Insights into nature-based tourism and recreation in Norway

Preliminary results from EU grant project 101113401 — 2022-NO-EGD on recreation-related services in Ecosystem Accounting

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Preface

In this report, we describe the work done in connection with an EU grant project over the period August 2023 to December 2024. We investigate the statistical base for developing ecosystem accounts for nature-based tourism and recreation and evaluate different valuation methods. The main output of the project was the development and distribution of a survey on nature-based tourism and recreation.

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Statistics Norway, 27/01/2025

Lasse Sandberg

Summary

The objectives of this EU grant project (101113401- 2022-NO-EGD) have been to i) improve the knowledge base for modelling ecosystem services, (ii) investigate the statistical base for developing ecosystem accounts for nature-based tourism and recreation, both on the supply and use of the ecosystem service, and iii) to evaluate different valuation methods for nature-based tourism and recreation. This report addresses the results of Work Package 3 (objectives ii and iii) and aims to produce estimates of ecosystem accounts in line with the EU Regulation No 2024/3024 on environmental economic accounts.

Extensive work has been undertaken to meet the objectives outlined in the EU grant application, particularly in evaluating various methods, both for physical measurement and monetary valuation, and subsequently developing new statistics on nature-based tourism and recreation. After assessing potential methods for physical measurement, we opted to create a new survey given the weaknesses demonstrated by evaluated data sources and existing statistics for measuring recreation-related ecosystem services. The survey, which serves as the primary output of Work Package 3, provides valuable data on recreational activities and overnight stays in Norway, offering insight into the frequency, types and geographical distribution of recreation-related ecosystem services. By connecting the activities to specific ecosystem types using maps, the survey enhances the understanding of the ecosystem's contribution to recreation-related services and has the potential to inform policy decisions both at a regional and national level. Regarding monetary valuation, we opted to include a module in the survey following a travel cost model structure, including questions on consumer expenditures.

The survey was conducted in November 2024, and most questions refer to activities done in late summer and autumn 2024. The preliminary results demonstrate that coastal areas and archipelagos, high mountain areas and forests are the most visited ecosystem types for overnight stays, while forests, open landscapes and high mountain areas are the most visited for same-day trips. The data collected demonstrated that most of the expenses were reported for food and accommodation.

The results from the survey will help to improve the accuracy of tourism data and to bridge gaps in existing statistics towards a more comprehensive understanding of nature-based tourism and recreational patterns. Drawing on experiences from other ongoing projects in Norway, valuable contributions to research on monetary valuation methods will be made with the exploration of a relatively new application of the travel cost model. The integration of spatial data can provide useful insight into site choice behaviour following the travel cost model through multi-site recreation models.

Several challenges and limitations were encountered during the survey development, such as addressing seasonal variations, ensuring limitation of recall bias and delimitation of key concepts. The plan forward is to hopefully collect data quarterly, which will make up for some of these challenges, especially regarding seasonal fluctuations. Despite the limitations, the project offers a novel foundation for future research on ecosystem accounting and policy development in Norway for nature-based tourism and recreation. Moving forward we plan on improving the survey based on experiences from this project.

Contents

1. Introduction

Most of the Norwegian population has access to outdoor recreation areas, and nature-based tourism is popular among domestic and international travellers. One reason for the ample use of nature is the great extent of forest land and other land types suitable for recreation in Norway. Only 1% of the country's land area is covered by infrastructure and 3.3 % is used for agriculture (Strand et al., 2023). Another reason for the extensive use of nature is the right to roam, in Norwegian *allemannsretten*, which gives everyone the permission to travel and stay in the Norwegian outback for free provided one follows some minor legal limitations (Outdoor Recreation Act, 1957). *Allemannsretten* is the main foundation for outdoor life in Norway. According to Statistics Norway (2021), 98% of the population engages in some form of outdoor activity each year.

It has been increasingly recognized that there is a need to better measure nature's contribution to people as a source of general well-being. An example of this is nature-based tourism and recreation, as their contribution to the physical and mental well-being of people is widely acknowledged in the literature (e.g. Street et al., 2007; Lackey et al., 2021). The recognition of the need to create a link between nature and society has driven the development of statistics to better reflect the balance between Gross Domestic Product (GDP), citizen well-being, and long-term sustainability (Stiglitz, Sen & Fitoussi, 2009). To this purpose, the System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA EA) was developed and adopted by the UN Statistical Commission to measure the contribution of ecosystems to the well-being of people[1]. In SEEA EA, ecosystem services are classified in three macro-categories: provisioning services, regulating and maintenance services, and cultural services (United Nations [UN] et al., 2024, Table 6.3). Nature-based tourism is classified as a recreation-related ecosystem service under the category of cultural ecosystem services. Cultural ecosystem services are defined as "*the experiential and intangible services related to the perceived or actual qualities of ecosystems whose existence and functioning contributes to a range of cultural benefits*", where a benefit is defined as "*the goods and services that are ultimately used and enjoyed by people and the society*" (UN et al., 2024, 6.51).

Limited statistics and data collection processes exist for documenting the extent of nature-based tourism and recreation in Norway, as well as for integrating these contributions into comprehensive national ecosystem accounts. Statistics Norway received a grant [2022-NO-EGD] from Eurostat in April 2023 to address these gaps. Statistics Norway is the main receiver of the grant, with the Norwegian Institute of Nature Research (NINA), Ecounting, and MENON as subcontractors of the project. Under Work Package 3 of the EU grant project, led by Statistics Norway, the focus has been on exploring methods for ecosystem services related to nature-based tourism and recreation, aligning with the proposed legal module on ecosystem accounts and national interests. Specifically, Statistics Norway aimed to estimate ecosystem accounts for nature-based tourism, following the EU Regulation on European environmental accounts (Regulation 2024/3024). The following objectives were outlined in the project, to i) improve the knowledge base for modelling ecosystem services, ii) investigate the statistical base for developing ecosystem accounts for nature-based tourism and recreation, both on the supply and use of the ecosystem service, and iii) explore valuation methods for nature-based tourism and recreation.

To achieve these objectives, Statistics Norway has explored a range of data sources and methods, including mobile phone signalling (MPS) data, crowdsourced information, and existing surveys conducted by Statistics Norway. Through this work, we concluded that the most appropriate approach would be to develop a new survey focused on site-specific recreation and overnight stays in various ecosystem types, enabling both the quantification of ecosystem use for recreation and the

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[1] Chapters 1-7 became a statistical standard in March 2021. United Nations Statistical Commission. (2021, March 10). Draft decisions: 52nd session. https://unstats.un.org/unsd/statcom/52nd-session/documents/decisions/Draft-Decisions-Final-10March2021.pdf

assessment of the monetary value of recreation in these ecosystem types. The survey questionnaire development drew on decades of methodological and policy-oriented survey research in Environmental Economics, incorporating insights from existing surveys in some countries (Netherlands, Canada, Denmark, England), as well as a survey under development in Ireland. We aim to conduct at least two rounds of data collection for the survey. As our first data collection took place in November 2024 and the second round will take place in April 2025, this report only includes descriptive statistics from the first round of the survey.

In addition to the development of this new survey, we explored three monetary valuation methods recommended by the literature when valuating recreation-related ecosystem services where travel is involved in accessing a site. These methods are (i) the travel cost method, (ii) the consumer expenditure method and (iii) the simulated exchange value method (NCAVES and MAIA, 2022). In addition, we have drawn on experiences from ongoing and previous projects where Statistics Norway is a project partner to assess the relevance of using hedonic pricing as a monetary valuation method. Hedonic pricing has in the past been used to value neighbourhood blue and green amenities to test out monetary valuation for the Oslo region in the URBAN EA project led by NINA where Statistics Norway was a project partner.[2] Hedonic pricing is currently being also used to value neighbourhood publicly accessible recreation areas in the Oslofjord region in the MAREA-project.[3] The travel cost method and consumer expenditures were found to be the most appropriate combination of methods for monetary valuation for this project, as hedonic pricing is limited in measuring recreation-related services outside of residential areas.

This report provides an overview of the survey development process, the data sources and methods explored, and the initial steps taken to improve the statistical foundation for documenting and valuing nature-based tourism and recreation as key cultural ecosystem services in Norway. Chapter 2 describes and delimits the main concepts and definitions needed to measure the ecosystem services nature-based tourism and recreation. Chapter 3 explores different ways to physically measure the ecosystem services, through existing statistics, crowdsourced data, EU recommendations and valuation of recreation areas. This chapter also discusses different methods of monetary valuation for recreation-related ecosystem services, both in terms of local recreation and travel-related recreation. Chapter 4 describes the work undertaken before the survey was conducted. Chapter 5 presents the data collection and preliminary results, while Chapter 6 discusses the results of the project, along with lessons learnt and future plans. Chapter 7 concludes.

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[2] For more information on the Urban EA project: https://www.nina.no/english/Sustainable-society/Ecosystem-accounting/Urban-Ecosystem-Accounting-Urban-EA
[3] The MAREA project is led by NIVA with Statistics Norway as a project partner. For more information on the MAREA project: https://www.marea-oslofjord.no/en

2. Main concepts and definitions

To measure nature-based tourism and recreation, we analysed existing definitions of "nature-based tourism" and "outdoor recreation" both in scientific literature and in established international statistical standards. We then assessed the reporting requirements for statistical purposes and for national policy relevance. This allowed us to frame the definitions and measurement objectives for our study.

Several definitions of "nature-based tourism" (NBT) can be found in scientific literature (e.g. Buckley, 2009; Dowling, 2001; Laarman & Durst, 1987; Lang & O'Leary, 1997). Fredman, Reinius and Lundberg (2009) reviewed international definitions and statistics of NBT and identified four recurring elements: (i) visiting a nature area, (ii) experiencing a natural environment, (iii) participating in an activity, and (iv) normative components related to sustainability and local impacts. Valentine (1992) elaborated on three types of human-nature relationships: experiences where the presence of nature is required (e.g. safari), experiences where nature enhances the experience (e.g. climbing), and experiences where nature has a subordinate role (e.g. outdoor swimming pool). Among the most recent reviews on NBT in the Nordics, Fredman and Margaryan (2021) summarize common definitions of NBT as "activities by humans occurring when visiting nature areas outside the person's ordinary neighbourhood". They claim that NBT is an umbrella term for several labels, including "nature tourism, wilderness tourism, adventure tourism, environmental tourism, wild-life tourism, geo-tourism, outdoor tourism and ecotourism" (Fredman & Margaryan, 2021).

In the context of ecosystem accounting, nature-based tourism is considered an ecosystem service, i.e. the contribution of ecosystems to benefits used in economic and other human activity (UN et al., 2024). The definitions in statistical manuals and standards stem from the literature mentioned above. SEEA EA does not define NBT specifically, but uses a broader concept, recreation-related ecosystem services, to define:

> The ecosystem contributions, in particular through the biophysical characteristics and qualities of ecosystems, that enable people to use and enjoy the environment through direct, in situ, physical and experiential interactions with the environment. This includes services to both locals and non-locals (i.e., visitors, including tourists). Recreation-related services may also be supplied to those undertaking recreational fishing and hunting. (UN et al., 2024, Table 6.3)

Eurostat's Guidance Note[4] defines NBT specifically, as:

> Tourism is considered nature-based if people travel with *one of the primary purposes* being direct, in-situ, physical and experiential interactions with the natural environment. This means activities people want to perform during the travels either require the *presence* of the natural environment or natural environment significantly enhances the experience. The sustainability aspect (i.e. the effect of tourism or tourists on the environment) is not considered in the definition of nature-based tourism [emphasis added].

For what concerns the definition of outdoor recreation, we looked at national legislation. The Norwegian Environment Agency (2020) defines "outdoor recreation" as "the activity of spending time or being physically active in nature". According to the Norwegian Outdoor Recreation Act, *Friluftsloven*, the right to outdoor recreation has three key principles: the right of passage, the right to stay, and the right to harvest (Outdoor Recreation Act, 1957, §2-9).

Having gathered the key definitions for nature-based tourism and outdoor recreation, we then explored what we needed to measure to comply with the EU legislation, and how these concepts could

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[4] The Guidance Note by Eurostat is currently under review and is not publicly available until its final version is released. Doc. ENV/EA/TF/2024_2/5 (unpublished).

be operationalized. We mainly refer to three frameworks: SEEA EA, Eurostat guidelines, and national needs.

The United Nations Statistical Commission adopted chapters 1-7 of SEEA EA, describing the accounting framework and the physical accounts as an international statistical standard in 2021 (UN et al., 2024). Chapters 8-11, which present valuation of ecosystem services and assets, were recognized as international statistical principles and recommendations. According to the EU Regulation on European environmental accounts, only physical measurement of ecosystem services is mandatory (Regulation 2024/3024).

Eurostat's guidelines suggest a default method to report on nature-based tourism (NBT), which we will briefly discuss here. Other methods can also be used if countries have other national data sources and methods that allow for a better estimation of the ecosystem service. According to Eurostat, NBT "shall be reported in number of overnight stays in hotels, hostels, camping grounds, etc. that can be attributed to visits to ecosystems". Overnight stays should be attributed to ecosystem types at level 1 of the ecosystem typology developed by the European Union (Maes et al., 2020). Visits by locals and same-day visitors are voluntary to report. A simplified graph of reporting requirements is included in Box 1 below, and the Reporting Table Format is included in Appendix A. Eurostat requires reporting on both the supply and the use of the ecosystem service.

The default method to measure the supply of this ecosystem service consists of

> (1) collecting statistics on overnight stays
> (2) isolating the ecosystem contribution ratio
> (3) apportioning stays among ecosystem types.

Step (1) suggests using statistics on nights spent in hotels, holiday and other short-stay accommodation; camping grounds, recreational vehicle parks and trailer parks published at NUTS level 3 (Eurostat, 2024c). Step (2) consists of deriving the ecosystem contribution to NBT (contribution ratios specific for each NUTS3 region) based on the presence of reachable opportunities for nature-based activities (quantified using inland and water-related elements). This can either be done by applying the Recreation Potential Map, developed by the European Joint Research Center (Lavalle & Zulian, 2015), or by obtaining fixed contribution ratios defined for different degrees of urbanization (e.g., cities 0.2, towns and suburbs 0.6, rural areas 0.9). It is also mentioned that region- or country-specific ratios derived from surveys or more detailed tourism statistics are to be preferred. Step (3) requires a modelling approach using a suitable attractiveness metric, if detailed information on actual visitation is missing. A possible attractiveness metric (i.e. a metric for factors influencing supply) measures accessibility, ecosystem management including facilities to support access, and landscape attractiveness. The default method suggested by Eurostat is to build on the Recreation Potential Map, which is based on two factors, the ecosystem-based potential and the human inputs to facilitate access to or undertaking recreational activities in ecosystems. Alternatively, the spatial allocation can be based on a uniform distribution among the selected ecosystems.

For the use side, domestic tourism by residents is to be reported as 'Households' final consumption'. Overnight stays performed by visitors who are not residents of the reporting country (also called inbound tourism) are to be reported as 'Exports'.
Concerning the measurement of recreational visits by locals and same-day visitors, Eurostat indicates the "number of visits to ecosystems" as the reporting unit. The direct observation of visitation rates is deemed as the best way to measure this indicator. Countries are strongly encouraged to report on recreational visits, as in most countries, the number of visits performed by locals and same-day visitors is much larger compared to tourists. This is also true for Norway: in 2021, more than 22 million domestic same-day visits were recorded, compared to 7.1 million domestic overnight trips (Statistics Norway, 2022; Eurostat, 2024). Thus, we deem it relevant to also report on same-day trips and visits

by locals. Lastly, in Norway there is a widespread cabin culture: there are approximately 450,000 registered holiday homes, with half of the population having access to a cabin, including through relatives or friends (Ellingsen & Hidle, 2012; Statistics Norway, 2024e).

In the EU grant project, we have stated that we would investigate NBT and recreation in both physical and monetary terms. There are three main approaches in the literature to the valuation of recreation-related ecosystem services where travel is involved in accessing a site: the travel cost method, the consumer expenditure method and the simulated exchange value method (NCAVES and MAIA, 2022). For local recreation, hedonic pricing is the method to be preferred. Since there are currently no monetary valuation methods adopted as a statistical standard for measuring NBT and recreation in monetary terms, we do not discuss them further here. We include a discussion about potential methods in a later section (3.2) and reporting tables in Appendix A (Tables A3 and A4).

Box 1: Definitions

Travel refers to the activity of travelers. A **traveler** is someone who moves between different geographic locations for any purpose and any duration.

A **(non-local) visitor** is a traveler taking a tourism trip. A **tourism trip** is a trip to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited.

A **visitor** is classified as a tourist (or overnight visitor) if his/her trip includes an overnight stay, or as a same-day visitor (or excursionist) otherwise. **Tourism** refers to the activity of visitors (United Nations Statistics Division, 2008).

The **usual environment** of an individual is defined as the geographical area (though not necessarily a contiguous one) within which an individual conducts his/her regular life routine (United Nations Statistics Division, 2008).

A domestic trip refers to trips that have a main destination in the country of residence of the traveler. An outbound tourism trip has a main destination outside this country.

