13 Survey questionnaires: data collection for understanding management conditions

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Understanding land management

Landscapes are constantly changing due to physical drivers such as geological processes and climate change as well as anthropogenic actions such as management and land use. These changes affect not only ecosystem services linked to providing, regulating, and supporting service but also cultural ecosystem services (UK National Ecosystem Assessment 2022) such as recreation, ecotourism, and spiritual experiences linked to the aesthetics of landscapes. Cultural services are rarely included in the present monitoring schemes. The existing long-term monitoring of landscapes is highly linked to natural sciences and mainly ecological indicators (Fry et al. 2009; Hansen and Loveland 2012). Yet, the way we perceive and experience the landscape is directly linked to health and well-being and willingness to participate in outdoor recreation. For example, a greater extent of specific habitats increases happiness for many people, and spending time in high-quality natural habitats increases well-being (Sonntag-Öström et al. 2015). Thus, to develop strategies for landscape management and land use policies that account for public perception, it is important to understand the consequences of land use changes (Schirpke et al. 2018). A major reason for the lack of detailed monitoring programmes linking social and natural science data over time is the high costs of gathering such data (Kienast et al. 2015), as well as a lack of researchers willing to cross interdisciplinary boundaries. Whilst funding is also a problem, Schirpke et al. (2021) noted that it is challenging to model aesthetic landscape values over time due to complex interactions between human observers and the landscape. Norton et al. (2012) also highlighted the inherent difficulty of combining different types of data, a lack of appropriate data, and a lack of scientists to broach disciplinary boundaries.

In designing a questionnaire aimed at understanding the consequences of land management strategies, there are many aspects to take into account and many different types of information that could be collected from the people involved in managing or using the land. Land varies widely in use, ownership, geography, and environmental quality. All of these are factors in determining the management objectives of a site and therefore the type of information that might be collected in surveys, which both extract information regarding current management practices and gather requirements from users of the land who might benefit from the way the land is managed.

Land under intensive use is likely to be complex in terms of management. For example, intensively farmed land can have a huge range of factors to investigate and take into account, such as livestock intensity, fertilizer and other inputs, farm staffing, water usage, crop yields, and forage types. Agri-environment schemes on farmland will have a

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direct bearing on how land is managed. Forestry is also a type of land use that needs to be monitored quite carefully in terms of management. Forests may be managed for timber and financial gain (production oriented) or to promote biodiversity and provide ecosystem services (nature oriented), but they also may be used for recreation by the public and managed for conservation objectives. It is also possible that they are neglected when owners have neither the time nor inclination to proactively manage them (see Keskitalo 2017).

Certain types of land may face multiple pressures of use; for example, coastal zones are popular for recreational purposes but also have high conservation value in terms of habitats and biodiversity. Land nearer to urban areas may also face greater pressures for recreational use; for example, the Peak District National Park in Great Britain. Depending on the landowner, and more often their tenants, some land is managed only for financial gain, whereas other land may have a wider range of management objectives, such as increasing amenity or conservation value. Forests can be managed intensively by large-scale private owners as well as commercial owners promoting production or management can be more nature oriented, emphasizing biodiversity and preservation – often by small-scale private forest owners (Forest Research 2022).

It is clear that there are a wide range of issues connected to land management, nearly all with a social dimension, such as upland vegetation burning and grazing, invasive species, rewilding, development, and pollution. In short, there are many drivers for investigating land management, and in designing a questionnaire aimed at people associated with that land, researchers must be clear on what aspect of management they want to investigate and why.

Why do we need surveys?

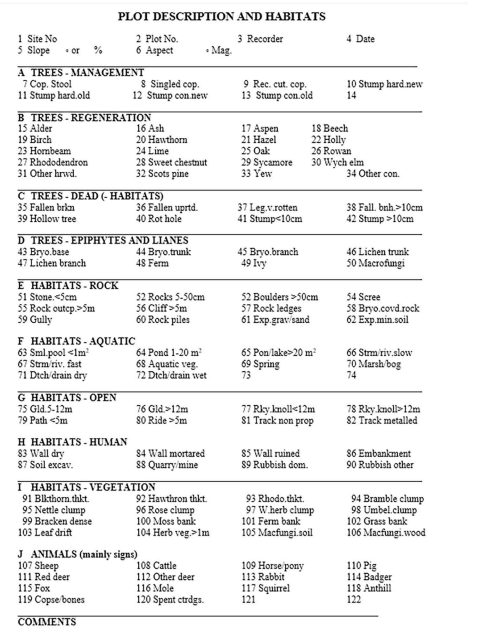
Obtaining information from land managers, landowners, and land users, as well as from policymakers, is important on several levels. Management information adds an additional explanatory variable in understanding data on environmental measurements associated with the land, such as vegetation surveys, soil analyses, water samples, and habitat surveys. This can help identify current and past trends in environmental change. Understanding environmental change, preferably with additional management information, can also help to direct policy for future improvements. A good example of this from Great Britain is the post–World War II loss of hedgerows identified by the Countryside Survey (Barr et al. 1991), which led to new policies of hedgerow creation (The Hedgerows Regulations 1997). Other policies for improving the quality of land might include pollutant controls or schemes to reduce invasive species or habitat loss.

