Forest Research

# Qualitative Longitudinal Methods for Forest Social Science

## Opportunities, feasibility and methods: a review

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# 1 Executive summary

- This review describes qualitative longitudinal research (QL), the different approaches used for QL research in the social sciences, and the benefits and limitations of this methodology. It then comments on the feasibility and benefits of using this methodology to understand the social implications of forest-based interventions.
- The review has two components: first a narrative review of current QL literature with a number of case study examples; and second, a structured review of papers applying a QL methodology in a tree, woodland or forest-based context.
- A total of 13 papers were included in the structured review. The search was undertaken using the following keywords: trees, woods, forests, and "qualitative longitudinal", and the searches were conducted in Scopus.
- The key benefits of QL research are: the temporal aspect and an ability to gain a dynamic, processual view of changes as they are experienced by individuals; increased time spent with each individual and therefore higher volumes of in-depth data on each person; and as a result of this, a more holistic view not just of how changes are experienced but also about the individual participant themselves and any external, contextual factors influencing change processes or attitudes etc.
- The key limitations of QL research are: retention of study participants over time; larger volumes of data and more time-consuming analysis; and additional ethical considerations.
- Recommendations are made in relation to: maximising retention; optimising analysis; co-production of research outputs; drawing on creative methods;

building relationships; making the most of the temporal aspect; and methodological reporting.

- The review demonstrates that QL research bears promise for forestry social science research. In the light of the current rate of environmental changes and human interventions impacting the environment, there is a need to study changes and impacts real-life as they take place. There is also currently a lack of high-quality QL research in the field and the methodology is likely to result in new findings around the more intangible human experience of environmental changes – findings which are difficult to capture with existing qualitative research on the topic.

# 2 Introduction to Qualitative Longitudinal research

> "There do not exist things that are made, but only in the making, not states that remain fixed, but only states in process of change … of becoming"
>
> - Bergson (1948), P.188

Qualitative Longitudinal (QL) research is a small but growing strand of the longitudinal methodology which is used in a wide range of disciplines including the social sciences, medicine, natural sciences and arts and humanities.

As the name suggests, it is the combination of qualitative and longitudinal methods, usually applied to follow individuals, households and other small groups (the participant 'panel') in real time (Neale, 2020). By adopting a temporal methodology, QL research has a unique ability to explore dynamic processes as they unfold in real time. The qualitative aspect allows the researchers to understand these processes in great depth, often approaching them through people's lived experiences, providing "insights into how people narrate, understand and shape their unfolding lives and the evolving world of which they are a part" (Neale, 2020 P.1) These studies therefore investigate the subject, the relevant external processes, and interactions between them.

## 2.1 What is qualitative longitudinal research, and what is it not?

One of the benefits of QL research is its flexible nature, and some researchers resist developing a narrow definition of the methodology (Thompson and McLeod, 2015). Vogl and Zartler, (2021) thus point out that QL does not need to be interview-based, and that the unit of analysis can be organisations and communities as well as individuals. Some authors (Thomson, Plumridge and Holland, 2003; Caruana *et*

*al.*, 2015) take the position that the sample can be different between interactions, when returning to a sample site. Other authors, however, argue that QL research must include data collection with the *same* sample at two or more points in time (Saldaña, 2003; Balmer *et al.*, 2021). In spite of the flexible nature of QL research, the expanding popularity of QL research has led researchers to call for improved clarity around methodologies (Calman, Brunton and Molassiotis, 2013). Below is a description of some of the variations in QL study design.

Some QL studies are run as **repeated, cross-sectional** studies where data collection is repeated, employing mostly or entirely different people for each data collection point and employing a cross-sectional analysis approach. Some consider this longitudinal research in spite of the lack of continuity with the same participants (Caruana *et al.*, 2015). Studies where the same individuals are tracked over time (through two or more data collection points) are termed **'prospective'** studies, and this is considered the 'true' qualitative longitudinal research approach (Neale, 2020). Caruana *et al.*, (2015) suggest that within prospective, or panel studies, there are three types of panels:

- **Cohort panels** consist of a defined population with similar experiences
- **Representative panels** consist of a randomised sample of the study population
- **linked panels** are panels where existing data on an individual which has been collected for other purposes is combined to create individual datasets informing the current study.