Trips to a destination inside the usual environment is considered as daily recreation or trips made by locals. (Eurostat Guidance Note, 2024)

Figure 1. Scheme for travel and tourism. Adapted from Eurostat (2013)

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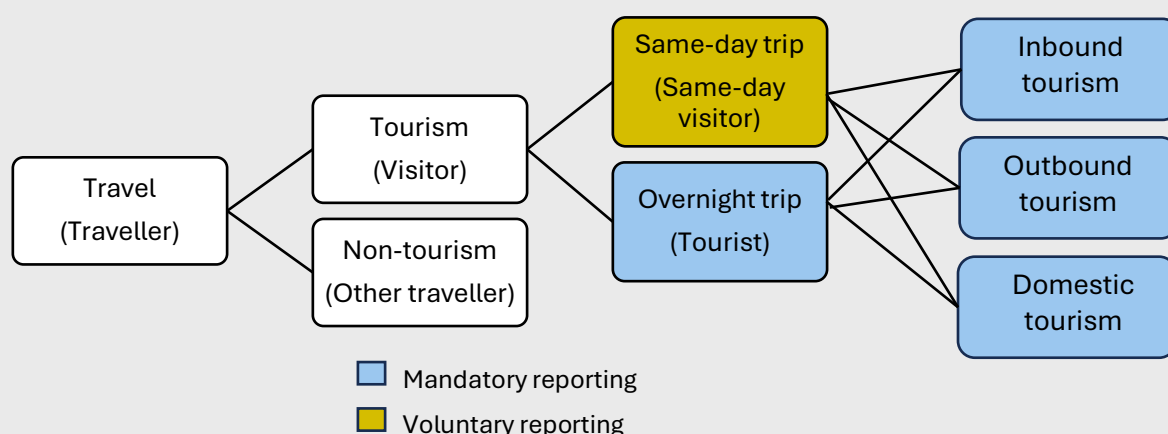
3. Evaluation of data and methods

After identifying the key metrics, we assessed possible methods and data sources for measuring nature-based tourism and recreation. First, we explored if it would be possible to rely on existing statistics, as Norway has several statistics on tourism and accommodation, or to expand on existing surveys. As the existing statistics were found to be inadequate for measuring NBT and recreation, we then considered four potential data sources: the use of crowdsourced data from the app Strava and the use of mobile phone signalling (MPS) data; the use of social media data; and the collection of new survey data. Simultaneously, as work progressed on the project, Eurostat developed its Guidance Note (GN) on measuring "Recreation-related ecosystem services", whose methodology we considered applying. After evaluating the different data sources and methods, we opted to conduct a new survey.

This chapter presents the existing statistics relevant to NBT and recreation and the four potential data sources considered. In addition to assessing the physical measurement of nature-based tourism and recreation, we evaluated methods of monetary valuation of the ecosystem services in line with SEEA EA guidelines, including valuation methods focused on travel-related recreation, such as the travel cost model, consumer expenditure and simulated exchange values, and for local recreation through hedonic pricing and value transfer.

3.1. Physical measurement

Existing statistics

The most intuitive way for us to approach the project was to analyse if it was possible to create ecosystem services accounts for nature-based tourism and recreation based on existing national statistics. Norway has extensive statistics on tourism and outdoor activities, which were evaluated based on the aforementioned definitions and metrics: overnight stays for nature-based tourism; same-day trips and activities for outdoor recreation; and economic accounts for tourism.

Nature-based tourism is measured by the number of overnight stays in different ecosystem types. In Norway, accommodation statistics include overnight stays at commercial accommodations (hotels, camping sites, holiday dwellings, youth hostels) and privately owned holiday homes arranged by Norwegian intermediaries (Statistics Norway, 2024a). Experimental statistics on overnight stays at Airbnb and other accommodations offered through collaborative economy platforms are collected for Norway by Eurostat (Eurostat, 2024b). The national statistics on tourism measure the level and change over time of overnight stays and are published monthly at various regional levels (county, tourism region, municipality). They cover both supply and demand by reporting on capacity per accommodation type for overnight stays (Statistics Norway, 2024a). In addition, statistics are available on holiday houses in Norway by area, altitude and location in relation to the climactic timberline monthly at the county level (Statistics Norway, 2024g). We currently do not have official statistics on camping in the wild or other types of unorganized overnight stays, but data on this exists and is collected by the Norwegian government's official trade representative abroad, Innovation Norway, in the Travel barometer. The data includes data on tourists with at least one overnight stay in Norway for domestic and foreign tourists (Visit Norway, 2024). Beyond this, tourism statistics on overnight stays do not include sufficiently detailed geographical information to identify the various ecosystems' contribution to tourism benefits. Nevertheless, we could extract the addresses of all commercial accommodations, making it possible to connect overnight stays to ecosystems. This would allow us to account for both supply (the capacity of the accommodations) and use over time, given the frequency of the statistics. This needs to be evaluated further but is not explored in this project.

For data on same-day trips and activities, the Norwegian Travel Survey reports on the number of same-day trips taken by the Norwegian population, both domestic and outbound, the purpose of the trip quarterly (Statistics Norway, 2024d). Domestic same-day trips are collected every three years and

are reported directly to Eurostat (Eurostat, 2024a). In addition, The Survey on Income and Living Conditions (EU SILC) has a national module about outdoor activities every 3 years and reports on outdoor activities performed in the previous 12 months, divided into categories such as hiking, cycling, skiing, boat trips, and outdoor climbing.[5] The survey includes statistics on motivation and barriers to participating in outdoor activities, giving insight into the reasons why people choose to participate or not in outdoor activities (Statistics Norway, 2024c). Neither of these statistics measures outdoor recreation at a geographical level that is sufficient to differentiate visits between different ecosystem types.

Regarding economic accounts of NBT and recreation, we do not have statistics on expenditures related to nature-based tourism and recreation specifically. Eurostat's standard categorization, which Norway also applies, divides the purpose of tourism into personal (including holidays, leisure and recreation) and business-related/professional (Eurostat, 2014). In addition, tourism satellite accounts are available for Norway and include tourist consumption of tourism products by Norwegians and foreign tourists, growth of consumption on tourism, and other measures of expenditures on tourism. The accounts also include the share of total employment attributable to the tourism sector. Under normal circumstances, the accounts are published annually, but are currently delayed (Statistics Norway, 2024b). In addition, more detailed statistics about revenue per guest per night and per guest for the whole stay are available monthly at the county level in the national accommodation statistics (Statistics Norway, 2024a).

In addition to exploring the existing statistics on same-day visits and overnight stays, there is also more specific statistics on two types of recreational activities (recreational angling and hunting) which are relevant for ecosystem accounting, and where the connection to ecosystem types is quite straightforward. Based on the definition of NBT and recreation, and Eurostat's recommendation to use ecosystems as reporting units, these recreational activities should be included when measuring NBT. Existing statistics on recreational angling and hunting can complement ecosystem accounts for recreation in nature areas.

The national hunter registry collects data on the number of active hunters, and Statistics Norway has data on how many active hunters went hunting (130 300 in 2023/24), and on the extent of the game, in terms of the number of hunted individuals of each species shot by the hunter (Statistics Norway, 2024f). These data are available at the municipal level. Based on the species hunted, it is possible to link one or more ecosystem types to the activity. For example, willow grouse hunting is normally carried out in mountain forests and low alpine zones, while moose and red deer hunting are normally below low alpine zones. A study by Wam, Andersen and Kaltenborn (2013) found that 90% of the willow grouse hunters travelled to another municipality to hunt willow grouse, hence they are part of domestic tourism. The turnover generated from small and big game hunting is estimated to be nearly two hundred million euros annually (Andersen & Dervo, 2019).

When fishing for anadromous fish (sea trout, Atlantic salmon and arctic char, hereafter labelled salmon angling) in Norway, one must buy a national fishing licence from the salmon fishing registry (operated by the Norwegian Environment Agency). There is no national, direct connection between the catch reporting system on the river level, where the anglers must report their catches, the reporting of river catches to Statistics Norway, and the angler in the salmon fishing registry. So, there is a potential for improving statistics and reporting by linking the angler to the catch reporting system. This improvement would make it straightforward to describe this form of domestic and outbound tourism on an ecosystem level. The most recent study has estimated the turnover generated from salmon angling in Norway to be around 1.3 million euros (Andersen & Dervo, 2019) and approximately

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[5] See Sports and outdoor activities, survey on living conditions – SSB for a complete list of outdoor activities.

70-75000 persons fish for salmon annually (Aas, Andersen & Stensland, 2021). For freshwater recreational angling, there are no other statistics, besides those already mentioned.

For what concerns visits to national parks, improved monitoring of trail use (volume and frequency) and visitor surveys have been used to expand the knowledge about visits to national parks in Norway (Selvaag & Wold, 2018; Wold et al., 2012; Selvaag et al., 2018). In the surveys, respondents report what type of activity they did, how long they stayed in the park and the type of accommodation they stayed at. These surveys have been carried out for two decades in several national parks in Norway and provide valuable information about visitor volume, where they walked and where they stayed (see, Zouhar et al. (2024) for a summary of the survey analyses). We believe these regional datasets could be suited to link visits to ecosystem types.

To conclude, existing tourism and recreation statistics include some metrics that, to some degree, address NBT and recreation as ecosystem services. Still, most of these are not immediately suitable for measuring recreation-related ecosystem services within either the SEEA EA framework or the European Regulation. Recreation-related ecosystem services take many forms, many of which are not currently measured in statistical terms. The main pitfalls are that tourism statistics collected in Norway do not include geographical information to identify the various ecosystems' contribution to tourism benefits and that they do not differentiate between tourism that is specifically nature-related and tourism that has other purposes. The same is true for the data collected over the years on same-day trips in Norway. On the other hand, statistics on recreational angling and hunting and the monitoring of trail use are already well suited for linking visits to specific ecosystem types. Nonetheless, these data are too narrow to use in this project as we aim to measure NBT and recreation in a nationally representative way.

Expanding on EU SILC

Given the lack of suitable indicators for measuring the ecosystem services of NBT and recreation in existing statistics, our next step was to consider if it would be possible to expand an existing survey in Norway to include questions that could help collect data on NBT and recreation. We concluded that the most suitable survey would be the Survey on Income and Living Conditions (EU SILC), which includes a module on recreation every 3 years.

Statistics Norway has collected data on recreation since 1970, so we have an overview of the long-term trends in this field. Since 1980, the EU SILC has included questions on recreation every third or fourth year. The questionnaire is based on activities engaged in during the previous twelve months. Questions are about activities like hiking in the forest, hiking in the mountains, cycling in nature, fishing, activities on skis etc. Until 2021, respondents were asked how many times they had conducted each activity in the last 12 months. In 2021, the follow-up question on frequency was changed because it was difficult to report on frequencies over a period of 12 months. Hence, from 2021, respondents were asked "How often do you do this activity?", with the answer options being "Less than once a month | 1-3 times a month | Once a week | Several times a week." The survey does not include a specific question about the type of nature the outdoor activities were performed in. However, in some cases, an ecosystem type is part of the specification of the question, like "Hiking in the forest," "hiking in the mountain," "cycling in the natural environment" etc.

The data from this source indicate that the proportion of people who engaged in various outdoor activities, as surveyed by Statistics Norway, has been stable or slightly decreasing over time. Another main finding is that there are large variations in the population and that participation in outdoor activities is influenced by income and culture; people with higher education and income have more time, and better finances and perhaps parents who have also been involved in outdoor activities (Dalen & Oppøyen, 2023).

When we investigated whether it would be possible to expand the EU SILC, we encountered several challenges. One issue was the different time frames of the data collection. According to EU Regulation 2024/3024, accounts for ecosystem services need to be updated yearly. Instead, the national module on recreation in the EU SILC is only included every third year. In addition, as the module is part of a broader survey, with several modules, there was little space for including all the questions that would allow us to compile ecosystem accounts consistently and robustly. We arrived at the same conclusion when exploring the possibility of expanding the Travel survey. This lack of flexibility made it difficult to expand on the survey, and we consequently explored other data sources.

Strava data

Strava is a mobile phone application for tracking physical exercise which incorporates social network features. It started with users tracking mostly outdoor cycling and running activities using Global Positioning System (GPS) data, but now incorporates several other exercise types, including indoor activities (Strava Support, 2024). We considered using Strava data to measure recreation as studies have shown that they can help identify recreation patterns and their spatial distribution. For this project, we collaborated with NINA, where researchers have extensive experience with Strava data, which they use to perform detailed analyses of recreational patterns and behaviour (Venter et al., 2020; Venter et al., 2021; Venter et al., 2023; Ulset et al., 2023). This collaboration has also explored the use of Strava data in the LandValUse project conducted by Statistics Norway[6]. This work includes examining the effect of price sensitivity on recreational behaviour, with ongoing plans to analyse the impact of weather conditions and extreme weather on recreation. Strava data are particularly useful for examining recreational behaviour. However, some issues arise regarding the representativeness of Strava users compared to the general population. One study found that the data only represents 5.7% of total recreational activity in Norway in 2020 and is biased towards cyclists, males and middle-aged people (Venter et al., 2023). Researchers at NINA are currently working on interpolating the data.

Despite the strengths of Strava data, the issue of representativeness complicates the use of Strava data in ecosystem accounting at the national level. Given these experiences, we decided not to proceed with such data in this project.

MPS data

We also investigated whether MPS data could be a useful data source for identifying recreation patterns. For this project, we were given access to a dataset which covered mobile phone use for approximately 40% of the Norwegian market. The data was retrieved from the operator Telia, serviced by the company Geodata A/S (Geodata, 2021). The data provider interpolated the other half of the market, making it possible to estimate data for the whole population. Using these data, we investigated whether it would be possible to analyse how much time people spent in locations with high recreation potential, such as overnight stays and same-day visits, making it possible to connect the data to different ecosystem types. However, to protect the cell phone users' anonymity, the data had a very coarse geographical resolution if there were only a few mobile phones in the same area. Furthermore, cell phone data does not allow differentiation among types of visits (commuting, recreation, job-related, etc.). Therefore, we concluded that we would not proceed with further analysis of MPS data. Appendix B includes an example of the testing of MPS data.

Social Media data

Lastly, we explored the use of social media as a potential data source. Pictures uploaded to social media can give insight into which landscapes mean something to people, and to what extent different landscapes provide ecosystem services such as recreation (Lindhjem et al., 2023). We evaluated two previous studies which have applied this method: Havinga et al. (2021) in the UK, and Lindhjem et al.

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[6]For more information about the LandValUse project, see https://www.ssb.no/en/forskning/miljo-ressurs-og-innovasjonsokonomi/landvaluse

(2023) in Norway. Both studies explore social media data as an approach to assess the aesthetic quality of the landscape through the social medium Flickr. The study by Lindhjem et al. (2023) used Flickr as a social media proxy to explore which landscapes mean something to people, specifically connected to Norwegian agricultural landscapes. By analyzing pictures uploaded to Flickr over five years, they explored how people engage with the landscape, and to what extent the Norwegian agricultural landscape provides recreational opportunities. The pictures were placed on an ecosystem map, and all pictures connected to agricultural landscapes were studied. They concluded that agricultural landscape contributes to the opportunity to experience nature and that social media analysis can illustrate the value of the landscapes for people who use them or are in proximity to them.

One issue with this method is that the focus of analysis is on the aesthetic quality of the ecosystems, which can give us an indication of whether landscape aesthetics contribute to nature-based tourism and recreation but cannot be used as a direct proxy for measuring these ecosystem services. It would be more appropriate to use this data to measure another cultural ecosystem service, i.e. visual amenities. Another issue is the matter of representativeness. Flickr is most popular with 40- to 60-year-old men, and is skewed by small, highly active user groups (Havinga et al., 2021). Lastly, as Lindhjem et al. (2023) analyzed the pictures manually, it would have been too time-consuming for our project to repeat the same methodology for each ecosystem type. A possibility could have been to use deep learning to classify the data, but deep learning applications remain limited (Havinga et al., 2021).

Eurostat recommendations and recreation maps
During the process of evaluating possible metrics, Eurostat released a preliminary draft of a Guidance Note (GN) on measuring NBT and recreation. Thus, we considered if we had the appropriate data to apply Eurostat's suggested methodology. As mentioned in Chapter 2, Eurostat's GN suggests using existing statistics on overnight stays and developing a model which isolates the contribution of each ecosystem to NBT. Subsequently, it would be possible to attribute the overnight stays to the different ecosystems, depending on how much each ecosystem contributes to recreation and nature-based tourism.

The key challenge of this methodology is isolating the so-called ecosystem contribution ratio. The GN suggests using the Recreation Potential Map (RPM) developed by the Joint Research Centre of the European Commission (Lavalle & Zulian, 2015), which also identifies the supply, demand, and actual flow of NBT. The RPM developed by JRC focuses on EU countries and is less accurate for non-EU countries such as Norway. The Pioneering Earth Observation Applications for the Environment - Ecosystem Accounting (PEOPLE-EA) project, funded by the European Space Agency, has identified several data gaps in the reference RPM for Norway and developed an improved version of the map. The map of the PEOPLE-EA project is based on Earth observation data, the JRC RPM, and the INCA model (Lavalle & Zulian, 2015; Vallecillo et al. 2018). The map especially complements the RPM by JRC for what concerns water elements and coastal areas. PEOPLE-EAs map could provide the first data source on recreation potential over water. Although the map improves the existing RPM, especially for water bodies, and allows us to move from a multi-year RPM to an annually updated RPM, the validation report for the project points to a "substantial data gap for Norway, which prevents proper modelling results" (Smets, 2024). This concerns, in particular, the lack of information on protected areas in Norway. Hence, we have decided not to further investigate improving the RPM in this project due to the extensive modelling it would require.

Other projects are working on collecting geographical data on recreation. The Norwegian Environment Agency has carried out a large-scale project to map outdoor recreation areas in every municipality. To date, 292 out of 357 municipalities in Norway have completed their mapping (Norwegian Environment Agency, 2024). Another ongoing project was conducted by the Norwegian Institute for Nature Research (NINA), which recently evaluated how suitable 33 national databases

and maps are for describing aspects related to the valuation of recreational areas in Norway. This evaluation is presented in Appendix C and serves as a good foundation for pinpointing the existing gaps and what work needs to be done to produce a national map for Norway. Each map layer was evaluated and scored along a 3-point scale (+, 0, -) on Delimitation, Use frequency, Quality of the area and Importance. The valuation of recreational areas in each municipality is mainly based on a process of local involvement of key stakeholders, and the base map analyses support this process.