Further, a survey may seek to identify the effect of implemented changes such as agri-environment schemes, as in Wales (Emmett and GMEP Team 2017). It may also help to identify conflicts regarding land use, such as tourism and recreation versus conservation or productivity versus biodiversity in forest management (Nordlund and Westin 2011).

What is a questionnaire survey?

Each land manager will have different objectives in managing his or her land, which will therefore determine the type of information collected in a land management survey. Surveys provide a tool to understand the intentions of land managers and users. In other chapters in this book, field inventories (chapter 5), citizen science (chapter 6), and interviews (chapter 14) have been described. This chapter focuses on questionnaire

(a)



PLOT DESCRIPTION AND HABITATS

1 Site No | 2 Plot No. | 3 Recorder | 4 Date
5 Slope ◦ or % | 6 Aspect ◦ Mag.

A TREES - MANAGEMENT
7 Cop. Stool | 8 Singled cop. | 9 Rec. cut. cop. | 10 Stump hard.new
11 Stump hard.old | 12 Stump con.new | 13 Stump con.old | 14

B TREES - REGENERATION
15 Alder | 16 Ash | 17 Aspen | 18 Beech
19 Birch | 20 Hawthorn | 21 Hazel | 22 Holly
23 Hornbeam | 24 Lime | 25 Oak | 26 Rowan
27 Rhododendron | 28 Sweet chestnut | 29 Sycamore | 30 Wych elm
31 Other hrwd. | 32 Scots pine | 33 Yew | 34 Other con.

C TREES - DEAD (- HABITATS)
35 Fallen brkn | 36 Fallen uprtd. | 37 Leg.v.rotten | 38 Fall. bnh.>10cm
39 Hollow tree | 40 Rot hole | 41 Stump<10cm | 42 Stump >10cm

D TREES - EPIPHYTES AND LIANES
43 Bryo.base | 44 Bryo.trunk | 45 Bryo.branch | 46 Lichen trunk
47 Lichen branch | 48 Ferm | 49 Ivy | 50 Macrofungi

E HABITATS - ROCK
51 Stone.<5cm | 52 Rocks 5-50cm | 53 Boulders >50cm | 54 Scree
55 Rock outcp.>5m | 56 Cliff >5m | 57 Rock ledges | 58 Bryo.covd.rock
59 Gully | 60 Rock piles | 61 Exp.grav/sand | 62 Exp.min.soil

F HABITATS - AQUATIC
63 Sml.pool <1m² | 64 Pond 1-20 m² | 65 Pon/lake>20 m² | 66 Strm/riv.slow
67 Strm/riv. fast | 68 Aquatic veg. | 69 Spring | 70 Marsh/bog
71 Dtch/drain dry | 72 Dtch/drain wet | 73 | 74

G HABITATS - OPEN
75 Gld.5-12m | 76 Gld.>12m | 77 Rky.knoll<12m | 78 Rky.knoll>12m
79 Path <5m | 80 Ride >5m | 81 Track non prop | 82 Track metalled

H HABITATS - HUMAN
83 Wall dry | 84 Wall mortared | 85 Wall ruined | 86 Embankment
87 Soil excav. | 88 Quarry/mine | 89 Rubbish dom. | 90 Rubbish other

I HABITATS - VEGETATION
91 Blkthorn thkt. | 92 Hawthron thkt. | 93 Rhodo.thkt. | 94 Bramble clump
95 Nettle clump | 96 Rose clump | 97 W.herb clump | 98 Umbel.clump
99 Bracken dense | 100 Moss bank | 101 Ferm bank | 102 Grass bank
103 Leaf drift | 104 Herb veg.>1m | 105 Macfungi.soil | 106 Macfungi.wood