Finally, **retrospective** longitudinal research is a term sometimes applied to biographical interviews or other studies examining changes over time through a retrospective lens. These studies are not repeated and therefore do not employ a panel.

While QL research usually refers to purely qualitative studies, some QL studies might adopt a nested, mixed methods qualitative approach with a QL study

incorporating quantitative approaches such as questionnaires to collect additional data. Similarly, some quantitative longitudinal studies will adopt a nested approach with qualitative research embellishing the details of longitudinal quantitative research. Arguably, this is not strictly QL research when the qualitative data collection is not repeated.

## 2.2 Temporal aspect

While it is clear that longitudinal research captures experiences of time and changes from the beginning of the study till the end, some longitudinal studies also adopt a retrospective lens or even expectations for the future (Neale, 2020) as illustrated in 1. The retrospective view can consist of the participants' reflections of their lives, but can also be based on document analysis.

In QL there is also a distinction between intensive and extensive studies (Figure 1). This relates to the duration of the study and the frequency of data collection (i.e. encounters with the study subjects) (Neale, 2020).

**Intensive** studies usually take place over a shorter timeframe with more frequent data collection points.

**Extensive** studies have less frequent data collection points, which can happen at regular or irregular intervals over years or even decades.

Most studies are intensive, or begin as intensive, giving us a detailed processual understanding over a short timeframe. Extensive studies tend to follow a panel of their subjects as their lives unfold.

Different rounds of data collection are usually termed 'waves' in QL research, while others occasionally refer to "data collection points" for shorter term data collection periods. I will be using the term 'waves' throughout this report to avoid confusion.

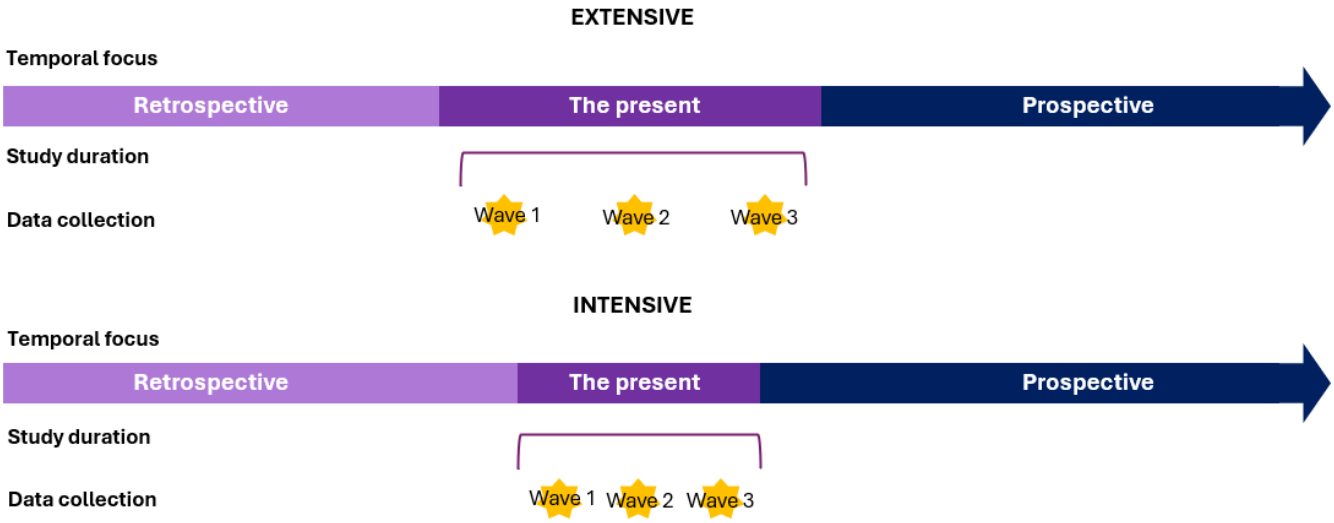


Figure 1. An illustration of the temporal focus of QL research (retrospective, the present, and prospective) and the difference between extensive studies, carried out over a long time period, and intensive studies which cover a shorter time period.