The base map for recreation can be used for (i) delimitation of areas and (ii) valuation of areas. The different map layers should be used for different topics. These topics include: delimitations and extensions of areas where map layers can be useful; frequency of use through crowdsourced data (i.e. Strava), where issues with representativeness need to be validated; quality of experience, where the assessment found that many map layers can already be used; meaning, symbolic and educational, which is currently difficult to extract from maps, and where local knowledge will be an important input; and development of new indicators, which requires assessing potential for multi-use and diversity.

It is also important to describe what the indicators cannot contribute with or only give a limited contribution to, such as categorization through volume, time, extent, activity, type of use and experience. Nor can the indicators contribute to activities outside infrastructure (such as wilderness experiences), non-formal meeting places, place attachment and identity, or places with strong symbolic value. Lastly, the indicators cannot contribute or give a limited contribution to seasonal- or specialized activities, such as hunting and fishing, as described above, or specialized activities with low participation rates.

To conclude, there are several synergies among different projects on recreation in Norway. However, the assessment of the data sources and their inability to measure NBT and recreation as per the reporting requirements, we decided to design and conduct a new survey on NBT and recreation. Chapter 4 describes the survey development in detail. The survey includes spatial mapping where respondents have participated in outdoor activities and overnight stays, allowing us to differentiate stays and activities among ecosystem types and the ecosystem contribution.

3.2. Monetary valuation

In addition to physically measuring NBT and recreation, this project has explored different methods for valuating ecosystem services in monetary terms. Although the monetary valuation of NBT and recreation is not required for reporting on ecosystem services to Eurostat, there are several reasons to estimate the value of the ecosystem's contribution to the economy and people in monetary terms. There are three main approaches in the literature to the valuation of recreation-related ecosystem services where there is travel involved in accessing a site: the travel cost method, the consumer expenditure method and the simulated exchange value method (NCAVES and MAIA, 2022). For local recreation, hedonic pricing is the most used method. This chapter explores these methods of valuating in monetary terms NBT and recreation.

3.2.1. Valuating travel-related recreation

Travel cost method
The travel cost model is commonly used in benefit-cost analyses and is demand-based, meaning it has the potential to describe the demand for use of a recreation site or sites (Parsons, 2017). It is part of "methods where the price for the ecosystem services is based on revealed expenditures (costs) for related goods and services" (NCAVES and MAIA, 2022, p. 29). It measures the cost incurred, along with the foregone income, by individuals or households to reach a site and receive an ecosystem service (NCAVES and MAIA, 2022). Travel costs are estimated as a function of, among other factors, time spent travelling to and from a site. It depends critically on how points of origin are located, how distance is modelled, and the travel time to the site. This has been difficult to measure accurately in the past, but

it can now be measured with higher accuracy thanks to novel survey design features that include spatial integration, such as Google Maps (Hanauer & Reid, 2017).

The travel cost model has two main approaches that estimate demand for a single site or multiple sites (Parsons, 2017). The single-site models do not accommodate for the presence of substitute recreational sites and are not preferred when valuing changes in more than one site simultaneously. For these valuations, a multiple-site model is favoured (Parsons, 2003). As this project is interested in exploring the monetary valuation of NBT and recreation at a national level, including several recreation sites, the multiple-site models are of relevance. This is also the recommended model type for valuating ecosystem services, due to its ability to cover all recreation destinations within an accounting area (NCAVES and MAIA, 2022).

The most widely used multiple-site model is the random utility maximation (RUM) model. This model considers the individual's choice of one recreation site over other possible sites on a single occasion. This choice is assumed to be dependent on the different characteristics of different sites. Two pieces of information are required for each site: the number of trips that an individual or household takes to the site over a period, and how much it costs that individual or household to travel to the site. The trip costs allow the model to implicitly capture the trade-off between expenditures and other characteristics of the chosen site compared to other sites. The model thus allows for valuing changes in site quality and can also be used to value access to one or more sites simultaneously (Parsons, 2003).

Conducting a multi-site recreation demand study requires that one defines which relevant recreation activities and population of people should be included and determine the geographical scale of the study. Determining the role of site characteristics is also important (Lupi et al., 2020). The recommended approach for measuring travel costs is to conduct a national travel cost survey inquiring about individual trips and purposes, generating trip choice data (NCAVES and MAIA, 2022; Lupi et al., 2020). These data can then be used to estimate demand for each site using the RUM model. A weakness of this model is that it cannot capture the potential multiple purposes individuals might have for the same trip. To compensate for this, the survey can ask respondents to estimate what proportion of the enjoyment they obtained from their whole trip they would assign to a specific recreational area. The total travel cost would then be multiplied by the stated percentage and used as the basis for assessing the travel costs for the specific site (NCAVES and MAIA, 2022). It is worth noting that a common challenge in multi-site travel cost models is the issue of multicollinearity between environmental attributes. When attributes are highly correlated, it becomes difficult to isolate the effect of each attribute on site choice (Lupi et al., 2020).

We considered whether it would be possible to use Strava data calibrated against path counters and phone tracking in the travel cost model. However, Strava data falls short of the monetary valuation of ecosystem services due to its aggregation at the trail level rather than at the individual level. As a result, it is not possible to track the distance individuals travel for outdoor recreation.

The application of the travel cost model has been explored in Norway by Barton et al. (2015), who calculated the recreational value of the peri-urban forest ("Marka") in Oslo using several different monetary valuation methods. The study suggests that the measuring of foregone income due to recreation rather than work is to be preferred to value in monetary terms the time spent in the Marka forest (Barton et al., 2017).

As the method we opted for in this project on the physical measurement of the ecosystem services is to conduct a new survey, we decided to include a travel cost module. The survey integrated Google Maps to pinpoint the exact locations visited by respondents to test a relatively new method in survey design (see, e.g., Fezzi et al., 2023 for a recent application). Using multiple rounds of maps will allow us to estimate multi-site recreation models, contributing to the understanding of site choice

behaviour and preferences within the framework of the random utility theory (Lupi et al., 2020). More specifically, by integrating remote sensing and detailed maps, we can extract site-specific environmental attributes, enabling us to estimate preferences and calculate willingness to pay for marginal changes in these attributes using the travel cost model. This integration could enhance the precision of valuing environmental attributes in outdoor recreation, further advancing the nonmarket valuation literature.

Consumer expenditure method

The travel cost method uses data that can be the basis for the consumer expenditure method and the simulated exchange value method. Whereas the travel cost method only asks about *travel* expenditures, the consumer expenditure method includes also other expenses such as entrance fees, food expenses and/or accommodation costs to value ecosystem services directly (NCAVES and MAIA, 2022). The rationale for this method is that these expenditures reflect the minimum willingness to pay, i.e., the amount people are willing to pay for the ecosystem service.

The consumer expenditures method thus uses estimated costs directly as a proxy for the value of the service. It is crucial to consider if all costs should be included in the estimation, and if they represent the value of the ecosystem service. It is difficult to argue that expenses reflect exclusively the ecosystem service: for example, an entrance fee for a park reflects also the costs connected with maintenance, facilities and other operational costs. These costs should be deducted to obtain an accurate estimate of the value (Barton et al., 2019). Often the resulting residual reflects a very low or zero value for ecosystem services.

In our survey we included questions about expenses related to food, parking, equipment rental, licences, car rental, transportation, entrance fees to parks, and accommodation. This will allow us to better isolate the ecosystem contribution and reduce the overstatement of expenses, by supplementing the travel expenditures from the RUM with other expenditures connected to the trip.

Simulated exchange value

The simulated exchange value method estimates the price and quantity that would apply if ecosystem services were traded in a hypothetical market. Using an appropriate demand function, standard microeconomic methods are used to find the simulated price of the ecosystem service, which can then be used to estimate the value that would have arisen if the ecosystem service were marketed. This method is relatively new (Caparrós et al., 2017) and its applications remain limited. In general, it seems that the simulated exchange value works well in cases with significant marginal costs per visit, as in cases where an entrance fee is paid to enter a park (Barton et al. 2017). As this is not the case for Norway, the supply curve would be almost flat, and the marginal exchange value would be near zero with this method. Thus, we decided not to proceed with this approach.

3.2.2. Valuating local recreation

Hedonic pricing

In ecosystem accounting, it has been proposed that one may estimate the value of neighbourhood recreation-related ecosystem services using the hedonic pricing method (HPM) (UN et al., 2024; NCAVES and MAIA, 2022). The HPM is a method "using prices that are embodied in market transactions" where the goal is to estimate the "differential premium on property value derived from proximity to an environmental attribute" (NCAVES and MAIA 2022, p. 27). This valuation method is indirect as the price is derived through econometric estimation. To estimate the implicit price, one specifies a functional relationship – the hedonic price function (HPF) – between the sales price of a house and the characteristics of the property. This includes the structural characteristics of the house, neighbourhood dis/amenities, environmental and other types. The estimated coefficients for the environmental amenities can be said to be the implicit price of that ecosystem service, which can be used in accounting. This implicit price is also referred to as the marginal price. For use in accounting,

the estimated price may be aggregated over all properties in the same market with the same level and access to environmental amenities.

If National Statistical Offices (NSOs) possess the required data, they may use the HPM and register of house transaction data linked with local environmental (and other) amenities to develop price estimates of neighbourhood recreation-related ecosystem services for ecosystem accounting. This would also permit NSOs to update value estimates as new data becomes available. The building of such a model requires linking property sales data to all the neighbourhood amenities of relevance for the price of the home at the sales location. The GIS analysis to quantify the level of environmental indicators can be quite resource demanding depending on the type of indicator one wishes to use. Related to this, one must determine how to best quantify and model a household's *access* to the amenity - whether it is best to measure access to the amenity as a distance from the house (e.g. a park, beach) or as proportion within a radius of the house (e.g. greenness). It is important to be aware of the limitations when it comes to how accurate the value estimates can and need to be for official statistics and policy use at various geographical levels. The fact that many environmental amenity indicators (and other indicators) may be correlated reduces the statistical accuracy of the implicit price estimate for each of the separate indicators.

Hedonic valuation for urban green areas has been tested for accounting in the URBAN EA project[7] for the apartments in Oslo and is currently being tested for the MAREA-project[8] for access to recreation areas among apartments, detached and semi-detached houses for the Oslofjord. The LandValUse project[9] has performed a national hedonic analysis of the impact of disamenities in predominantly rural areas from land-based wind power production—where wind turbines affect environmental amenities from quite a distance. It is important to be cognizant of how rural and urban housing markets and dis/amenities in landscapes differ. It is possible that in urban areas green amenities matter a lot for house value, while in rural and more green areas, the disamenities related to infrastructure near the house subtract from house value. Closeness to water has also been found to be an important predictor of sales price (Chen et al., 2019). Examples of marginal price estimates from the study of the impact of access to urban green areas on apartment prices are given in Table 3.1.

Past and ongoing work on hedonics is important to lay the groundwork for national hedonic valuation of recreation-related ecosystem services in urban neighbourhoods. Hedonic valuation will likely then focus on the neighbourhood recreation-related ecosystem services. This valuation may then be complemented with travel cost analysis (Boyle, 2003) to value recreation further away from the house. A challenge when combining the methods is to avoid double counting (Champ, Boyle & Brown, 2003).

As hedonic valuation cannot be used to value recreation-related ecosystem services further away from people's residence and because it is difficult to use this in more rural areas of Norway where communities have ample access to green areas, this method was not used in this project but will be explored in future analyses. Future explorations will look to studies where hedonic pricing has been used nationally and in ecosystem accounts. Examples exist from the UK (ONS, 2019a; b) and the Netherlands (Horlings et al., 2020) (NCAVES and MAIA, 2022).

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[7] For more information on the Urban EA project: https://www.nina.no/english/Sustainable-society/Ecosystem-accounting/Urban-Ecosystem-Accounting-Urban-EA
[8] For more information on the MAREA project: https://www.marea-oslofjord.no/en
[9] For more information on the LandValUse project: https://www.ssb.no/en/forskning/miljo-ressurs-og-innovasjonsokonomi/landvaluse

Table 3.1   The aggregate marginal values of blue-green infrastructure across all apartments in Oslo

		Sum of all apartments of….			
Variable	Effect area	Number of apartments in effect area	…expected marginal effects (MNOK)	..lower bound marginal effect (2,5%) (NOK)	..upper bound marginal effect (97,5%) (NOK)
Forest border	within 500m of Marka forest	36 310	2 467	845	4 110
Fjord shoreline	within 100m of fjord	34 965	5 875	4 717	7 048
Fjord open space	within 100m of open space by fjord	414	170	22	335
Park	within 500m of parks	160 722	13 595	8 325	18 935
Large park	when closest park > 100,000m^2	31 147	1 293	304	2 304
Cemetery	within 500m of cemetery	45 356	3 535	2 081	5 010
Freshwater	within 200m of park with freshwater element	53 089	4 610	2 672	6 594
Green area	green area within 500m	224 204	-317	-369	-265

Source: Barton, Stange, Blumentrath, and Traaholt (2015)

Value transfer

Much of the data and research on the monetary valuation of ecosystem services is fragmented (UN et al., 2024). A monetary valuation method which seeks to reconcile and utilize the information from existing studies is the value transfer method, also referred to as benefit transfer. This method can be applied through two approaches: unit value transfers and value function transfers. The former takes a single estimate of the monetary value of an ecosystem service, or a measure of a tendency (e.g. mean, median) from different studies and uses them to estimate the value of an ecosystem service in other locations. The latter estimates a function between value and ecosystem and the economic context from one or more primary research studies and applies this function in other locations (UN et al., 2024).

Value transfer can be quite useful for NSOs to update estimates over time. It is then important that the methodology used is adjusted for new research findings. Value transfer from the study of the housing market in Oslo could potentially be used to value urban green in other large cities in Norway, but the transfer error would increase for rural areas with different population characteristics and amenities. Due to the large spatial variation between locations in Norway, and the geographical limitations of the study on hedonic pricing in Oslo, this project does not explore this valuation method further.

After evaluating the different monetary valuation methods, we decided not to further explore the valuation methods for local recreation or the simulated exchange value method. We opted to include a module in the survey following the structure of a travel cost model (multi-site RUM) and include questions on other expenditures.

4. Survey preparation and implementation

4.1. Preparation work

To develop the survey, we started by analysing existing surveys and studies from other countries on nature-based tourism and recreation. The surveys we analysed were the English "People and Nature" survey (Natural England, 2024) (EN), the Irish "Our Lives Outdoors" survey (Central Statistics Office, 2024) (IE), the Canadian Nature Survey (Federal, Provincial, and Territorial Governments of Canada, 2014) (CA), and the Danish survey about the use of nature by Danish people (Gernow et al., 2024) (DK). In this chapter, we briefly compare the structure and content of the surveys, summarized in Table 4.1.

The surveys aim to gather information on the importance of nature for recreation. The CA and DK surveys consider both how often people visit nature and their connection to nature. The UK and IE surveys also inquire about feelings towards nature, but mainly focus on how often people use nature for recreation, with an eye to statistical production.

The surveys start with questions about people's connection to nature and their habits of visiting natural areas. They then move on to questions about nature-based activities and overnight stays. Some surveys focus more on overnight stays (CA, IE, DK), while others focus on measuring recreation in detail (CA, IE). Some surveys also ask about the last trip to a nature area (EN, IE, DK).

Regarding geographical scope, CA asks about activities within 20 kilometres from home and beyond, and the address of the most recent overnight stay. England asks for the exact location of one visit in the last 14 days. DK has the most detailed scope, asking for the exact location of the last two trips to a nature area, places associated with freedom, peace, and other values, and the last overnight stay. EN and IE also ask about the types of ecosystems visited, with EN focusing on the last 14 days, and IE on the last three months. For the timeframe, CA and DK focus on the last 12 months, EN on the last 14 days, and IE on the last three months.

Lastly, all surveys include questions to estimate travel expenses, either directly (CA, EN, IE) or indirectly (DK). Some studies have built up on these data to measure travel-related expenditures. Tyllianakis (2024) and Lloyd-Smith (2021) use the results from EN and CA surveys, respectively, to conduct travel cost analyses. Following the DK survey, Gernow et al. (2024) have used the survey data to map Danish people's engagement with nature in specific ecosystem types, to demonstrate what specific ecosystem types are important for recreation in Denmark. Overall, the use of survey data in previous studies has had a variety of goals. Given the scope of this project, the results from our survey have the potential to further contribute to research in the field on both monetary and physical valuation of NBT and recreation.