J ANIMALS (mainly signs)
107 Sheep | 108 Cattle | 109 Horse/pony | 110 Pig
111 Red deer | 112 Other deer | 113 Rabbit | 114 Badger
115 Fox | 116 Mole | 117 Squirrel | 118 Anthill
119 Copse/bones | 120 Spent ctrdgs. | 121 | 122

COMMENTS

(b)

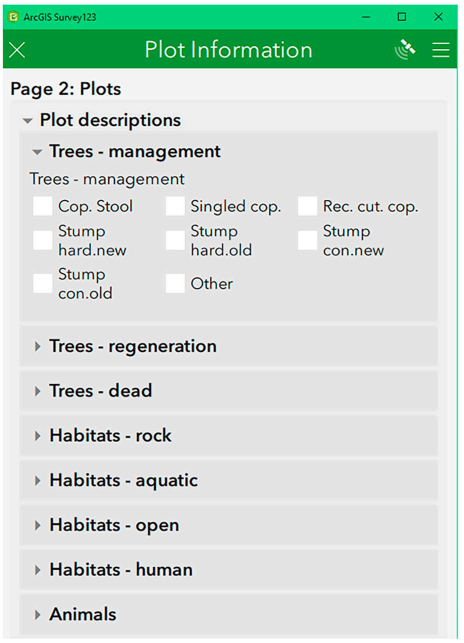


Figure 13.1 Example of a very simple survey capturing woodland management information, from a long-term monitoring programme in Great Britain, the "Bunce" Woodland Survey (Wood et al. 2015). (a) Information was collected on paper form in 1971 but (b) has now progressed to electronic capture.

surveys, which often aim to find patterns of behaviour and attitudes by obtaining a larger set of observations/responses. There are a range of ways in which this information may be collected. For example, simple observations of management may be collected at the same time as other field data as part of long-term monitoring, as in the Bunce Woodland Survey (Wood et al. 2015). This might be collected on paper or via digital mobile applications (see Figures 13.1 and 13.2).

If there is an intention of incorporating the questionnaire survey into a long-term monitoring programme, it may be wise to keep the survey simple to ensure repeatability. This is especially true if the survey is part of a national programme, rather than a small-scale site or regional survey. On the whole, long-term environmental monitoring incorporating social and management information is extremely rare.

How do we define and find the population for a survey?

All of the individuals or entities that share the characteristics that are defined by the study we want to carry out constitute the *population* (see also Appendix 1). The first task is therefore to define the population. This can be fairly uncomplicated in some cases. For example, when investigating how people would vote in an election, the population consists of all eligible voters. However, defining the population is usually not that

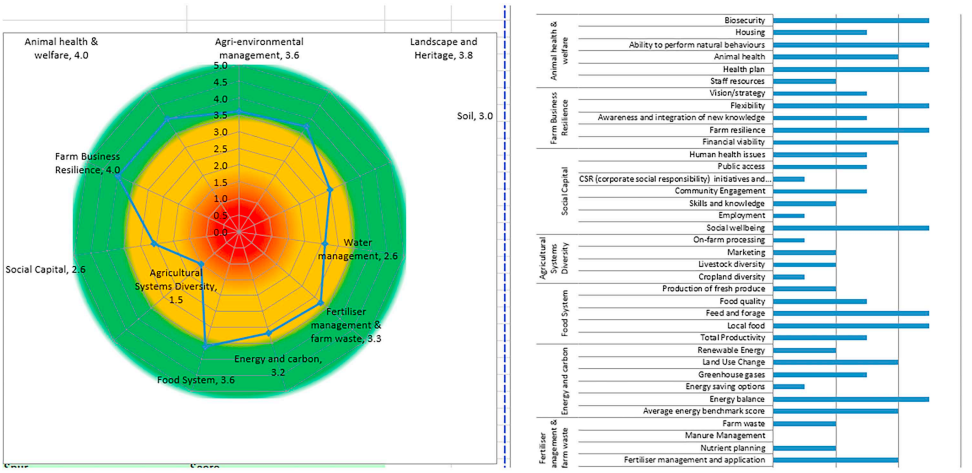


Figure 13.2 Example of a very complex survey designed in Microsoft Excel to capture many aspects of farm management information. Known as a "public goods tool", it incorporates analysis as an instant visual output (right) and was designed by the Organic Research Centre in Great Britain (https://www.organicresearchcentre.com/our-research/research-project-library/public-goods-tool/).

straightforward; for example, when surveying landowners, private owners, companies that own land, and public owners such as cities or states. But what about commons? Is it every single member or the board who makes the decisions on management? What if a holding is co-owned by two or three people – are all part of the population or should only one owner per holding be included in the population? If co-owners are included, sampling might lead to two or more people owning a holding being included, which would then lead to different levels of representation within the population compared to single-owner holdings. When surveying, for example, farmers, we also must define what and who a farmer is. Is it someone who has a business registered for farming or is it also someone who owns farmland and maybe keeps some livestock to provide food for the family? When land is leased to someone who manages it, is the landowner or the tenant part of the population? The answer to questions like these partly lies within the aim of the survey but needs to be considered before starting the sampling.

