elements of stakeholder engagement.
Estonia	Yes, environmental education programmes, National Assessment and Mapping of Ecosystems and Ecosystem Services (ELME) project with its' actions	Youth Environmental Council (Noorte keskkonnanõukogu), Cooperation Councils of National Parks, implementation of practical nature conservation works (e.g. mowing or grazing of semi-natural grasslands), Volunteer work camps
Poland	The staff of the Faculty of Human Geography and Planning will carry out a new project '"Services provided by the main types of ecosystems in Poland— an applied approach.". As part of the project, information and education activities will be carried out, which will cover the scope and main results of the diagnosis and evaluation of services provided by the main types of ecosystems in Poland in practical terms. The project will be implemented until the end of 2023.	As part of the Program of Conservation and Sustainable Use of Biodiversity with Action Plan for 2015-2020, the objectives include Activation of the society for the protection of biodiversity. As part of this objective, systems of cooperation with volunteers were created in national parks. In addition, as part of the project entitled Nature and Economy - the basis for dialogue has been created in selected Natura 2000 areas, the so-called Natural partnerships that initiated dialogue and cooperation between local entrepreneurs, local

		governments and public administration institutions. The management plans for protected areas are consulted with society.
Sweden	The Swedish EPA has dedicated resources for information of the values of ecosystem services, for example through the ongoing work on nature-based solutions. The Swedish EPA has also launched a guide on green planning ("grönplanering") for municipalities.	There are different ways for citizens to influence decision-making, e.g. by participating in civil society organisations dealing with environment and climate. At the municipal level, there is an established consultation process and so-called citizens' dialogues are arranged on different societal issues. The Swedish Association of Local Authorities and Regions has developed a guidance document for municipalities and regions on how they can work with democracy issues and citizens' dialogues. The Swedish EPA's guidance on management of protected areas also has a chapter on guidance for including local participation in decision-making. The UN Convention on the Rights of the Child became Swedish law in 2018 and it means that the rights of the child must be considered in deliberations and assessments made in decision-making processes in cases and matters that concern children. It is possible to seek finance from the LONA-grants that are administered by the Swedish EPA for bottom-up environmental solutions in the local context by municipalities and civil society organisations. Another example of involvement of local actors and rights-holders is the association Laponiatjuottjudus which has been established to manage the World Heritage Site Laponia, and is based on local participation by local actors and rights-holders such as Sami reindeer-herding and economic districts and municipalities.
Liechtenstein	Yes, there was an attempt in a study to calculate the financial value of ecosystem services such as protected areas, intact rivers or forests.	
Georgia	I would not call it a programme, but awareness campaigns happen in frames of individual projects, usually with Donor support.	Development / update of management plans of protected areas, as well as establishment of new protected areas, includes consultations with local comminutes;
Albania	The following programmes are in place: valuation of ecosystem services for Kune-Vaini lagoon (GEF-UNEP and H2020 WBC-RRI.NET "Responsible Research and Innovation) project.	Active engagement and participation of local communities to the respective meetings of the Management Committees of protected areas. This is ensured as in the order of Minister of Tourism and Environment of 2018, on

		management Committees of protected areas, local communities are represented by a representative and/or by a local environmental NGO. Climate change actions for citizens are embedded in the programme being implemented in the context of Horizon 2020 WBC-RRI.NET project.
Slovakia	Slovak Environmental Agency is administrated website – www.enviroportal.sk (relevant information on environment, environmental database online access, public awareness and environmental education, seminar information, presentations, etc.). There are also other for example: https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/zelena-infrastruktura-v-procese-adaptacie-na-zmenu-klimy/ ; https://www.ewobox.sk/home; https://dropie.sazp.sk/; https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/zelena-infrastruktura.html. This theme was partly supported by the SK-Climate Programme "Climate Change Mitigation and Adaptation" (by Iceland, Liechtenstein, Norway Grants/Norway grants).	
Iceland		(34) Project grants from the ministry (35) Perhaps not programs, but Vatnajokull National Park is a decentralized park managed by regional councils.
?	The Nature Protection Program has been identified that Public information and communication are essential in supporting measures and strategies related to biodiversity. All stakeholders should be involved in searching for opportunities for biodiversity conservation, which is the reason why an operational framework for education, information and inclusion of the public should be established.	The most important program encouraging the participation of local communities in the management of protected areas is Operational Program "Environment" 2014-2020. There are legal provisions requiring public participation in management planning process, both for Natura 2000 sites and for protected areas designated according to the national legislation. Legislative changes are also envisaged for enhancing of local communities participation in the management of Natura 2000 sites. Management plans are developed on the basis of comprehensive socio-economic information, data about the infrastructure within and around the protected areas. Management plans provide zoning of the territories and define specific regimes for use and utilization of the separate zones according to their conservation value. The MP are agreements between the interested parties, namely the protected area's managers and local population. They are tools for development of opportunities for sustainable development and use of

		natural resources. Therefore, the management plans of protected areas are prepared in cooperation with all the interested stakeholders including other ministries, municipalities, regional governors, local businesses, NGOs, etc. Public discussions and consultations are being held according to the specific legislative procedures. For example, in the process of elaborating and adopting of management plans for national parks, nature parks and managed reserves contractors organize public discussions with the participation of representatives the central and local authorities concerned, the owners or their associations, the scientific, academic and non-governmental organizations and others. The general opinions, recommendations and notes from the public discussions shall be formed in a protocol, which is attached to the draft management plan. The management plan shall take into account the views expressed, recommendations and notes. Besides, for the National parks on every 4 years from the MP entry into force a special public hearing is held which aims to assess the management plan implementation.
?		There are Community protected areas/or Municipality PAs.