Table 4.1   Comparison of Recreation Surveys

	Canada	England	Ireland	Denmark	Norway
Structure	a. Your connection to nature b. Human-wildlife interactions c. Nature-based activities d. Overnight stays and day trips e. Demographics	a. General experiences of green and natural places b. Specific visit within last 14 days c. Children's general experiences of green and natural places & reasons for not spending more time outside d. Environmental attitudes and behaviours e. Gardens and gardening behaviours f. Demographics	a. Same-day visits b. Most recent same-day visit c. Most recent overnight trip d. Water-based activities, motivations, and barriers	a. Last visit to a nature area b. Second last visit c. Experience values d. Connection to nature e. Demographics	a. Nature-based activities b. Overnight stays c. Last trip to a nature area d. Second to last trip
Geographical scope	"In Canada, at home or within 20 km of my home", and "in Canada, farther than 20 km from my home", for every activity. For overnight stays and day trips, location (name of nearest city, town or village) of three trips where you spent the MOST time	Exact location on map for one visit in the last 14 days	Ecosystem level; ecosystem contribution ratio	Name and map of exact location of last two visits to a nature area; exact location on map of places one associates with freedom and peace, with wild nature, with sightseeing and aesthetics, with social settings, with motion and physical activity, with mindfulness and spiritual well-being, one's favourite place; place of overnight stay for last trip	Exact location on map for three activities; exact location on map of last two trips; ecosystem level for overnight stays
Connection to ecosystems	No	Yes. Asked for most recent visit in the last 14 days	Yes, asked for all visits in the last 3 months	Not directly	Yes, for overnight stays and last two trips
Timeframe	Short trips, same-day visits & overnight stays: **last 12 months.** "Days per year..."	Most recent visit in the **last 14 days**	Same-day visits in the **last 3 months**; most recent same-day visit in the last 3 months; most recent overnight trip in the last 3 months	Last 12 months	Activities in the last 12 months and in the last 3 months. Overnight stays in the last 12 months.

Source: own elaboration based on our survey, the English "People and Nature" survey by Natural England (2024) (EN), the Irish "Our Lives Outdoors" survey (Central Statistics Office, 2024) (IE), the Canadian Nature Survey (Federal, Provincial, and Territorial Governments of Canada, 2014) (CA), and the Danish survey about the use of nature by Danish people (Gernow et al., 2024) (DK).

4.2. The survey development

The overall aim of the survey is to gather comprehensive data on the outdoor recreational habits and preferences of the Norwegian population. This survey seeks to understand how much time people spend in green and nature areas, connect visits to ecosystem types, and look at the types of activities people engage in. The survey was developed in collaboration with the Research Department and Methods Department at Statistics Norway, ensuring quality and research potential in the outcomes.

Key concepts and definitions

Before constructing the survey, we agreed on some recurring terms and expressions. We include the key terms we settled on.

First, we defined the concept of "outdoor" / "in nature". We were interested in measuring activities and overnight stays conducted outdoors and where the activity "requires the presence of the natural environment or the natural environment significantly enhances the experience" (Eurostat)[10]. Initially, we considered using "nature areas", but this expression might exclude parks and green spaces in urban areas. Thus, we chose "green and nature areas" in most contexts, and "parks and nature areas" in the context of recreation.

For what concerns the measurement of "recreation", we named the module "Outdoor life" and defined outdoor activities as "activities done in your free time in parks and nature areas in Norway, without an overnight stay. This includes also short trips like running or walking your dog". The Norwegian term "tur" (which translates to "trip") has a broader meaning than in English, covering both multi-day trips and shorter activities like running and hiking. For the module about recreation, we wanted to specify that the focus is on shorter trips.

We defined "overnight stays" as "trips that included an overnight stay where one of the main purposes was to spend time in nature. Only include overnight stays in Norway". This definition is in line with the one suggested by Eurostat (see Chapter 2). In this context, we also use the term "hytte". This Norwegian term translates to "cabins" in English but commonly refers to holiday homes near outdoor recreation areas and nature.

For the last two trips, we asked people to describe their "last trip to a nature area in Norway, which took place in the last 6 months, lasted at least one hour, had as one of the main purposes to visit a nature area, and was not job-related". This long specification was made necessary as we wanted to exclude shorter trips and focus on stays "outside one's usual environment". In addition, we wanted to include trips where one potentially incurs expenses, to be able to estimate a travel cost model. We spent a lot of time discussing whether we should use a geographical boundary, i.e., trips at least 10 kilometres from home, or include a time limit, i.e. trips at least one hour from home. We concluded that the time limit is less biased towards people who use public transport.

For the ecosystem types, we discussed how to make the definition of ecosystem types understandable for common people, as using a map control function in the survey became a feasible option only in the later stages of the project. Many technical terms are not commonly known, and we concluded that people relate more to landscape types than to ecosystem types. Our starting point was thus to adapt the Eurostat classification for our needs (Maes et al., 2020). This was done to better reflect the ecosystem typologies present in Norway, and to minimize the

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[10] The Guidance Note by Eurostat is currently under review and is not publicly available until its final version is released. Doc. ENV/EA/TF/2024_2/5 (unpublished).

potential for confusion among the respondents regarding what ecosystem types. The new names were derived from discussions with natural scientists from the Norwegian Institute for Nature Research (NINA), who recommended using more colloquial terms. For instance, we replaced the ecosystem type "sparsely vegetated ecosystems" with "high mountain areas". This was deemed a more appropriate and intuitive classification as Norwegians associate high mountain areas with areas above the treeline.

The common Norwegian ecosystem classification lacks Eurostat ecosystem type 03, "Grassland" (Strand et al., 2023). In the latest reclassification according to Eurostat's typology, grasslands are underrepresented, accounting for only 0.5% of the land (Strand et al., 2023). Therefore, we merged the classes "Grassland" and "Heathland and shrub" and renamed them "Open landscapes (mountain, grass, shrubs and heather)". Classes 08 and 09 were also merged, as rivers and canals only represent 0.4% of the surface[11] (Strand et al., 2023).

We also decided to drop Ecosystem type 10, "Marine inlets and transitional waters", as there is not a clear definition to allow us to match the category to Norwegian ecosystems (Strand et al., 2023). As Norway does not have the data needed to differentiate Class 12 from 10, we dropped class 10.

Class 11, "Coastal beaches, dunes and wetlands" needs to be measured by meters above sea level, distance of bare mountains from the sea, and degree of marine intervention according to Eurostat requirements. Due to overlap with existing ecosystem types in Norwegian classifications, the class has been limited to include coastal areas below 40 meters above sea level. Class 11 constitute 0.3% of the surface in Norway, most likely due to the mountainous coastline in Norway, and the overlap with other ecosystems in the Norwegian coastal areas (Strand et al., 2023). The suggested adaptation is demonstrated in Table 4.2 below.

Table 4.2   Crosswalk of classification ecosystem types, level 1, in Eurostat and our adapted version

Eurostat classification	Adapted version (translated)
01 Settlements and other artificial areas	Parks and green areas in cities or towns
02 Cropland	Cropland
03 Grassland 05 Heathland and shrub	Open landscapes (mountain, grass, shrubs and heather)
04 Forest and woodland	Forest
06 Sparsely vegetated ecosystems	High mountain areas
07 Inland wetlands	Mire and wetlands
08 Rivers and canals 09 Lakes and reservoirs	Lakes, rivers, and ponds
10 Marine inlets and transitional waters	-
11 Coastal beaches, dunes, and wetlands	Coastal areas and archipelagos
12 Marine ecosystems (offshore coastal, shelf and open ocean)	Open ocean and fjords

Source: own elaboration.

Despite the improvements in the definitions, some challenges remain when asking respondents to associate activities with ecosystem types. For example, some activities take place in multiple ecosystem types: If running/jogging or cycling, the activity is often taking place on paved roads, which falls under Ecosystem type 01 "Settlements and other artificial areas". However, the road may cross rivers, forests, and croplands. It is not intuitive which ecosystems people should indicate for their activity. In the end, we allowed for multiple answers, and we will work on assigning weights to the relative importance of each ecosystem type.

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[11] due to the lack of geometrical coincidence between different data sources in Norwegian maps (Strand et al., 2023)

The survey structure

We decided to structure the survey into three modules: (a) recreation, (b) overnight stays, and (c) last two trips. The main themes in the survey are summarized in Table 4.3 and the questionnaire is available in Appendix E.

Table 4.3   **Overview of modules and themes covered in the survey**

Module	Theme	Description
0	Background questions	Connection to nature, access to nature areas, ownership and access to holiday homes, membership to outdoor associations
1	Recreation	Outdoor activities performed in the last 12 & frequency in the last 3 months; location of 3 activities.
2	Overnight stays	Overnight stays in nature areas in the last 12 months; types of accommodation; ecosystem type; trips to nature areas in foreign countries
3	Last two trips	Location, activities*, expenses*, means of transport, duration, ecosystem type*, accommodation type of overnight stay (if any); frequency of trips

*Only for the last trip. Source: own elaboration.

The initial part of the survey asks respondents to what extent they enjoy being outdoors and if they have access to private or shared gardens, balconies, or other outdoor areas. It also inquiries about access to holiday homes and memberships in various outdoor associations. This first section helps to establish a baseline understanding of the respondents' living situations and their potential for engaging in outdoor activities. We do not include socio-demographic questions, as we will get access to background information about respondents from registry data.

Module 1 "Recreation" focuses on the types of outdoor activities that respondents participate in. We include ten default activities and the possibility to indicate up to three extra activities. The default activities are jogging/hiking, biking, fishing, water-based activities, motorized activities, hunting, berry or mushroom picking, barbecues, picnics, studying nature, and relaxing in nature, and were selected based on historical data on the activities done most frequently by Norwegians (Dalen & Oppøyen, 2023).

Respondents are asked which activity they have done in the last 12 months. For the ones they have done, a follow-up question asks how many times they have done each activity during the last three months. This detailed information helps to paint a clear picture of the population's engagement with outdoor recreation. Module 1 also asks the specific locations where some of the activities have taken place. Three activities are selected based on frequency, i.e., the activities respondents have done more often in the three-month interval. Respondents are asked to mark on a map where they have done these activities, providing precise data on the geographical distribution of outdoor activities. This section is crucial for understanding the accessibility and popularity of different nature areas across Norway.

Another important aspect of Module 1 is identifying the barriers that prevent people from spending more time outdoors. Respondents are asked to what extent their needs for outdoor activities are met and whether they wish to spend more time in nature. The survey explores barriers such as lack of time, health issues, accessibility, and costs. Understanding these obstacles is essential for developing strategies to encourage more outdoor activity among the population in Norway.

Module 2 "Overnight stays" includes questions about overnight stays in nature over 12 months. This section covers trips where respondents stayed overnight in various accommodations, such as holiday homes, hotels, campsites, or tents. Respondents are asked about the number of nights spent in these accommodations. Then, they are asked to attribute the overnight stays declared to

each ecosystem type. This information helps capture the extent of longer-term engagement with natural areas and the experiences people seek during their stays.

Module 3 asks detailed questions about the most recent and second most recent trips to nature areas and follows the structure of travel cost surveys. Respondents are asked to think about their last trip to a nature area, taken in Norway in the last six months, with a duration of at least an hour, with the primary purpose of visiting a nature area, which was not job-related. They are then asked to pinpoint on a map where they travelled to, with follow-up questions on the place of departure and means of transport used. The layout of the map application in the survey is presented in Figure 4.1. Other questions ask about the duration and purpose of the trip, whether the trip included an overnight stay (if so, where), which activities were done during the trip, which ecosystem types they visited (multiple can be selected), and which expenses were incurred. The second part of Module 3 mirrors the first part, as it asks most of the same questions, but about one's second to last trip.

Figure 4.1   The integration of Google Maps in the survey[12]

Source: Screenshot from our questionnaire.

Testing of the questionnaire

The questionnaire was developed in collaboration with experts from the Methods Department at Statistics Norway. When we developed the survey structure, the methodologists recommended that the recreation module should be activity-based, i.e. based on outdoor activities, not on ecosystem types. In other countries, surveys have been ecosystem-based, so the ecosystem types have often been the starting point, but our experience suggests that it is difficult, as trips and activities take often place in several ecosystem types. Thus, we chose to use the questions from the Survey on Income and Living Conditions 2021 (see Section 3.1), where the starting point is the type of performed activity.

From here, the first version was developed and tested on people in the target group. We conducted cognitive interviews by the "think aloud" approach, i.e., we asked respondents to tell us what they were thinking and what their cognitive reasoning was like when they came up with their answers.

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[12] As respondents were asked the questions in Norwegian, we include the English translation of the question asked: "*You have previously answered that you have been doing [INSERT NAME OF ACTIVITY] in the last 3 months. Where did you last do this activity? Mark the trip destination on the map. If round trip, mark the approximate centre point of the trip, or the point furthest away from where you think the trip began.*"

The advantage of this approach is that it may reveal whether people understand questions in different ways (ambiguous concepts), if their understanding of the question follows the intentions of the questioner, and how much time it takes to answer the questions (heavy response burden). As the target group is the general population, we needed to find out if their answers aligned with the information the researchers were looking for. We interviewed 12 people in three waves to find out how they understood the questions. The questionnaire was adjusted after each wave.

We report the main findings from the testing rounds. First, respondents found it challenging to understand how to define an "activity in nature". One respondent had been on a 10-day sailing trip, which contained several activities and same-day visits within the trip. How and what should they report? Questions regarding such a trip needed clarification for the respondent to be able to decide what to include in their answers. Reporting expenses for a multiday trip also proved to be very demanding for respondents. In general, we found that people struggle to aggregate and add up numbers when responding to surveys, thus we tried to avoid aggregation where possible. At the same time, asking for costs per day proved to be equally demanding, if not more demanding in some cases.

Another respondent stated that he did not regard a walk in the park as a recreational activity, as it was something he did to get some fresh air and would not report it as an outdoor activity. Other respondents had different opinions on this matter. Another issue that arose is the difficulty of separating the activity in nature from the transport stage when asking about one's last two trips. We require respondents to report on trips at least one hour from home. This makes it difficult for respondents to understand that they need to report on the entire trip door-to-door, not only on the activity per se. We ended up asking respondents to include the duration door-to-door, although this solution overweighs the transport stage.

Regarding the module about the last two trips, it was not straightforward to agree on what point respondents should indicate as to where their last trip took place. Should one indicate the point furthest away from where one started? And what about round trips? Should one indicate the halfway point? We ended up specifying that if the activity involved a round trip, respondents should indicate either the approximate centre point of the trip or the point farthest from where the trip began. In practice, the distance of the trip is equivalent to the "distance from home to that ending point", multiplied by two. This offers a limited understanding of the trips people have been on and the ecosystem types they have visited. We will try to improve this issue in the next survey round, by for instance asking respondents to pinpoint several points on the map for each trip.

Another example of the difficulties associated with this approach to operationalizing distance occurred when testing the survey with someone who had been hunting. The hunter we interviewed said that the hunting trip started at home, where most of the preparations for the hunt happened. Then he drove to the hunting ground, where he spent several nights in a cabin. He was unsure if he should report the trip from home, or from the cabin he was spending the nights at. Although the overall trip started from home, the actual hunting activity took place in the surroundings of the cabin. In connection to this, we noted that asking respondents "How many times have you done an activity in the last three months?" makes it more challenging to report on activities not done every week or done many days in a row for a short period, such as fishing and hunting.

Reporting on expenditures was also challenging for many respondents. It is not easy to report on rented equipment, or expenditures for food. We first considered asking about expenses for equipment in general, not only rented equipment, as in several outdoor activities the cost of the activity is close to zero, but the cost of equipment is high (e.g. biking, hunting, climbing). However, we concluded that it would be difficult to disaggregate the cost of equipment in general to the cost per trip. Thus, we concluded that we would only include rented equipment per trip and use that as

a proxy for owned equipment. For food expenditures, respondents found it quite straightforward to report on food bought in cafes and restaurants, less intuitive for food brought from home.

Lastly, we had to adjust the use of time horizons. In previous versions of the survey, the time horizon of questions varied significantly between "the last month", "the last six months", "the last year", and "the last three months". This created confusion among respondents. In addition, our colleagues who tested the survey stated that some respondents were anchoring their questions to the timeframes of previous questions. Thus, we decided to reduce the variation in the timeframes and mark more clearly when changes occurred.

5. Data

5.1. Data collection

The target population of the survey is defined as people aged 18-85 who are resident in Norway. It was decided to set an upper age limit, as pre-testing demonstrated that elderly people have difficulty in answering the questionnaire. The lower age limit was set at 18 to ensure consistency with related survey data collected by Statistics Norway.

Experts at Statistics Norway constructed the sample design and drew a nationally representative sample of 5000 respondents. As the survey is considered a pilot, i.e. a survey conducted to prepare and verify the survey methodology, the sample size is relatively small for a national survey. The response rate was 50.4%, and the net sample was 2520 respondents. However, the respondents could skip questions, so there are several missing values. We also included in our sample respondents who started the survey but did not complete it. The completion rate among respondents was 86.2%. The average time to fill out the survey was 22 minutes[13].

The questionnaire includes 26 main questions and 58 follow-up questions. Most questions are multiple-choice. Some questions require numerical answers, such as the number of overnight stays spent at a hotel, or the amount spent during the last trip. Five questions require respondents to interact with a map. The survey is web-based and adapted for cellphones, tablets and PCs. The first round was carried out from October 30, 2024, to November 27, 2024. We are currently looking into the possibility of conducting the survey quarterly.

Implementation of the questionnaire in Blaise®
The questionnaire was programmed in Blaise® 5.14 as a computer-assisted web interviewing (CAWI) survey with two layouts suitable for mobile phones and desktop PCs. Blaise® is a system developed by Statistics Netherlands for collecting survey data which supports multiple modes, such as interviewer-administered telephone and web interviewing. Blaise® uses a specific programming language for defining the routing which makes Blaise® particularly flexible for complex survey design[14].

The layout designed for mobile phones takes advantage of the inherent possibilities built into such devices and incorporates large buttons instead of radio buttons and checkboxes suitable for a touchscreen interface. The design also utilizes a Blaise® "Auto Enter" feature, which automatically forwards to the next question or page, where appropriate, after the user has selected an option. Layout for desktop PCs is more traditional with radio buttons and checkboxes.

The design and routing in this survey were straightforward. Since it was a requirement to make it possible for the respondents to pinpoint specific geographic locations, the questionnaire also made use of maps for this purpose. This was accomplished with a built-in feature of Blaise® called a map control, supporting several map providers. Google Maps was chosen as the most convenient option for Statistics Norway. The one major obstacle was that the Google Maps API had changed, which required updating the map control from Statistics Netherlands.