Surveying a whole population is seldom possible unless our population is limited to, for example, all landowners in a village. *Sampling* is the process of selecting participants who are to represent the population (see chapter 4 and Appendix 1). This can be done as a random sampling, where each member we pick has the same probability of being chosen but there is no limitation as to being representative with respect to, for example, size of holding, owner's education level, etc. If we want to make sure that we have representation of different specific groups that are important for our survey, we use stratified sampling to ensure that we have a proportional or at least a minimum number of participants in every subgroup that is important for the investigation.

A list of all members in the population constitutes the *sampling frame*. How do we find the members of a population? Are there cadastres or registers available? When it comes to landownership, one can assume that all holdings are linked to an owner, but how the

registers are organized differs. They can be national as, for example, in Sweden and Finland or on a regional or federal level as, for example, in Germany. It is not always possible to have information about the sample members; for example, people's addresses are not always knows, the registers or cadastres do immediately record change of ownership, or property identifications are not linked to an exact geographical location. All personal data handling has to follow the *EU General Data Protection Regulation* (GDPR 2016), which in some cases limits access to personal information (see the section "How do we ask questions linked to monitoring?").

Once we have defined the population, established the sampling frame, and decided on the sampling strategy (unless we aim to survey a total population), the respondents have to be approached. The design of the survey is influenced by the method of interaction with the respondents. A complex questionnaire survey – for example, an activity diary on time used for different management activities during a specific period – often needs some instant feedback from the researcher. The diary can have inconsistencies that can be checked while talking to the respondent. In these cases, a physical face-to-face meeting is most effective. It is advantageous to send out the questionnaire in advance, so that the respondents can review the questions. An advantage with face-to-face interviews is the interaction between the respondent and researcher. However, face-to-face questionnaire surveys are time-consuming and thus expensive. Setting up meetings takes time, and because the time needed for meetings is difficult to estimate, the researcher needs good margins between meetings. The respondents can be geographically spread, meaning long travel times between meetings, which adds to time and reduces the number of respondents who can be surveyed. Not all respondents are comfortable with having a stranger coming to their home or workplace, which can result in respondents dropping out. Conversely, face-to-face meetings with respondents can be perceived as threatening for the researcher and often require two persons for the visit. Finally, the data have to be entered into a file, which is time-consuming.

Telephone surveys are more time efficient than face-to-face meeting, and inconsistencies and misunderstandings can be sorted out. It is possible to have follow-up questions, as in face-to-face meetings. Telephone surveys are usually preceded by sending the questionnaire in paper format to the respondent, which enables the respondent to review the questions in advance and refer to the questions on paper during the interview. Telephone surveys have higher response rates and lower item non-response rates (partial non-response) than other survey modes (Lesser et al. 2012). However, most sampling frames and registers lack up-to-date cell phone numbers (which is the most common telephone device these days), meaning that the sampling frame is not always suited for the way we want to reach the respondents and we end up with a bias. As with face-to-face meetings, data have to be entered into a data file afterwards.

Mail-out surveys consist of paper questionnaires distributed by mail. Physical addresses are usually available in registers, which means that most respondents can be reached (unless they have no known address or have not updated their address). The mail-out surveys need to be printed on paper, copied, and sent out, which is costly. The respondents are asked to return the completed survey in a pre-paid envelope, which adds to postage costs. Paper questionnaires soon run into many pages, and the task of filling them out can be perceived as too time-consuming. After two or three weeks, a reminder is sent to respondents who have not answered the survey, which adds to costs and time. Once a completed questionnaire is received, it has to be registered manually to a data file. Missing answers have to be treated as just missing; similarly, multiple answers to a

question when only one answer is valid are regarded as missing. A combination of mail-out and digital questionnaires is increasingly more often applied. The respondent receives a paper survey by mail but can choose to respond digitally, which cuts costs for postage and data entry. In contrast to face-to face and telephone interviews, follow-up questions are not possible, and misunderstandings cannot be sorted out. However, an evaluation by Lesser et al. (2012) showed that the response rate was lower for a combination of digital and mail methods compared to mail only.