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[13] This figure represents the total time, from when one first started answering the survey to when it was submitted. Many respondents did not complete the survey in one go but returned to it later to complete it. Here we only control for respondents that used more than one day to answer the survey.
[14] For more information about Blaise®, see https://www.blaise.com/blaise/about-blaise

5.2. Preliminary survey results

We have briefly examined the data to provide some preliminary results. For what concerns the sample, it is balanced gender-wise, as 50.6% of the respondents are male, and 49.4% female. For education, we see some overrepresentation of highly educated respondents, with 42% of respondents having attended college or university, 37% upper secondary education, and 17% primary or lower secondary school[15]. The age of respondents spans from 18 to 84 years, with a mean value of 49.3 and a median age of 51. The response rate varied among modules: for overnight stays, it was 91%, but only 403 respondents stated that they had been on a nature-related trip that included an overnight stay in the last six months. For the module on the last trip the response rate was 91%, but only 68.5% of 2520 respondents stated that they had been on a trip in the previous six months. For the second to last trip the response rate was 64%, but only 48.4% of 2520 respondents said they had been on several trips in the previous six months. Due to the varying number of missing values in the modules, we report here the descriptive statistics for those who responded to the relative questions. A full overview of response rates and missing values for the statistics reported in this section can be found in Appendix D.

Concerning the results from the background questions, we find that the majority of respondents (92%) enjoy being in nature and that 61.4% either own or have access to one or more holiday homes. 578 respondents own one or more holiday homes, 857 have access to one or more holiday homes and 112 both own and have access to one or more holiday homes. 17% of respondents are members of an outdoor association.

The most common activity among respondents was going for a hike or jogging (90%), followed by relaxing (68%) and water-based activities (64%). Column 2 in Table 5.1 provides an overview of the share of respondents doing each activity over 12 months. On average, respondents had done 4 out of the 10 listed activities in the past 12 months. Many respondents (44%) had done more than four activities: 17% of respondents had done five activities, 14% six activities, and 8% nine activities, demonstrating that Norwegians engage in a variety of outdoor activities. For the frequency of activities, walking/jogging was the activity done most frequently (1-2 times a week) over three months. For all other activities, the most common frequency was 1-3 times a month.

The 10 activities we selected covered the habits of 80% of respondents, whereas the remainder indicated they had done other activities (of which 27% indicated one extra activity, 42% two extra activities, and 22% three extra activities). The most common activities stated in the category "Other activities" were disc golf, frisbee, golf, football, mountain trips and hikes, bouldering/ climbing, walking the dog, orienteering, and playing with children. 76% of respondents spent up to 5 hours per week on outdoor activities, of which 33% spent between 2 and 5 hours a week and 43% less than two hours per week. The distribution between genders is balanced, except for respondents who spent more than 10 hours per week on outdoor activities (6% of the respondents), of which 60% are men and 40% are women.

In Table 5.1 we compare our results with the results of the national module on outdoor activities from EU SILC 2024 (Statistics Norway, 2024c). The EU SILC 2024 survey was conducted from January to June 2024 and had a sample of 11,800 respondents. The response rate was 49% (Dalen & Grimstad, 2024). The results match quite well, with an average margin of error of 4.1 percentage points. The different timing of the data collection could be an explanation for our results being more biased toward summer recreation, compared to the EU SILC 2024, which also includes questions about winter activities. We expect the next survey round to give a more comprehensive

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[15] We do not have data on education for 3.5% of respondents.

overview of recreation, as it will map winter activities, which in Norway represent an important part of recreation, as indicated by the EU SILC survey.

Regarding satisfaction with time spent in nature and related barriers, 80% of respondents feel that their needs are met either "to a great extent" or "sufficiently". 84% answered that they would like to spend even more time in nature. The three main barriers to spending more time in nature were lack of time, family commitments, and work-related tiredness.

Table 5.1   Response rates for each activity and a comparison between our results and EU SILC 2024 results

Activity (done in the last 12 months)	Share of respondents (our survey)	Share of respondents (EU SILC 2024[16])
Walk / jog	89.8%	90.6%
Relaxing or recharging your batteries	68.2%	-
Water-based activities (swimming, bathing, boat trip, canoe, and similar)	63.7%	68.7%
Picnic or barbecue	50.7%	-
Berry or mushroom picking	43.5%	46.8%
Cycling	33.2%	24.5%
Fishing	32.2%	38.2%
Studying nature (looking at plant, bird and/or animal life, or photographing)	27.5%	-
Motorised activities on land (ATV, motocross, snowmobile, and similar)	9.7%	-
Hunting	8.1%	7.4%
Skiing*	-	33.6%
Outdoor ice skating*	-	12.0%

*Activities only included in EU SILC.
Source: own elaboration and EU SILC 2024 (Statistics Norway, 2024c).

Table 5.2 provides an overview of the distribution of self-reported overnight stays and same-day visits to different ecosystem types. For overnight stays, the most visited ecosystem type was "Coastal areas and archipelagos" (26.4%), followed by "High mountain areas" (20.1%) and "Forest" (19.0%). For same-day visits, measured by looking at the ecosystem types self-reported for the last trip, the most visited ecosystem was "Forest" (28.9%), followed by "Open landscapes" (20.1%) and "High mountain areas" (12.9%).

For overnight stays, 79% of all overnight stays were spent either at own or borrowed holiday homes (46%) or in nature (33%). The remainder was spent either at rented holiday homes (6%), tourist cabins (7%), camping sites (6%), or other sites (2%).

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[16] Sports and outdoor activities, the Survey on Income and Living Conditions (EU SILC) (Statistics Norway, 2024c). https://www.ssb.no/statbank/table/13372/.

Table 5.2   Distribution of visits to ecosystems (self-reported)[17]

Ecosystem type	Overnight stays	Last trip
Cropland	3.5%	6.0%
Forest	19.0%	28.9%
Open landscapes	13.1%	20.1%
High mountain areas	20.1%	12.9%
Mire and wetlands	0.6%	7.6%
Lakes, rivers and ponds	8.4%	10.0%
Coastal areas and archipelagos	26.4%	9.7%
Open ocean and fjords	6.2%	4.8%
Parks and green areas in cities or towns	2.6%	-

Source: own elaboration.

For expenditures, the average expenditure reported by respondents for same-day trips was 82.8 NOK per person. For multi-day trips, the average expenditure was 2281 NOK. The majority of expenses were reported for food and drinks (53%), and accommodation (39%). For those who reported expenses for parking, the average expense was 33 NOK. For those who rented a vehicle, the average expense was 1620 NOK. Lastly, for those who rented some sort of equipment, the average expense was 1250 NOK. Further investigations are needed to make inferences about the data collected.

5.3. Preliminary GIS results

The integration of Google Maps in the survey allowed us to extract the coordinates for the respondents based on the location of their last two trips, and their three most frequent recreational activities. An example of the data we obtained for each respondent is demonstrated in Figure 5.1.

Figure 5.1   Example of output data for one respondent from the map function in the survey

Source: Kartverkets interactive Norgeskart https://norgeskart.no/ [Coordinates from a random respondent]

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[17] For the related question in the module about one's last trip, we did not include «parks and green areas in cities and towns» as a category. Since we requested people to think of a trip at least one hour away from home, we assumed that this category was not relevant for this module.

The coordinates from the questionnaire were cleaned and analyzed in QGIS. The cleaning of the data involved removing respondents who had marked areas outside of Norway (55 respondents for the last trip module). These coordinates are included in the tables below under the category "Unclassified". The map used is a test version of the base map for extent accounts in Norway, which is still under development. To use the test version of the ecosystem extent map, all regions were imported into the open-source program QGIS and then merged to compile a complete map of Norway. The coordinates were tested across both regional and country files to make sure no errors occurred in the merging. Using the coordinate reference system EPSG:4258, corresponding with the ecosystem extent map, the coordinates of each variable were layered to include the corresponding ecosystem type they adhered to. Due to the ecosystem extent map using, among other classifications, the Eurostat level 1 classification, this was used in the tables below. Table 5.3 illustrates the number of observations for each ecosystem type for the last trip.

Table 5.3 Last trip – total observations (aggregated coordinates)

Ecosystem types	Observations	Share
Settlements and other artificial areas	222	14%
Cropland	75	5%
Grassland	17	1%
Heathland and shrub	142	9%
Forest and woodland	678	42%
Sparsely vegetated ecosystems	168	10%
Inland wetlands	48	3%
Rivers and canals	13	1%
Lakes and reservoirs	93	6%
Coastal beaches, dunes and wetlands	24	1%
Marine ecosystems	152	9%
Unclassified (outside Norway)	55	-
Total	1687	-
Total within Norway	1632	-

Source: own elaboration in QGIS.

Table 5.3 shows that 222 respondents indicated "Settlements and other artificial areas" as the ecosystem they visited when pinpointing the location. This is an important finding, as this ecosystem type was not an option in the relative multiple-choice question in the last trip module, because we assumed that respondents would not indicate urban areas. We made this assumption as the trip had to be to a nature area, at least one hour from the respondent's house. We have now understood that future survey rounds need to include this ecosystem type. In this round, this negligence may have caused some noise in the distribution of answers among ecosystem types in the multiple-choice question.

Figure 5.2 shows the distribution of all the coordinates for the last trip. They show a good spatial distribution across the country, with clusters around the cities of Oslo, Bergen, and Stavanger. The clusters represent a mean of all coordinates within a 500km radius. The reason for the large radius is the spatial vastness of the country, the distribution of the coordinates, the opportunity to capture larger spatial patterns, and to make sure all coordinates adhered to a cluster. The clustering was done using the feature "point cluster" and testing different outcomes with different radiuses. These clusters are a way of demonstrating where the mean point of a radius with coordinates is. Where the distribution of coordinates is large, as in the northern part of Norway, it was important to include the actual coordinates (indicated by the dots).

Figure 5.2   Clusters (500 km radius) and coordinates (dots) for the last trip
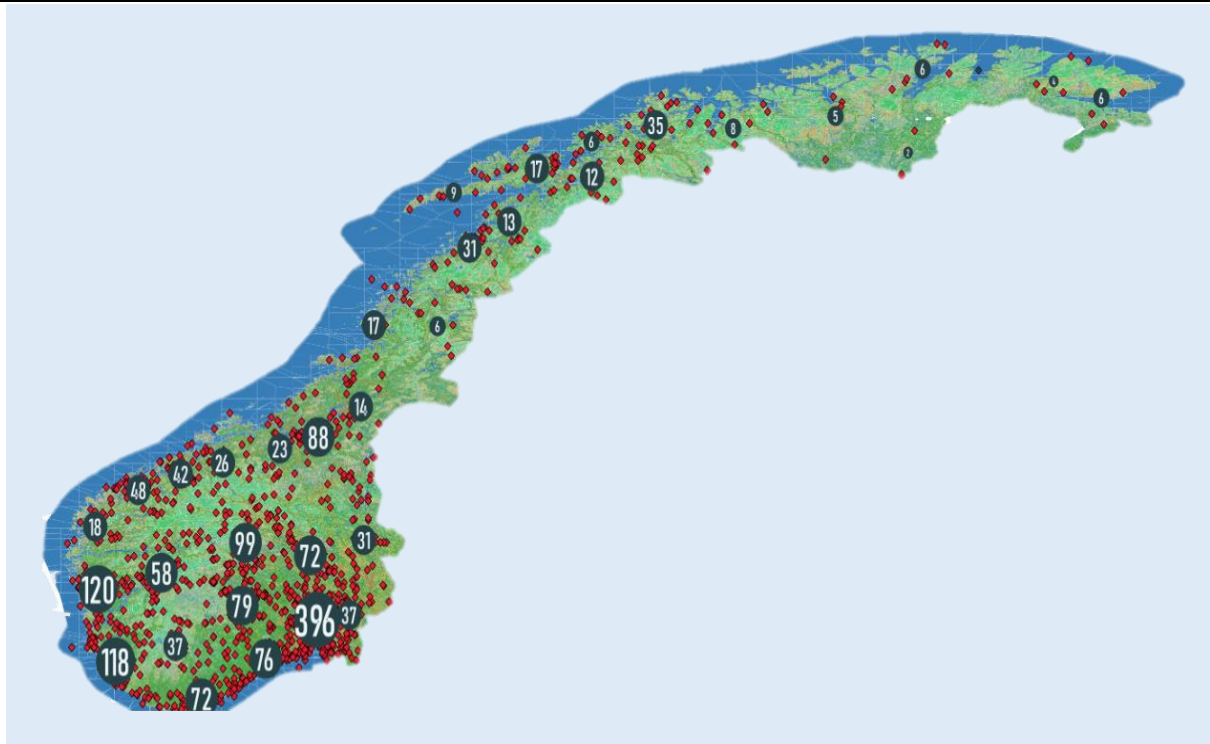

Source: own elaboration. Map from *Grunnkart for bruk til arealregnskap (Testversjon 1)* (Geonorge, 2024)

We then looked at the correspondence between the ecosystem types associated with the coordinates and the self-reported ecosystem types. It should be noted that in the self-reporting question, respondents had the possibility of indicating more than one ecosystem type, as they could have been on a trip crossing several ecosystem types. In addition, the ecosystem types for self-reporting which were aggregated for the questionnaire do not match perfectly with the ones in the ecosystem extent map, but we have aligned them for comparison. This was done by adding up the coordinates from the ecosystem types that were merged, such as "Grassland" and "Heathland and shrub" into "Open landscapes" (see Table 4.2 in Chapter 4).

For 703 respondents (43% of coordinates) we found a match between the ecosystem types they pinpointed on the map and the ones they self-reported in the multiple-choice question. The distribution among ecosystem types can be seen in Figure 5.3 in the category (A) "Match". We see that the ecosystem type "Forest" was by far the ecosystem type with the highest match, with 409 matches, more than four times more than the rest of the ecosystem types.

Figure 5.3 also summarizes the accounts for all visited ecosystem types that we obtained from the survey for the last trip. Category (A) shows matches, while category (B) shows ecosystem types indicated on maps but not included or marked in the self-reporting, and category (C) shows ecosystem types self-reported, but which were not indicated on maps. If we assume that they all correspond to reality, i.e. that respondents have visited both the ecosystem types they self-reported and pinpointed on the map, we find that the results are well aligned between the ones self-reported and pinpointed, as there is at maximum a 3% deviation in the visitation rates among ecosystems.

Figure 5.3   Summary accounts for all visits to ecosystem types during the last trip, measured as number of coordinates for (A) and (B), and number of self-reported ecosystems for (C)
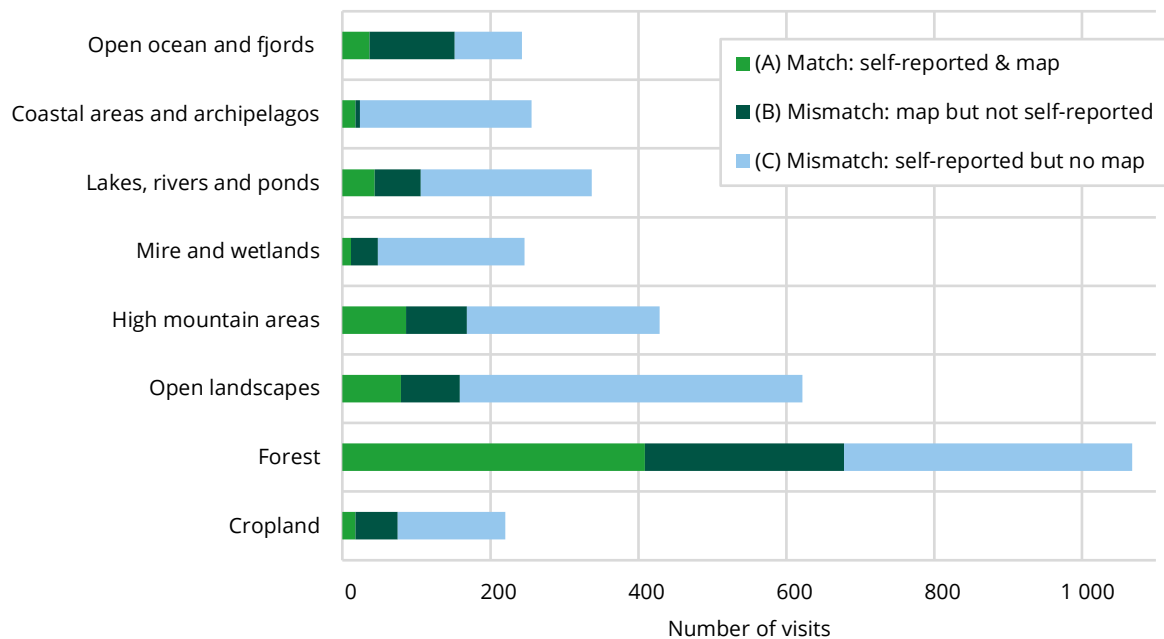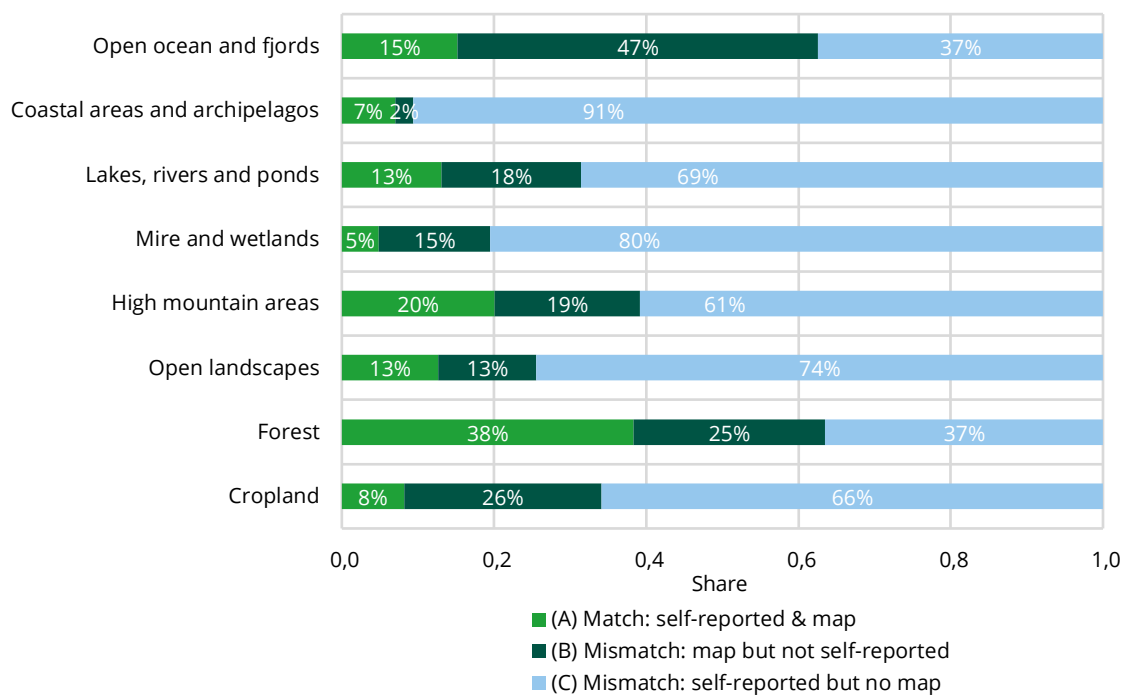

Source: own elaboration.

While category (A) is unproblematic, the mismatch captured by categories (B) and (C) need further investigation. For category (B) "mapped but not self-reported", we have two main hypotheses. First, the single coordinate may have been placed poorly. An example could be a respondent visiting a mountainous area and who set the pin on a river. This could easily have led the respondent to report only "High mountain" and not "River" in the self-reporting question. Another example could be that the respondents did not zoom in closely enough and randomly pinpointed a place in the area they visited, which then could result in a different ecosystem than the ecosystem they deemed to have visited. Secondly, respondents could potentially have a poor understanding of the ecosystem they visited. Category (C) "self-reported but not mapped" can be partially interpreted as the secondary ecosystems respondents have visited. While respondents could only indicate one ecosystem type on the map, with self-reporting they could indicate more than one ecosystem type, leading us to conclude that (C) in many cases represents the other ecosystem types visited during the trip. For those who only indicated one ecosystem type in self-reporting, we assume they can be treated as shortly discussed for category (B). In any case, it should be noted that our preliminary analysis only looks at the exact coordinates and does not include a buffer zone. In future analyses, we will include a buffer zone around the coordinate and also account for the ecosystem types contingent to the point. Including a buffer zone would decrease the size of the mismatch as indicated by categories (B) and (C).

Figure 5.4 shows the distribution of answers within the same ecosystem type. We observe that Forest is the ecosystem with the highest levels of match (38%), followed by High mountain areas (20%) and Open ocean and fjords (15%). The ecosystems with the lowest values of match are Mire and wetlands (5%) and Coastal areas and archipelagos (7%). In general, the share of Match is quite low. We also observe that the mismatch in category (C) is largest for Coastal areas and archipelagos (91%), Mire and wetlands 80%), and Open landscapes (74%). Again, this can be interpreted as secondary ecosystems that respondents have visited during their trip. For what concerns category (B), the share of answers is in most cases less than 30% of the total, with the exception for Open ocean and fjords (47%). This is quite surprising, as the hypotheses mentioned earlier (that respondents either poorly pinpoint or are not able to distinguish ecosystem types) are unlikely to

be applicable in this case. We hope to be able to further investigate this finding in future survey rounds.

Figure 5.4   Distribution of self-reported and mapped visits within ecosystem types

Source: own elaboration.

Table 5.4 shows the distribution of ecosystem types among the coordinates pinpointed by respondents in all map-related questions. The coordinates for the map-related questions have a decreasing response rate, where Activity 1 had 2283 coordinates, Activity 2 had 2114, Activity 3 had 1830, and the Second to last trip had only 1211 coordinates. This could indicate that placing coordinates gradually increased the response burden, possibly making respondents skip these questions later in the questionnaire. For the activities, the mostly visited ecosystem types were Forest and woodland and Settlements and other artificial areas.

Table 5.4   Number of coordinates associated with each ecosystem type for all activities marked on maps

Ecosystem types	Trips		Activities		
	Last trip	Second to last trip	Activity 1	Activity 2	Activity 3
Settlements and other artificial areas	222	176	456	419	325
Cropland	75	55	145	106	96
Grassland	17	14	39	26	24
Heathland and shrub	142	87	131	105	115
Forest and woodland	678	495	890	732	632
Sparsely vegetated ecosystems	168	109	131	138	124
Inland wetlands	48	28	47	38	36
Rivers and canals	13	6	13	21	12
Lakes and reservoirs	93	66	126	131	123
Coastal beaches, dunes and wetlands	24	19	20	41	26
Marine ecosystems	152	116	235	292	271
Unclassified (outside Norway)	55	40	50	65	46
Total	1687	1211	2283	2114	1830
Total within Norway	1632	1171	2233	2049	1784

Source: own elaboration.

5.4. Limitations

Our survey has some limitations, mainly regarding the activity-based approach and the ecosystem aggregation.

First, the activity-based approach proved to be a better approach than an ecosystem type approach for respondents during testing. This has, however, prevented us from associating every activity with an ecosystem type, as the response burden would have been too high. Consequently, we only map the ecosystem type of the three activities done most frequently. This is a limitation, as 62.6% of respondents engaged in more than three activities. The activity-based approach has therefore led us to have high accuracy on the type and frequency of recreational activities, and lower accuracy on where they are done.

Another problem related to the activity-based approach is that activities vary across seasons, particularly between winter and summer. Thus, we will need to decide whether we keep the same list of activities at each round, or if they should vary, depending on the season. There is a large seasonal variation across Norway, with some areas in Northern Norway covered in snow for seven months a year, on average. The decision to include (or not) some activities at different rounds of the survey will impact the quality and accuracy of the results. To limit the error, we would need to ask people to recall the type and frequency of activities they participated in over the past 12 months. However, reporting this information over 12 months may reduce the precision of the data due to recall bias. Thus, we decided to focus on the past 3 months. There is a trade-off between minimizing recall bias and aggregation over a year, specifically for the year 2024, as we could only send out the survey once this year. As mentioned earlier, our survey only covers the months of August, September and October for the recreation module. Although technically these months cover half of summer and the beginning of autumn, this period is considered autumn in Norway, and most Norwegians take holidays in July. A solution, if possible, could be to run the survey quarterly to aggregate data and look at seasonal variations in activities. The main recreational activities in Norway take place in the summer and winter months, so we expect that if we were to only aggregate the current results, they would quite significantly underestimate the outdoor recreation use of ecosystems in Norway, as suggested by the comparison with the EU SILC data.

Secondly, the connection between ecosystem types and trips/activities will probably not be as accurate as desired. This is due to two main pitfalls. First, the reclassification of ecosystem types implies that we need to reassign the visits to the ecosystem typology indicated by the EU. Some EU ecosystems overlap in our new classification, and some have been dropped, so there will be some errors in the disaggregation. The other pitfall is noise in the data and mismatch between self-reported ecosystems and ecosystems indicated on the maps. It will thus be crucial to include a buffer zone around the point where the respondent may have been during the trip and include the contingent ecosystems. The choice of the radius of the buffer zone will have consequences on the number of ecosystems we include. We could use the self-reported ecosystems of respondents who indicated more than one ecosystem to decide the size of the buffer zone.

Other limitations regard the fact that there may be self-selection in the sample, the low response rate in some modules, the missing values, and the fact that we only ask Norwegian residents. Regarding self-selection, 92% of respondents answered that they enjoy being in nature. This could potentially indicate a presence of self-selection, as those who enjoy nature are more likely to answer the survey, but it could also be that Norwegians on average enjoy being in nature, as historical data suggests (Dalen & Oppøyen, 2023). Another potential limitation comes from the overnight stays, as only 17.5% of respondents in the module stated that they had been on an overnight stay in nature in the previous 12 months. This will make it difficult to aggregate the answers in a representative way. Regarding missing values, we will make it mandatory in the next

round to answer a question before moving to the next one. Lastly, the fact that we only sent the survey to Norwegian residents implies that we are not able to show figures for international tourists visiting Norway and will need to supplement our data with external data to be able to report to Eurostat. This can be solved by developing a visitor survey for international tourists, similar to the one Innovation Norway conducts.

6. Discussion

In this chapter, we summarize our findings so far and discuss the challenges and experiences we have had during this project. We also briefly present our plans for work beyond the EU Grant project.

The main outcome of the project was developing and conducting the survey. The preliminary results demonstrate that the survey has great potential for measuring NBT and recreation and in the long run produce statistics that meet EU Regulation No 2024/3024. We were able to collect data about the frequency and extent of nature-based activities done by Norwegians in summer and autumn, expenditures related to NBT and recreation, and overnight stays in Norway. The novelty of the statistic is that it only concerns activities and overnight stays done where *one of the main purposes was visiting a nature area*.

Another contribution of the statistics concerns the types of activities respondents get asked about. In fact, whereas the Survey on Income and Living Conditions has asked about a fixed list of activities over the past 50 years, we have now allowed respondents to indicate activities which have not been previously listed. We found a great variation in the type of activities each respondent does, and that respondents on average did at four different activities. We also found that free-time activities such as relaxing and picnicking are very popular, so questions about recreation should not focus exclusively on sport-related activities. Also, the results on outdoor recreation activities seem to match quite well with the existing EU SILC survey, with an average margin of error of 4.1 percentage points which increases the validity of the survey. Therefore, the new format provides us with more comprehensive statistics on nature-based recreation. At the same time, it should be noted that the current round only covers summer activities. It would be very useful to map nature-based tourism and recreation for winter months, too, as winter recreation and tourism are very important in the Norwegian culture and economy.

One of our objectives was to test if adding the integration of maps to the questionnaire would impact response rates. As our response rate (50.4%) aligns with the response rate of surveys by Statistics Norway, we conclude that adding this feature did not impact significantly the response rate. However, it seems to have impacted the completion rate. Moving forward, it will be interesting to explore whether respondents are willing to answer more map-based questions or if five map-related questions is an upper limit.

We expect that the main contribution of our research will come from connecting visits to ecosystem types and asking respondents to pinpoint the location of three activities and two trips. Our preliminary results for the last trip show that the national distribution of coordinates was good and that the most visited areas are concentrated around Oslo, Stavanger, and Bergen. We also found that, if we compare the coordinates with the self-reported ecosystems, there is a quite significant mismatch, with a match rate of 43%. This can be due to several reasons. Our main hypotheses are (i) that in self-reporting more ecosystems were indicated, leading to only finding a match between one of the self-reported ecosystems and the coordinate; (ii) the lack of a buffer zone around the coordinate significantly decreases the likelihood of matching. As about 40% of respondents indicated more than one ecosystem type in self-reporting, it will be crucial to include a buffer zone around the coordinate to also capture contingent ecosystems. Still, the mismatch needs to be further investigated.

The spatial data will also complement existing statistics on tourism and accommodation. Strava data can also be used to supplement our figures. Although some regions may already have statistics on the most visited natural areas, it will be interesting to have comparable data across

regions. In addition, existing data is collected from the *suppliers*, i.e., owners of accommodations, whereas our survey asks *users* of various types of accommodations, giving us insights about users and allowing us to match supply data with demand data.

The use of maps will also contribute to the research on ecosystem accounting, by enabling a direct connection between ecosystem extent accounts and ecosystem services accounts. Connecting visits directly to a map will make the ecosystem accounts policy-relevant, as policymakers at regional and national levels will identify the most visited natural areas, where the visitors come from, etc. These analyses will especially supplement the data from two projects, the large-scale project carried out by the Norwegian Environment Agency to map outdoor recreation areas in every municipality and the development of a base map for recreation by the Norwegian Institute for Nature Research (see Section 3.1). As the inputs for these projects have a top-down approach, with either municipalities or researchers mapping the importance of recreational areas, it will be useful to also include the perspective of the direct users of recreational areas by including the results from our survey.

Regarding statistical reporting on ecosystem services, we will compile both supply and use tables in physical terms (see Appendix A, Tables A1 and A2). For the supply table, we will need to report on the number of overnight stays divided by 12 ecosystem classes (mandatory reporting). As we have aggregated the ecosystem classes (as illustrated in Table 4.2), we will need to disaggregate them for reporting. We have not discussed yet how the disaggregation will be made and which criteria we will follow. Regarding the number of visits to ecosystems performed by locals and same-day visitors (voluntary reporting), we will discuss which figures to use, if only the ecosystems pinpointed on maps with in the recreation module with a buffer zone, or only the self-reported ecosystems, or a combination of both. We also need to clarify if we can only report one ecosystem per visit, or if it is possible to consider several ecosystems for each visit. Also, knowing the respondents' place of residence, we will be able to define which visits should be considered as done by locals and which should be defined as visits outside one's usual environment.

For what concerns the use table, we will report on domestic consumption by households, as required by the EU. Regarding export of NBT, we will not have data on foreign NBT and recreation in Norway from the survey results. However, it will be possible to obtain data on foreign tourism from an external provider, Innovation Norway. To date, we do not have any data source for measuring foreign recreation. We are also confident that we will be able to compile supply and use tables in monetary terms (see Appendix A, tables A3 and A4). The project thus goes beyond the mandatory reporting regarding NBT by including outdoor recreation and by exploring monetary valuation methods for both ecosystem services.

The outcome of this survey will also be used to estimate a multi-site travel cost model. By integrating remote sensing and detailed maps, we can extract site-specific environmental attributes, enabling us to estimate preferences and calculating willingness to pay for marginal changes in these attributes using a travel cost model. This integration could enhance the precision of valuing environmental attributes in outdoor recreation, further advancing the nonmarket valuation literature. Further investigation is required to make inferences about the preliminary results of monetary valuation.

Lessons learned and future plans
Most of the project's efforts were dedicated to developing a survey. Out of 20 months for the project, four were dedicated to the set-up and public procurement process, six to the evaluation of data and methods and the testing of MPS data, and ten to the preparation, development and distribution of the questionnaire. Although this may sound like a relatively long time, we had to

optimize the time to achieve our goals without compromising on quality. In this process, we faced three main challenges. The first challenge was combining many different purposes into one questionnaire. We had to meet Eurostat requirements for ecosystem accounts, thus focusing on the connection between nature-based tourism and recreation and ecosystems. We built on previous experiences and chose to take an activity-based approach. We also wished that the survey would meet research needs by integrating a travel cost model and maps. This resulted in an initial version of the questionnaire which included approximately 90 questions and would have taken more than 30 minutes to complete. The second challenge consisted of shortening the questionnaire to ease the response burden. The Methods department at Statistics Norway assisted us with rephrasing and restructuring the questions to reduce the cognitive demand on respondents and also reduce ambiguousness. This phase took a long time and brought many improvements and cuts in the survey, as it was not easy to simplify the survey without sacrificing the accuracy and meaningfulness of questions. The last challenge was related to programming the questionnaire, especially related to the map-based questions. As including map-based questions was new for us we had to reduce the number of map-based questions due to concerns about a drop in response rates on such questions.

The limited time, scope, and resources of the project led us to focus our efforts on the development of a survey with a strong methodological approach and focus less on collaboration with relevant stakeholders. For future data collection, we will collaborate with external stakeholders such as municipalities, other governmental agencies, researchers, and tourism organizations, to get feedback on the questionnaire and input on their data needs. We will also investigate internally if there could be synergies with existing surveys and statistics. In the context of this project, we only looked at whether existing statistics could be used to report on ecosystem accounts. It could be useful to align with other statistics which have some overlap in questions and indicators. For instance, we are currently discussing the possibility of taking over the reporting on same-day visits from the Travel Survey in the long term, as it is demanding to gather. It would also be possible to complement the data in the Survey on Income and Living Conditions with our survey results.

This project has inspired further exploration of data collection methods that will be able to provide good information about the use of nature and link it to locations specified on maps. We plan to conduct a feasibility study exploring various forms of 'smart surveys' that utilize maps, images or mobile data, which may be particularly interesting in this context. The use of PPGIS (Public Participation Geographical Information System) should also be part of the feasibility study. The gained knowledge, the new methods and data may also have transfer value to areas beyond the ecosystem services of nature-based tourism and recreation.

7. Conclusion

Extensive work was undertaken to meet the objectives outlined in the EU grant application, particularly in evaluating various methods for both physical measurement and monetary valuation, and subsequently developing new statistics on nature-based tourism and recreation. After assessing potential methods for physical measurement, we opted to create a new survey. The survey, which serves as the primary output of work package 3, provides valuable data on recreational activities and overnight stays in Norway, offering insight into the frequency, types and geographical distribution of the recreation-related ecosystem services. By connecting the activities to specific ecosystem types using maps, the survey enhances the understanding of the ecosystem's contribution to recreation-related services and has the potential to inform policy decisions both at a regional and national level. Regarding monetary valuation, we opted to include a module in the survey following a travel cost model structure, including questions on consumer expenditures.