Digital surveys are becoming more common, and one advantage is lower costs and less time than face-to-face or telephone interviews and mail-out surveys. The sample can be large without adding extra costs except for the postage for a postcard, and when the respondents answer the survey their answers are automatically registered in a data file. In that respect, they are self-administered (Belisario et al. 2015). Registers often lack e-mail addresses, but this problem can be overcome by sending a postcard to the respondent with a unique code and asking the respondent to log in and access the survey. When designing the survey, attention has to be paid to readability; that is, whether the questions and their alternatives are suitable for a computer screen and a smartphone. A large number of respondents can be reached, but response rates are generally lower compared to mail-out surveys (D.M. Shannon and Bradshaw 2002; Zahl-Thanem et al. 2021). For example, Belisario et al. (2015) found that response rates were between 10% and 20% lower for digital surveys compared to other delivery modes. Although many people have the knowledge and experience to work with digital platforms, some groups are excluded from internet and digital applications due to economic restrictions, age, etc. This leads to the issue of representativity (see the section How do we ask questions linked to monitoring?).

We strive for as high a response rate (number of responses divided by total sample number) as possible (see section How do we ask questions linked to monitoring? for more on validity). At the same time, budgets are generally not unlimited, so the researcher has to balance a number of requirements or characteristics (see Table 13.1).

How do we ask questions linked to monitoring?

Using surveys, we strive for answers to our questions, and the questions must both mirror what we want to know (*validity* – to measure what we want to measure) and be understood by the respondents. Some questions are contextual and assume that the respondent understands and has an experience of the context. When asking, for example, how important it is that a forest be characterized by biodiversity, a straight question is often difficult to formulate – what is a *forest*? Do we mean a forested area of a certain size? What does *biodiversity* mean? The question needs to be divided into more concrete questions that together – via an index, for example – can describe biodiversity (C.E. Shannon and Weaver 1949).

Table 13.1 Characteristics of different survey data collection methods

	Time	*Cost*	*No. of respondents*	*Response rate*	*Data entry*
Face-to-face	High	High	Low	High	Manual
Telephone	High	Medium	Medium	High	Manual
Mail-out survey	Medium	High	Medium	Medium	Manual
Digital/web	Low	Low	High	Low	Automatic

Even the seemingly simple question can be open for misinterpretation. A survey on how many hours per week people spent on computer games showed that some elderly respondents were very active. It turned out that some respondents had misunderstood the question regarding how old they were and answered with their year of birth; that is, some younger respondents who were born in, for example, 1983, answered "83" instead of their actual age at the time of the survey. In this case, this could be controlled by matching with the registers.

Open answers are possible but should be limited. They can be perceived as time-consuming for the respondent, the answers tend to be very short, and each respondent formulates their answers differently and may use words that have different meaning for different people. For example, in a migration survey, in open answers to a question about reason for moving (domestic), some respondents answered that they wanted to move closer to family, and others stated that their parents were getting older. Do these reasons express the same rationale, or do they indicate different aspects of life? In general, questions with fixed alternatives are easier to answer for the respondent, but at the same time the alternatives can be too few, too broad, or understood differently by different respondents. In the end, to design policies etc. we need to ask questions to understand what people think and why they behave in a certain way. Pilot surveys, preferably combined with interviews, are important to test how the questions are understood. Pilot surveys also provide an idea of how time-consuming the survey is for the respondent and can lead to limiting the number of questions.

There is a balance between the number of questions and time a respondent spends answering the questions. The more questions there are, the harder it is to get sufficient numbers of responses. But what is a sufficient number? In general, we need an acceptable response rate; that is, the number of people who responded divided by the number of people in the sample. The higher the response rate, the more likely it is that the respondents are a good representation of the population. Over time, response rates have dropped. Reasons for decreasing rates include survey fatigue, targeting the wrong population, and poorly designed surveys that "make no sense" to the potential respondents. Of course, response rate varies with survey mode and is, in general, highest with face-to-face interviews and lowest for digital/online surveys. *Reliability* – that is, the extent to which the survey or test will give the same result if repeated. Repeatability is likely to increase where the response rate increases provided that the sample is large enough to capture the population. However, when surveying people, we must be aware that their responses are dynamic, because their socioeconomic situation as well as attitudes might have changed, and the context may be different. Another important issue is *validity*; that is, how well we manage to measure what we intend to measure.

The sample size is dependent on the size of the population, the variation in responses, the analysis you want to perform, and the confidence you want to place on your results. The more respondents, the better, but, as stated in chapter 4, a small sample is enough if it is well chosen. Still, there are some rules of thumb: if we have a sample of 30 or more observations, the sampling distribution of the mean can be assumed to be normal (Mordkoff 2016), and a sample of at least 50 respondents is desirable to have statistical significance (Trost 2001). Because we often need to know how different groups of people perceive, for example, land management and how they act, we need questions that distinguish different characteristics among the respondents. Background questions on sociodemographic data, employment, resources, etc., are useful in this respect. To avoid too many questions, we need to decide what sub-groups are of interest for the

study. However, the more sub-groups there are, the more respondents we need. If we are interested in differences between, for example, men and women, young and old, or urban and rural residents, questions on gender, age, and place of residence are important background questions. If we want to combine the sub-groups to understand, for example, how young women in rural areas perceive a forest's qualities, we need a large number of respondents to analyze the data quantitatively, and a rule of thumb is 50 respondents in each sub-group to assume statistical significance. In this example, we have eight sub-groups, we expect a response rate of 30%, and we need 50 respondents in each group, so we need to invite 1328 respondents ($8 \times (50/30 \times 100)$). However, it is not certain that the response rate will be the same in all sub-groups, so to ensure that we will receive at least 50 respondents in each sub-group, it is a good idea to invite a larger number.

The GDPR went into effect May 25, 2018, and states that participants in a survey must give their consent for participating, unless the survey is conducted anonymously and there are no personal data that can identify the respondent. Examples of personal data are e-mail and physical addresses, phone number, registration plate number, or information that enables you to trace a respondent by combining bits of data. GDPR is valid for most surveys. GDPR is applicable if, for example, you have a population frame from which you draw a sample for which you have information on the individuals.

Long-term survey of landscape management – linking survey data to physical monitoring data

As discussed, social factors are rarely included in long-term ecological monitoring schemes. From a social science perspective, *visual beauty*, linked to scenic beauty, aesthetic quality, and visual preferences, is determined by both subjective responses and to some extent objective criteria (Dronova 2017). Subjective views vary depending on one's age, profession, background, cultural heritage, environmental expertise, and other social dimensions (Kaplan 1995; de Val et al. 2006; Dramstad et al. 2006; Gunnarsson et al. 2017).

One could ask whether it is possible to have objective criteria of a landscape. Fry et al. (2009) suggested that there are a number of broad common "evolutionary" landscape properties that seem to be preferred irrespective of culture and personal preferences, meaning that to some extent they are "objective". Here we will provide you with some examples from England (Norton et al. 2012), Sweden (Hedblom et al. 2019), and Switzerland (Schirpke et al. 2021).

Norton et al. (2012) combined interviews with national monitoring data in the British UKCEH Countryside Survey. Their aim was to demonstrate a novel approach for providing measures of cultural services at a national scale in England, creating a map indicating high cultural values. They conducted a telephone survey complemented with a survey of 150 members of the public in 16 focus groups and extended creative sessions, as well as 16 in-depth interviews (see Natural England 2009). A focus group interview involves a small number of demographically similar public participants who have other common experiences. Their reactions to specific evaluator-posed questions are studied. In Norton et al. (2012), participants were from a mix of socioeconomic, gender, and age groups, including people living and working in or using the areas concerned. Participants were asked to identify types of landscape, landscape features, and emotions that they linked to each of eight cultural services (history, place, inspiration, calm, leisure/activities, spiritual, learning, escape). In total 20 landscape features were selected; for example,

waters, coast, mountains, grassland, woodland, hedges, etc. The data from interviews (qualitative data) and data from the monitoring program (spatial areas) were selected in isolation, meaning that, for example, spatial scales were not referred to in interviews. Thus, there was partly a mismatch in study scales and one of the major challenges of the project of how to integrate qualitative data with spatial biophysical data. Linking the datasets was done by experts who subjectively transferred people's perceptions of cultural services (e.g. low-high inspiration of waters). The final product was a map revealing recreational potentials in the whole of England.