The survey was conducted in November 2024, and most questions refer to activities done in the summer and autumn months of 2024. The preliminary results demonstrate that, according to self-reporting, coastal areas and archipelagos, high mountain areas and forests are the most visited ecosystem types for overnight stays, and forests, open landscapes and high mountain areas are the most visited for same-day trips. However, we found a relatively low correspondence between self-reported ecosystems and coordinates (43%), which needs to be further investigated. The data collected demonstrated that most of the expenses were reported for food and accommodation.

The results from the survey will help improve the accuracy of tourism data, and bridge gaps in existing statistics towards a more comprehensive understanding of nature-based tourism and recreational patterns. Drawing on experiences from other ongoing projects in Norway, valuable contributions to research on monetary valuation methods will be made with the exploration of a relatively new application of the travel cost model. The integration of spatial data can provide useful insight into site choice behaviour following the travel cost model through multi-site recreation models.

Several challenges and limitations were encountered during the survey development, such as addressing seasonal variations, ensuring limitation of recall bias and delimitation of key concepts. The plan forward is to collect data quarterly, which will make up for some of these challenges, especially regarding seasonal fluctuations. Despite the limitations, the project offers a novel foundation for future research on ecosystem accounting and policy development for nature-based tourism and recreation.

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Appendix A. Reporting table format

The tables below show the proposed reporting format for this ecosystem service. Grey cells = not applicable.

Table A1.　　Reporting format for the supply of recreation-related ecosystem services in physical terms

Reporting item	Ecosystem type level 1											
	1	2	3	4	5	6	7	8	9	10	11	12
	Settlements and other artificial areas	Cropland	Grassland	Forest and woodland	Heathland and shrub	Sparsely vegetated ecosystems	Inland wetlands	Rivers and canals	Lakes and reservoirs	Marine inlets and transitional waters	Coastal beaches, dunes, and wetlands	Marine ecosystems
Number of overnight stays that can be attributed to visits to ecosystems (mandatory)												
Number of visits to ecosystems performed by locals and same-day visitors (voluntary)												

Table A2.　　Reporting format for the use of recreation-related ecosystem services in physical terms

Reporting item	Economic units				
	1	2	3	4	5
	Intermediate consumption by industries	Government final consumption	Households' final consumption	Gross capital formation	Exports
Number of overnight stays that can be attributed to visits to ecosystems (mandatory)	▓	▓		▓	
Number of visits to ecosystems performed by locals and same-day visitors (voluntary)	▓	▓		▓	

Table A3.   Reporting format for the supply of recreation-related ecosystem services in monetary terms

	Ecosystem type level 1											
	1	2	3	4	5	6	7	8	9	10	11	12
Reporting item	Settlements and other artificial areas	Cropland	Grassland	Forest and woodland	Heathland and shrub	Sparsely vegetated ecosystems	Inland wetlands	Rivers and canals	Lakes and reservoirs	Marine inlets and transitional waters	Coastal beaches, dunes, and wetlands	Marine ecosystems
Expenditures on overnight stays that can be attributed to visits to ecosystems (NOK)												
Expenditures on visits to ecosystems performed by locals and same-day visitors (NOK)												

Table A4.   Reporting format for the use of recreation-related ecosystem services in monetary terms

	Economic units				
	1	2	3	4	5
Reporting item	Intermediate consumption by industries	Government final consumption	Households' final consumption	Gross capital formation	Exports
Expenditures on overnight stays that can be attributed to visits to ecosystems (NOK)					
Expenditures visits to ecosystems performed by locals and same-day visitors (NOK)					

Appendix B: Mobile Phone Signalling Data investigation

In WP3 of the EU grant project, recreation and nature-based tourism, one of the tasks was to investigate the possibility for new technologies for estimating nature-based tourism and recreation services and evaluate challenges and costs. More specifically, we have tested this by using MPS data from one operator (Telia) as serviced by the company Geodata A/S. The data by Telia estimates data for the whole population, and not only the mobile phones operated by Telia.

The data is readily usable statistics. The processing places mobiles in geographical locations (grid cell size of 500mx500m, but bigger in locations with few residents), if the mobile phone has been in the location for at least 20 min. This data gives us information on visits to various locations of interest in hourly time-slices since 2019. Since it is readily made statistics, we have no way of directly combining the results with other data for individuals. For any time-slice and geographical grid, there has to be at least 5 mobile phones (sim-cards). The tele-company estimates the number of phones by a simple method based on market share. The market share is approximately 40 percent.

The statistics is not processed further by Geodata and is only presented in a visual explorer. There are three different statistics: Visitors, activity and trips. The exploration app has some limitations when it comes to extracting the detailed numbers, not only visual graphics. We have not had access to the actual grids and statistics, only via the application for exploring single grids and municipalities.

- <u>Activity</u> is the number of phones within the grid with a duration of at least 20 minutes.
- <u>Visitors</u> is the number of phones within a grid with a duration of at least 20 minutes and which stayed the night in another grid. This gives statistics for the grid and by municipalities where the visitors spent the night.
- <u>Trips</u> is the number of phones within a municipality with a duration of at least 20 minutes and which spent the night in another municipality. This gives statistics for each municipality and by municipalities where the visitors spent the night.

The activity statistics is only available as bar charts in the present app. However, it is the visitors-statistics which potentially can be of direct use in estimating recreation services. Figures can be obtained for the trips- and visitors-statistics, and test extracts and calculations for visitors and trips have been done for a few municipalities.

We have looked closer at the visitors-statistics. Only the top 20 municipalities are where someone spent a night are included in the statistics from the app. Figure C1 shows an example of a grid in a holiday home area in the municipality of Sandefjord.

Figure C1.   Visitors, one grid with holiday homes. Sandefjord municipality
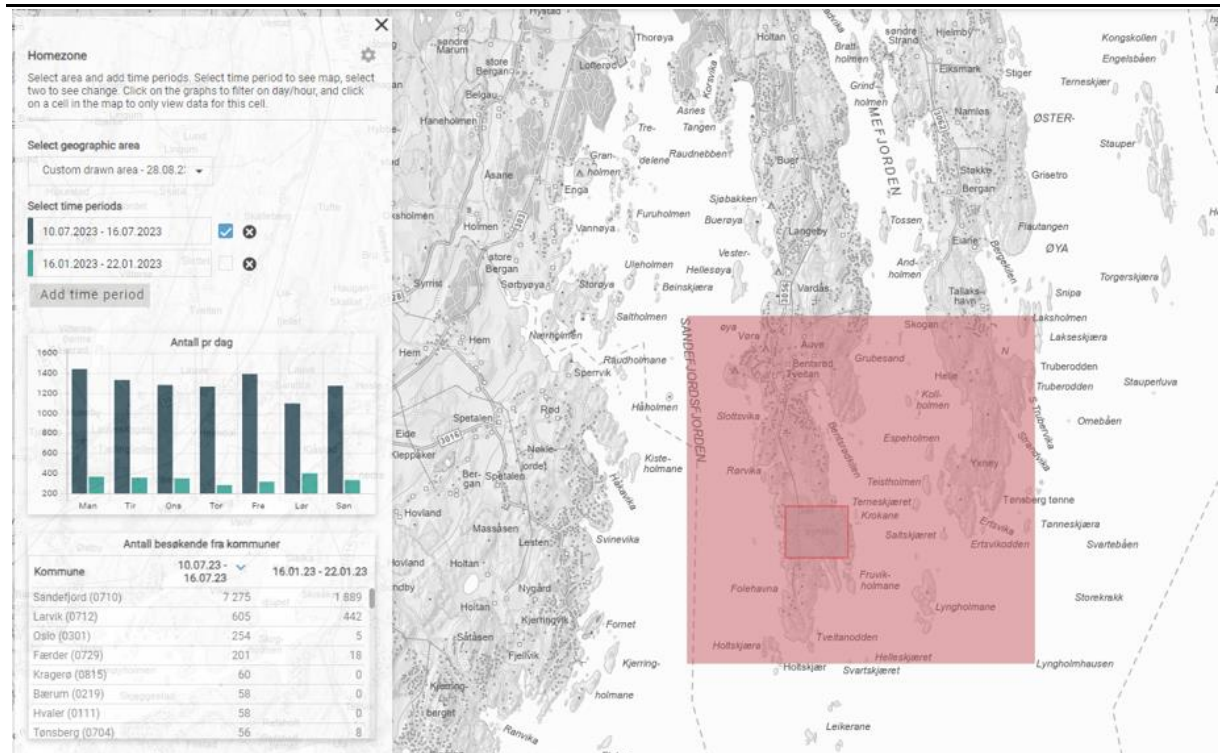
One crucial aspect is the geographical grids. The grid is fixed, and the grids vary in size (see figure C2). In densely populated areas and areas with commercial and industrial activity the grids are small, sized 500m x 500m. In nature areas and areas with little activity, on the other hand, the grid sizes are quite large (a couple of kilometres). It is difficult to find recreational areas or parts of recreational areas which are exclusively contained in a grid. Dwellings, holiday homes and other activities affect the visitor number in most cases.

Figure C2.   The fixed grid for an example area along the Oslo fjord. Smallest grids are 500m
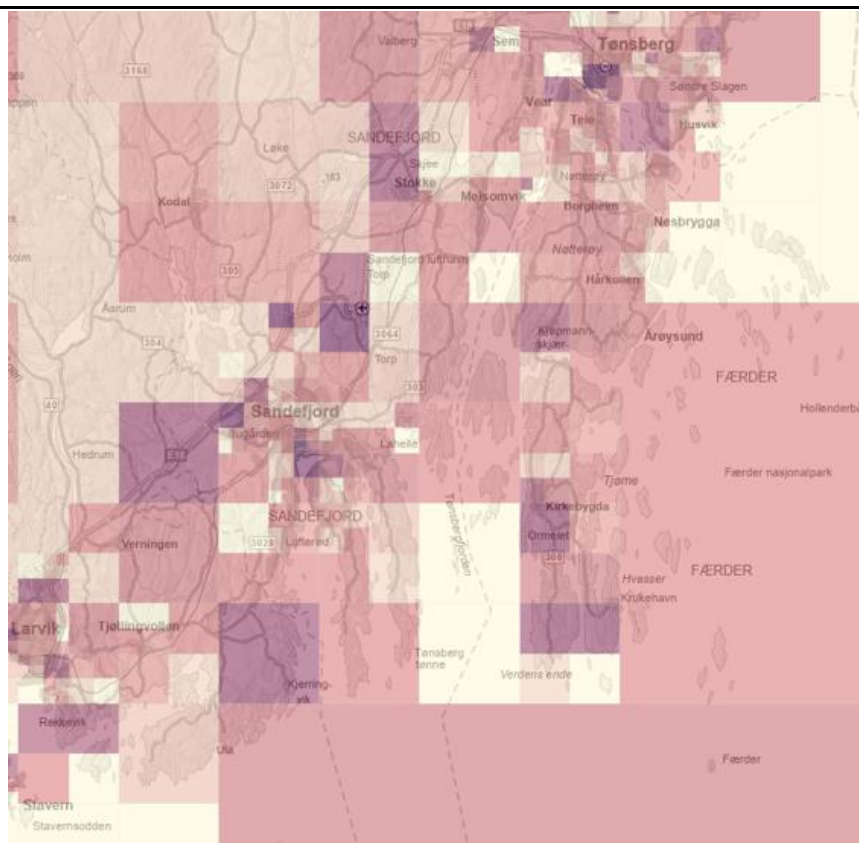
We have looked closer at a popular beach outside of Oslo, the Huk beach. See figure C3.

Figure C3.   The Huk beach as represented by a grid. Visitor statistics

Totalt antall besøkende fra kommuner - topp 20			
Kommune	11.07.22 - 17.07.22	07.11.22 - 13.11.22	09.01.23 - 15.01.23
Oslo (0301)	4 316	3 766	3 729
Nesodden (0216)	705	495	546
Bærum (0219)	162	191	134
Lørenskog (0230)	66	20	10
Skedsmo (0231)	62	11	11
Asker (0220)	55	19	59
Fredrikstad (0106)	27	11	9
Røyken (0627)	27	10	5
Drammen (0602)	26	5	10
Færder (0729)	21	14	7
Rygge (0136)	20	12	6
Rælingen (0228)	19	0	0
Hole (0612)	19	0	0
Fet (0227)	18	5	5
Nittedal (0233)	16	0	6
Lier (0626)	15	5	6
Frogn (0215)	14	19	0
Spydeberg (0123)	13	0	0
Gran (0534)	11	0	0
Risør (0901)	10	0	0
11.09.2023	side 4 av 10	Rapporten er levert av Geodata AS	

In the case of Huk beach, the area is represented by a 1kmx1km grid which also includes some residential buildings, a restaurant and an island dominated by holiday homes. We extracted figures

for three weeks; one in July, one in November and one in January. The week in July has most visitors, as we expected, but perhaps less significantly that we thought. There are some oddities in the statistics, most prominently that Nesodden is the second visitor municipality after Oslo. Nesodden is a municipality in a peninsula to the south with no direct boat-link to the Huk area. This leads us to suspect that the travellers onboard the ferry from Nesodden to Oslo harbour somehow interfere in the statistics.

It proved difficult to find other beaches in the Oslo fjord which were not affected by other activities. It is difficult to calculate directly on visitors to the recreational services without other activity making the figures more uncertain. If one were to proceed with these ready-made statistics, one must for instance do indirect calculations based on the difference in visitors in various seasons or use equivalent indirect approaches.

The starting point of the visitors is also of concern when doing calculations of travel time. We only know the municipality from which the visitors came, and no more detailed geographical area within the municipality. Some municipalities are rather large while others are somewhat smaller, but this leads to a further uncertainty in actual travel time. Based on these experiences we have not gone further concerning the tele statistics and recreational services. We made some test calculations for travel time to Huk from the top 20 visitor municipalities, by both car and public transport.

Although it has proved difficult to utilize the data in the formats given and for the purpose of direct calculation of recreational services, it might be useful in other statistical domains and with access to the actual aggregated statistics and grid geodata. Work on this is in fact in progress at Statistics Sweden (as presented at the Nordic statistical meeting 2022 by Pieter Vlag, Ulf Durnell and Jens Malmros[18]).

Even with access to the actual grid statistics, it would be difficult to use the readymade statistics for recreational areas for the whole country, because of the constraints given by the geography/ aggregation. One would have to try aggregating the statistics for our specific purpose.

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[18] For the presentation, see: https://www.nsm2022.is/s/MOBIL-PHONE-POSITION-DATA-AND-OFFICIAL-STATISTICS.pdf

Appendix C: Evaluation of map layers for the Basemap for recreation

Main category	Delimitation	Use frequency			Quality									Importance		
Map layer (name in Norwegian)	Delimitation-Extension	Number of users (total)	Potential use	Distribution origin	Large, natural areas	Accessibility	Soundscape	Facilitation	Suitability (certain activities)	*Multi use diversity*	Function	Quality of experience Experience richness	Quality of experience - virginity	Symbolic value national/Regional	Symbolic value. Local	Knowledge value
FKB Grønnstruktur (NIBIO)	+											+			+	
Statlig sikra friluftslivsområder (Mdir)			+			+		+								+
Turruter (SK)	+		+			+		+					-			
Skiløyper	+							+	+		+					
MTBmap	+								+		+					
Tilgjengelig strandsone (SSB)	+					+										
Naturvernområder (Mdir)					+		+		+		+		+	+		+
Naturtyper (Mdir) – KU verdi												+			+	
Geologisk arv (NGU)																
Inngrepsfrie naturområder (Mdir)	+				+			+					+	+		
Verdifulle kulturlandskap (Mdir)												+		+		+
Utvalgte kulturlandskap (Mdir)																+
Geologisk arv												+				
Kulturminner (RA)												+				+
Kulturmiljø (RA)												+				
Støysoner (flere kilder, bla. SVV, Bane Nor, Forsvaret)							-									
Rekreasjonsareal/nærturterreng (SSB) /evt SSB-arealbruk	+		+			+										
Kommuneplanens arealdel																
Befolkning (SSB)			+													
Fjellareal på nasjonalt og regionalt nivå.						+										
Hovedøkosystemer	+											+				
AR5 (bonitet, treslag)																
Barnetråkk			+			+		+	+		+					+
Universell utforming						+		+	+		+					
Livsmiljøer												+				
Skogsalder												+			+	
Bonitet																
Treslag																
Hogstflater												-				
Mobilitetsdata	+	+														
Interessepunkt								+				+				
Registrering i database for kommunal forvaltning, drift og vedlikehold (FDV) -																

Appendix D: Response rates and missing values

Table D1.   Response rates and missing values for some selected questions

Question	Topic	Yes	No	Respondents	Share of "Yes" among respondents	Missing values	Response rate
A6	Walk / jog	2221	252	2473	89.8%	47	98.1%
A8	Cycling	818	1645	2463	33.2%	57	97.7%
A10	Fishing	793	1673	2466	32.2%	54	97.9%
A12	Water-based activities	1,569	895	2464	63.7%	56	97.8%
A14	Motorized activities	239	2,224	2463	9.7%	57	97.7%
A16	Hunting	200	2,265	2465	8.1%	55	97.8%
A18	Berry or mushroom picking	1,069	1,389	2458	43.5%	62	97.5%
A20	Picnic or barbecue	1,246	1,213	2459	50.7%	61	97.6%
A22	Relax	1,673	781	2454	68.2%	66	97.4%
A24	Study nature	673	1,776	2449	27.5%	71	97.2%
A28	Other activities	467	1,917	2384	19.6%	136	94.6%
B0	Trip in the last 6 months?	1,726	556	2282	75.6%	238	90.6%
c1a	Overnight stay in nature during the last 12 months?	403	1,903	2306	17.5%	214	91.5%
b25a	Have you been on more than one trip in the last 6 months?	1219	386	1605	76.0%	915	63.7%
A3_ELM_1	I own one or more cabins	690	1,822	2512	27.5%	8	99.7%
A3_ELM_2	I have access to one or more cabins	969	1,543	2512	38.6%	8	99.7%

Source: own elaboration.