Hedblom et al. (2019) used a similar approach as Norton et al. (2012), although they narrowed down the landscape to only include mountain areas. One of the aims was to suggest indicators based on the National Inventories of Landscapes in Sweden (NILS) physical monitoring data and link that to perceived landscape properties. The NILS data are hierarchical and include very detailed data from lichen species ($0.28m^2$) in the field to remote sensing habitat classifications ($1km^2$). The idea was to use a more detailed physical monitoring data than Norton et al. (2012) because they suggested much finer-grained information of the local landscape. The survey questions in Hedblom et al. (2019) were highly linked to the existing monitoring data. Questions about perception were linked to photos taken in the field in the same places where the vegetation was recorded. Thus, the respondents' answers could be directly linked to specific existing landscapes. The 39 respondents in this case were all active in mountain areas (either as company representatives or working for a national agency) participating a conference on the theme linked to "Swedish mountain areas". Interestingly, one of the main findings was echoed from Norton et al. (2012); that is, an open landscape with views was ranked highly. Yet, the main finding was that it was possible to link specific detailed physical data (qualitative, such a birch cover) to perception and appreciation. This method, however, can be complex in long-term studies. For example, a rather low tree cover in the alpine region that is perceived as positive today may be perceived as negative in 100 years when the tree cover has doubled (ongoing trend due to climate change; Pearson et al. 2013), and we would not be able to ascertain whether this negative perception was the result of the tree cover per se or the result of the changes in people's attitudes. Thus, it is important to evaluate not only previous and present questionnaires but also previous and present visual landscapes using photos or physical data. This was done in an innovative way by Schirpke and colleagues in 2021.

The aim for Schirpke et al. (2021) was to analyze changes in aesthetic landscape values for periods between 1950 and 2010 across the European Alps. They did this by combining three former surveys where respondents answered a 5- to 10-minute survey and rated a number ($N = 187$) of 360° photos (in total $N = 2209$ respondents). A mean preference score for each landscape photograph was calculated and linked to 1 of 19 landscape types; for example, urban areas, vineyards, pastures, etc. The landscape types were derived from maps from 1950, 1980, and 2010. They then randomly selected 30,000 viewpoints and evaluated what was potentially seen at different distances from this point (0–60m, 60m–1.5km, 1.5–60km, and 10–50km). The end product was three maps showing how the aesthetic values changed over 60 years (1950–2010) of different management in the European Alps.

In summary, it is possible to combine physical monitoring data with rather short social surveys (short surveys are preferred because people are busy today and longer surveys have lower response rates; *short* means approximately 5–15 minutes) to reveal people's perceptions of rather large areas (England, Swedish forest landscapes and mountains, and the

European Alps). The main obstacles are (1) interpreting respondents' subjective perceptions of physical monitoring data such as cover of trees, cover of shrubs, coniferous versus deciduous forest, etc. and (2) following people's perceptions over time. There are no long-term monitoring programs that link people's perceptions with data collection. Although Schirpke et al. (2021) showed that it is possible to have a present perception of landscape and also look back at historical perceptions, but we cannot know exactly how people perceived the landscape in past times (something both Hedblom et al. (2019) and Schirpke et al. (2021) emphasized). A way forward is thus to have repeated surveys in representative parts of physical surveys, including respondents from different demographic groups. Using photos in combination with questions seems to be the best way to interpret perceptions of physical monitoring data. The more detailed the photos are, the easier it is to link to specific physical data; for example, Schirpke et al. (2016, 2021) used 360° photos but suggested that future studies use so-called tangential visibility analyses where viable pixels are measured according to their size and distance from the observer's point of view.

How do we carry out international surveys, and how do we ask questions?

Sometimes we are interested in land use or attitudes towards land management in several countries. The goal of such international surveys might be to observe the different perceptions or preferences of citizens in different countries over time or to propose European Union (EU)-wide policies based on citizens' attitudes about a particular issue. Such international surveys require very good agreement on the terms used, because their meanings may differ across disciplines, as well as across countries, cultures, and languages. In addition, a very good translation of the questions and often an adaptation to country-specific characteristics is very important. In international surveys, it is advisable to work with national experts who can help with country-specific questions to avoid misunderstandings. Usually, they also take care of the sampling at the national level and evaluation of the responses.

An example is an international survey on private forest owners' willingness to adhere to different management activities in the process of transition to a wood-based bioeconomy in five EU countries: Austria, Finland, Germany, Slovenia, and Sweden (Juutinen et al. 2022; see Table 13.2). The survey was conducted as part of the project ValoFor: Small Forests – Big Players: Valorising small-scale forestry for a bio-based economy, funded by ERA-NET ForestValue and the European Union's Horizon 2020 research and innovation programme (Grant Agreement N° 773324). The survey, with a common structure and questions for the five participating countries, was originally developed in Sweden and then translated from Swedish into English and other languages. In each country, the translated survey was pre-tested to ensure clarity of questions and overall structure and adapted by forestry experts from the participating countries with alternatives for the local language.

The survey included questions on forest owner characteristics (e.g., sex, age, education, years of ownership), the forest holding (e.g., size, management plan, certification), motives for ownership, and perceived utilities (forest values) of the holding. One section included questions on to what degree different management activities were applied and whether changes in these were expected. Some management activities that were assessed aimed to promote a production-oriented management, some activities were purely nature oriented, and some were a mix of both. Not all forest management activities were

Table 13.2 International survey on private forest owners' willingness to adhere to different management activities in the process of transition to a wood-based bioeconomy – the case of five EU countries: Austria, Finland, Germany, Slovenia, and Sweden

Population	*Small-scale private forest owners in Austria, Finland, Germany, Slovenia, and Sweden*				
Type of questions	Direct questions: multiple choice, yes/no Likert scale One selection Open questions				
Collected data	2524 responses				
	Austria	Finland	Germany	Slovenia	Sweden
Sampling design	A web-based questionnaire sent to a market research company's address list. The survey was kept open until the required sample size of a minimum 300 respondents was reached.	A nationwide questionnaire sent by mail to a random sample of 3000 Finnish family forest owners with at least 2 hectares of forestry land	An online questionnaire, using the tool LimeSurvey. The survey was kept open until the required sample size of a minimum 300 respondents was reached.	Printed invitation to the online questionnaire and printed questionnaire sent to a random sample of 2000 forest owners; additional personal interviews until the required sample size of a minimum 300 respondents was reached	Printed questionnaire sent to random sample of 2000 forest owners
Survey distribution	A private market research company	A private market company	The von Thunen institute	Slovenian Forestry Institute	The University of Agriculture in Umeå
Response rate	Not recorded	31.4%	Not recorded	Online questionnaire: 13.3%	31.7%
Number of responses	300	942	307	323	652
% Male respondents	85.9	76.2	89.0	70.6	76.5
Owner's age, mean (years)	50.1	64.1	48.6	53.8	65.1
Years of ownership, mean	21.6	27.1	17.1	17.9	27.9
Size of forest property, mean (hectares)	29.1	55.5	111.6	13.0	92.0

Source: Juutinen et al. (2022).

applicable in all five countries. For example, protection against browsing is not applicable in Finland and Sweden but is important in Austria, Germany, and Slovenia and was therefore part of the country-specific analyses.

Due to different sample sizes and data collection methods, the respondents represent themselves and are not assumed to be representative of all forest owners in the five countries. However, their attitudes and perceptions of forest ownership and forest management provide important insight into the current and possible future behaviours of private forest owners and the possibilities to direct European forests in the direction presented by the New EU Forest Strategy. It also provides an insightful snapshot of the current situation in small private forests.

Conclusion

In conclusion, understanding land management information is an important aspect of understanding drivers of environmental change. In long-term ecological monitoring, linkages between social and natural science are rare due to the costs involved and a lack of willingness amongst researchers to cross interdisciplinary boundaries. In terms of the practicalities of designing land management surveys, there are many aspects to consider. Questionnaire surveys aim to gather information about people – land managers, landowners, land users, policymakers, and politicians – and how they perceive, for example, land management. Their attitudes and behaviours can only be measured by asking questions. Designing a questionnaire requires the researcher to have a clear idea about what is to be examined and who to survey and how. Important steps are therefore to identify a population, a sampling frame, and a method for how to reach the respondents.

Key messages

- We need questionnaire surveys to acquire knowledge of people's preferences, attitudes, behaviours, and reasoning.
- To draw conclusions from surveys, we need correct sampling procedures and well-designed questionnaires.
- We need to acknowledge ethical concerns and follow the GDPR whenever respondents are identifiable.

Study questions

1 How would you define a population of visitors to a forest or a Natura 2000 area?
2 Where could you find the sampling frame for a study on that population?
3 What group differences would you examine, and what would that mean for sampling?

Suggested reading

Krosnick, J.A. and Presser, S. (2018) Question and questionnaire design, in Vannette, D. and Krosnick, J.A. (eds) *The Palgrave Handbook of Survey Research*. London: Palgrave Macmillan, pp. 439–455. doi.org/10.1007/978-3-319-54395-6_53

Krosnick and Presser (2018) highlights how to construct a questionnaire and what type of questions (open versus closed) to include, scales, bias, etc.

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