Table D2.   Response rates and missing values for some selected questions

Question	Topic	Answer	Missing values	Response rate
A1 (First Q)	How much do you enjoy being in nature?	2520	0	100%
Avslutt (Last Q)	How interesting did you find the questions?	2173	347	86.2%
A33	How many hours per week do you use on outdoor activities?	2413	107	95.8%
A38	To what extent do you feel that your needs for outdoor recreation is met?	2314	206	91.8%

Source: own elaboration.

Appendix E: Survey about outdoor life and recreation in Norway

Statistics Norway, November 2024

The purpose of this survey is to collect information about how much time the population spends outdoors in green and natural areas in Norway. We want to collect information about how often you visit these places, what activities you do there, and what benefits you get from spending time in these places.

A1 How much do you enjoy being outdoors in nature?
- Not at all
- A little
- Neutral
- Quite
- A lot

A2 Which of the following statements best describes your living situation? Select all that apply.
- I have access to a private garden
- I have access to a shared private garden
- I have access to private outdoor areas (e.g., balcony)
- I have access to a shared outdoor area (e.g., backyard)
- I do not have access to a private garden, nor a shared garden, nor an outdoor area

A3 Which of the following statements best describes you? Select all that apply.
- I own one or more holiday homes
- I have access to one or more holiday homes through family/friends
- I have access to one or more community gardens
- I do not have access to any holiday homes

A3_5 Are you a member of any outdoor associations?
- Yes
- No

If A3_5 == Yes, ask A3_6

A3_6 Which of the following outdoor associations are you a member of? Select all that apply.
- Norwegian Hunter and Fisher Association
- Ski Association
- Norwegian Tourist Association
- Norwegian Canoe Association
- Norwegian Climbing Association
- Birdlife Norway
- Norwegian Sailing Association
- Norwegian Mushroom and Edible Wild Plants Association
- Norwegian Scout Association
- Norwegian Marching Association
- Norwegian Kennel Club
- Norwegian Orienteering
- Norwegian Nature Photographers
- Cycling Association
- Forest Society
- Norwegian Naturist Association
- Norwegian Diving Association
- Salmon Fishing Norway
- Other outdoor associations

A3_7 Which other outdoor associations are you a member of?

A4 Do you live at the address registered as your primary residence?
- Yes
- No

A5 Please provide the postal code of the place where you live.

Module A: Outdoor activities

This part of the survey is about outdoor activities in parks and natural areas in Norway where you have not stayed overnight. Very short trips should also be included (e.g., when you go out to exercise, walk the dog, etc.)

ACTIVITIES

A6 Have you jogged or been on a hike in parks or nature areas in the last 12 months?
- Yes
- No

A7 How many times have you been on a walk/jog in parks or natural areas in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A8 Have you been on a bike ride in parks or natural areas in the last 12 months?
- Yes
- No

A9 How many times have you been on a bike ride in parks or natural areas in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A10 Have you been on a fishing trip in the last 12 months?
- Yes
- No

A11 How many times have you been on a fishing trip in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A12 Have you been active in or on water outdoors (e.g., bathing, swimming, kayaking, on a boat trip etc.) in the last 12 months?
- Yes
- No

A13 How many times have you been active in or on water outdoors in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A14 Have you engaged in motorized activities on land in nature (e.g., ATV, motocross, snowmobile, etc.) in the last 12 months?
- Yes
- No

A15 How many times have you engaged in motorized activities on land in nature in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A16 Have you been hunting in the last 12 months?
- Yes
- No

A17 How many times have you been hunting in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A18 Have you been berry or mushroom picking in the last 12 months?
- Yes
- No

A19 How many times have you been berry or mushroom picking in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A20 Have you had any barbecues or picnics in parks or natural areas in the last 12 months?
- Yes
- No

A21 How many times have you had any barbecues or picnics in parks or natural areas in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A22 Have you been in parks or natural areas to relax or recharge your batteries in the last 12 months?
- Yes
- No

A23 How many times have you been in parks or natural areas to relax or take a break in the last 3 months, i.e., from day.month to day.month (dynamic date)?
- None

- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A24 Have you been out in parks or natural areas to study nature, e.g. looking at plant, bird and/or animal life, or photographing during the past 12 months?

- Yes
- No

If A24 == Yes, ask A25

A25 How many times have you been out in parks or natural areas to study nature or photographing in the last 3 months, i.e., from day.month to day.month (dynamic date)?

- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A26 Have you been doing any winter outdoor activity (cross-country skiing, downhill skiing, ski mountaineering, snowboard, snow kiting, ice skating, sledging, etc.) during the past 12 months?

- Yes
- No

If A26 == Yes, ask A27

A27 How many times have you been out in parks or natural areas to study nature or photographing in the last 3 months, i.e., from day.month to day.month (dynamic date)?

- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (about 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A28 Have you engaged in any other activities in parks or natural areas than those asked about during the past 12 months?

- Yes
- No

If A28 == Yes, ask A29

A29 Please specify:

1. _____

2. _____

3. _____

If A29 == Yes, ask A30

A30 [INSERT NAME OF ACTIVITY 1. IN A29] - How many times have you engaged in this activity in parks or natural areas during the past 3 months, i.e. from today.month to today.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (approximately 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

If A29 > one answer, ask A31

A31 [INSERT NAME OF ACTIVITY 2. IN A29] How many times have you engaged in this activity in parks or natural areas during the past 3 months, that is, from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (approximately 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

If A29 > two answers, ask A32

A32 [INSERT NAME OF ACTIVITY 3. IN A29] How many times have you engaged in this activity in parks or natural areas during the past 3 months, that is, from day.month to day.month (dynamic date)?
- None
- 1-2
- 3-4
- 5-9
- 10-19
- 20-29 (approximately 2 times per week)
- 30-49
- Over 50 (more than 5 times per week)

A33 How many hours do you usually spend on outdoor activities per week? Please select one option.
- up to 1 hour per week
- from 1 and up to 2 hours per week
- from 2 and up to 5 hours per week
- from 5 and up to 10 hours per week
- 10 hours or more per week

NATURE AREAS

Now we're going to ask you a few questions about where the activities you've been involved in over the past three months took place.

A35 You have previously answered that you have been doing [INSERT NAME OF RANDOMIZED ACTIVITY 1] in the last 3 months. Where did you last do this activity? Mark the trip destination on the map. If round trip, mark the approximate center point of the trip, or the point furthest away from where you think the trip began.
MAP

A36 You have previously answered that you have been doing [INSERT NAME OF RANDOMIZED ACTIVITY 2] in the last 3 months. Where did you last do this activity? Mark the trip destination on the map. If round trip, mark the approximate center point of the trip, or the point furthest away from where you think the trip began.
MAP

A37 You previously answered that you did [INSERT NAME OF RANDOMIZED ACTIVITY 3] in the last three months. Where did you last do this activity? Mark the trip destination on the map. If round trip, mark the approximate center point of the trip, or the point furthest away from where you think the trip began.
MAP

OTHER QUESTIONS ABOUT RECREATION

A38 To what extent do you feel that your needs for outdoor activities in parks or natural surroundings are met?

- Largely met
- Sufficiently met
- Partially met
- Not met at all
- I do not feel a need to engage with outdoor activities

A39 Would you like to spend more time in nature?

- Yes
- No
- Don't know

If A39 == 1, ask A40

A40 What prevents you from spending more time in nature? Select all answers that apply.
1. Lack of time
2. Family commitments - focusing on children's/others' needs rather than my own
3. I am out of shape
4. I don't have anyone to do the activity with
5. Too tired when I'm off work
6. There are too many people there
7. My health
8. Household/family member's health is too poor
9. I feel unsafe in nature
10. Travelling costs
11. Costs related to equipment
12. Accessibility
13. Lack of suitable natural areas nearby
14. Not interested in outdoor activities
15. Other reasons

If A40 == 12 «Accessibility», ask A41

A41 In what ways is "accessibility" preventing you from spending more time in nature? (Open-ended question)

_____

Module C: Overnight stays

In this module you will be asked some questions about overnight trips where one of the purposes was to be out in nature. Only include overnight stays in Norway.

C1a Have you had an overnight stay in nature during the last 12 months?
- Yes
- No

C1b In the last 12 months, how many nights have you had an overnight stay, where one of the purposes was to spend time in a nature area in Norway?
1. └┴┴┘ Number of nights in your own or borrowed holiday homes or similar
2. └┴┴┘ Number of nights in a rented holiday home or similar
3. └┴┴┘ Number of nights in a hotel or cabin (e.g. DNT)
4. └┴┴┘ Number of nights at campsite or hostel
5. └┴┴┘ Number of nights in nature (tent, RV, boat, or similar)
6. └┴┴┘ Other

C2 Can you break down your overnight stays from the previous question into the different nature areas? if you have visited more than one type of nature during one and the same trip, please state the nature area where you spent the most time.
1- Cropland └┴┘
2- Forest └┴┘
3- Open landscapes (mountain, grass, shrubs, and heather) └┴┘
4- High mountain areas └┴┘
5- Mire and wetlands └┴┘
6- Lakes, rivers, and ponds └┴┘
7- Coastal areas and archipelagos └┴┘
8- Open sea and fjords └┴┘
9- Parks and green areas in cities or towns └┴┘

C3 How many trips abroad have you made in the last 12 months where one of the purposes was to spend time in nature?

└┴┴┘

C4 How many nights (in total) did you stay abroad in connection with this (these) trip(s)?

└┴┴┘

Module B: Questions about your last trip

The questions in this section are about your most recent trip to a natural area in Norway that:

- took place within the last 6 months

- lasted at least one hour, where the main purpose was to go to a nature area

- was not work-related

B0 Have you been on such a trip in the last 6 months?
- Yes
- No

B1 Give the trip a name. For example, it could be 'Skiing in the Mountain area' or 'Paddling in the fjord'. We will use the name you enter for the trip in later questions.

_____

Insert the name of the excursion at the top of the screen and make sure the name is visible at the top of the screen for all questions in the module up to B24.

B2 Indicate on the map where you travelled to. If you visited more than one nature area, please indicate the one where you spent the most time.
MAP

B3 Did this trip start from home?
- Yes
- No

If B3==No, ask B4

> **B4 Where did the trip start from? Enter the postal code, or the nearest town if you do not remember the postal code.**
>
> _____

B5 What means of transport did you use to get there? If you used more than one means of transport, please select the one you travelled the longest distance with.
1. Electric car
2. Hybrid car
3. Petrol or diesel car
4. Motorbike
5. Public transport (train, bus, tram, metro, ferry)
6. Boat
7. Airplane
8. Bicycle, electric bike
9. On foot
10. Other (specify)
11. Don't know
12. Will not say

B6 Which of the following nature types best describes the park or nature area you visited? Please select one option.
1. Cropland
2. Forests
3. Open landscapes (mountains, grass, shrubs, and heather)

4.   High mountain areas
5.   Mire and wetlands
6.   Lakes, rivers, and ponds
7.   Coastal areas and archipelagos
8.   Open sea and fjords
9.   Parks or green areas in cities or towns

B7 How many people did you travel with on this trip?
Number of children (0-17 years): ⌊⊥⊥⌋

Number of adults (18 years and older): ⌊⊥⊥⌋

B8 How long did the trip last? This includes the entire journey, i.e. from when you left your starting destination until you returned. Choose one of the answers.
1.   Less than one hour
2.   Between 1 and 2 hours
3.   Between 2 and 3 hours
4.   Between 3 and 5 hours
5.   Between 5 and 24 hours
6.   Between 1 and 3 days
7.   More than 3 days

B9 What month did you make this trip?

_____

☐   I don't remember

If B8 == 6 or 7, ask B10

B10 Where did you spend the night?
1.   At friends' or family's place (or similar)
2.   In your own or a borrowed holiday home or similar
3.   In a rented holiday home or similar
4.   In a hotel or cabin (e.g. DNT)
5.   At a campsite or hostel
6.   In nature (tent, RV, boat, or similar)
7.   Other types of accommodation

B11 Which of the following outdoor activities did you do during your trip? Select all the answers that apply.
Randomise order besides 'other' and non-response (Don't know/don't want to say).

1.   Walk/jog
2.   Cycling
3.   Fishing
4.   Water-based activities (swimming, bathing, boat trip, canoe, and similar)
5.   Motorised activities on land (ATV, motocross, snowmobile, and similar)
6.   Hunting
7.   Berry or mushroom picking
8.   Relaxing or recharging your batteries
9.   Studying nature (looking at plant, bird and/or animal life, or photographing)
10.   Barbecue / picnic
11.   Winter activities (cross-country skiing, downhill skiing, snowboarding, ski mountaineering, snow kiting, ice skating, sledging and similar)

12.   Other activities
13.   Don't know
14.   Will not say
15.   None

B12 Please specify which activity(ies) you did during your trip.
_____

B13 Of the activities you carried out, which would you say was the main activity?
Show the activities that the respondent ticked in question B11 in addition to a 'Don't know' option, and let them tick an exclusive answer

B14 In the last 6 months, how many trips have you taken to the area you indicated?
└┴┴┘

B15 Did you record one or more outdoor activities in the fitness app Strava during your trip?
- Yes
- No
- Will not say
- Don't know

The next questions are about costs related to your trip. Include money you spent on yourself and others. Include money you spent at any time during your stay. Do not include money spent on fuel. If your trip lasted several days, state the total amount you spent for the entire trip.

B16 How much did you spend on food and drink? Including food and drink purchased in shops, cafés, etc.
└┴┴┴┘ NOK

If B6 == 1, 2, 3, or 4, ask B17

B17 How much did you spend on parking and tolls?
└┴┴┴┘ NOK

If B6 == 1, 2, 3, or 4, ask B18

B18 How much did you spend on vehicle rental? Write "0" if you didn't rent a car.
└┴┴┴┘ NOK

If B6 == 5, ask B19

B19 How much did you spend on tickets for bus/train/ferry etc.?
└┴┴┴┘ NOK

B20 How much did you spend on entrance fees?
└┴┴┴┘ NOK

B21 How much did you spend on accommodation?
└┴┴┴┘ NOK

B22 How much did you spend on equipment rental and fees? E.g. camping equipment, sports equipment, fishing and hunting licences.
└┴┴┴┘ NOK

B23 If you hadn't taken your last trip to the park or nature area you marked on the map, what would you rather have spent your time on? You would have...
1.   Stayed at home
2.   Visited friends or family
3.   Gone to the cinema or the theatre
4.   Gone to a café or restaurant
5.   Visited a museum
6.   Gone to the fitness centre
7.   Taken a trip to another outdoor area
8.   Other activities

If B23 == «Other activities», ask B24

B24 Please specify what you would have done instead.
_____

SECOND TO LAST TRIP

You are getting close to the end of the survey. We conclude with some questions about your second to last trip to a nature area in Norway that:

- took place within the last 6 months

- lasted at least one hour where the main purpose was to go to a nature area

- was not work-related

B25intro Have you been on more than one trip in the last 6 months?
- Yes
- No

B25 Give your second to last trip a name. For example, it could be "Fishing trip in the forest" or "Barbecue on the beach". We will use the name you give for the trip in later questions.

B26 Mark on the map the nature area you visited on your second to last trip. If you visited more than one nature area on your second to last trip, mark the area where you spent the most time.
MAP

B27 Did this trip start from home?
- Yes
- No

If B27==No, ask B28

B28 Where did your trip start? Enter the postal code or the nearest town, if you do not remember the postal code.
_____

B29 What means of transport did you use to get there? If you used more than one means of transport, please select the one you travelled the longest distance with.
1.   Electric car
2.   Hybrid car
3.   Petrol or diesel car

4.   Motorbike
5.   Public transport (train, bus, tram, metro, ferry)
6.   Boat
7.   Airplane
8.   Bicycle, electric bike
9.   On foot
10.   Other (specify)
11.   Don't know
12.   Will not say

B30 Which of the following nature types best describes the park or nature area you visited? Please select one option.
1.   Cropland
2.   Forests
3.   Open landscapes (mountains, grass, shrubs, and heather)
4.   High mountain areas
5.   Mire and wetlands
6.   Lakes, rivers, and ponds
7.   Coastal areas and archipelagos
8.   Sea and fjords
9.   Parks or green areas in cities or towns

B31 How many people did you travel with on this trip?
Number of children (0-17 years): ⌊⌊⌊⌋

Number of adults (18 years and older): ⌊⌊⌊⌋

B32 How long did the trip last? This includes the entire journey, i.e. from the time you left your starting destination until you returned again. Choose one of the answers.
- Less than one hour
- From 1 and up to 2 hours
- From 2 and up to 3 hours
- From 3 and up to 5 hours
- From 5 and up to 24 hours
- From 1 and up to 3 days
- 3 days or more

B33 What month did you make this trip?
_____

☐   Do not remember

If B32 = 6 or 7, ask B34:

B34 Where did you spend the night?
1.   At friends' or family's place (or similar)
2.   In your own or a borrowed holiday home or similar
3.   In a rented holiday home or similar
4.   In a hotel or cabin (e.g. DNT)
5.   At a campsite or hostel
6.   In nature (tent, RV, boat, or similar)
7.   Other types of accommodation

B35 In the last 6 months, how many trips have you taken to the nature area you marked on the map as your second to last trip?
⌊⌊⌊⌋

(Avslutt) How interesting did you find the questions in the survey?
1. Not interesting at all
2. Very little interesting
3. I don't have an opinion about them
4. Quite interesting
5. Very interesting

Thank you very much for answering the survey!