## 2.3 Epistemology

QL research is grounded in an interpretive epistemology. This means that there is not thought to be one version of the truth, but rather that the truth is co-constructed between the researcher and participant. This is the main epistemology of qualitative research, and Brinkmann and Kvale (2014) have provided a good description of this co-construction process in qualitative interviews in particular. Brinkmann and Kvale (2014) argue that during interviews (which they illustrate with an analogy) "There is an alternation between the knowers and the known, between the actors who enact the conversational context of the interview and the context that organises what the actors say" (P.5) highlighting how knowledge is a result of the personal interaction and the conversation that arises through this interaction. In QL research, this co-construction of knowledge between the interviewee and the researcher becomes particularly important, as the interviewee might reflect on their past and present in a different light at different research encounters, and as the researcher discovers emerging discrepancies in accounts of

the same event (Bernardi and Sánchez-Mira, 2021) or encounters new or redefined information which might lead to reinterpretation of previous data (Vogl and Zartler, 2021).

## 2.4 Differences to quantitative longitudinal research

Quantitative longitudinal research is more common than qualitative longitudinal studies and can be very large-scale, such as the Monitor of Engagement with the Natural Environment survey with a panel of 46,000 people surveyed annually (Natural England, 2018). Such studies can chart patterns in societal behavioural changes over time. They employ between hundreds and thousands of participants and data collection takes place at regular intervals at a multi-annual rate. As Neale, (2020) describes it, this "creates a bird's-eye view of the social world, a 'long shot' that is panoramic in scope. The result is an *epic movie*, a highly valuable 'surface' picture of social dynamics. However, it is a movie in which the intricacies of the plot and the fluid twists and turns in the story line are hidden from view" (P.8). QL research tends to instead focus on the individual or the unit of analysis, with a view of historical, geographic, societal and institutional factors. The qualitative approach is based in an interpretive epistemology, and therefore by nature, the QL approach focuses not just on people's behaviours and which factors influence these, but also on people's subjective understandings of the world. In fact, it is not unusual for participants to express one view or opinion at one account, and to subsequently express a different opinion altogether. Changes in human agency and subjective evaluations of life experiences are equally of interest as the objective changes in behaviours. QL is therefore also particularly well placed to answer questions around *why* people make certain decisions and changes.

## 2.5 Analysis

One of the challenges of qualitative research which is amplified in QL research is the extensive amounts of data that is generated from several rounds of repeated data collection, requiring ongoing analysis. In 'true' QL research, each round of data

collection informs the next (Smith, 2010) so the researcher gains a cumulative knowledge-base of the subject. Therefore, rigorous QL research is iterative, and adaptable, responding to the dynamic world it aims to investigate. However, many studies adapt a cross-sectional or thematic analysis approach, analysing the themes within the dataset synchronically (as a snapshot) repeated after each stage of data collection. For the purpose of exploring changes relating to an individual or a group over time, it is recommended to analyse the data case by case with a dynamic view over time (diachronic) as well as across cases and/or themes (Millar, 2007; Thomson, 2007; Dwyer and Patrick, 2021). Retaining a focus on key themes across the sample, without losing the context of the respondent, however, is difficult. Yet, the ability to revisit and reconsider themes from previous waves and explore those in greater details at later waves is a benefit of this approach, enabling the researcher to respond to themes as they appear, and further explore these with the remaining sample (Dwyer and Patrick, 2021).

### 2.5.1 Recurrent cross-sectional analysis

This approach is most suitable for before-and-after studies with just two time points, or where a panel cannot be maintained (Grossoehme and Lipstein, 2016; Winkler *et al.*, 2017). This approach can also be helpful when a large drop-out rate can be expected as interviews from single-encounter participants can still meaningfully be analysed together with the remaining dataset. Grosshoehme & Lipstein (2016) recommend considering the following aspects of the research design before deciding on an analytical approach: research focus; sample considerations; theoretical approach; level of data analysis; and timing of analysis before undertaking analysis on QL data (see Table 1)

Table 1. Comparison of recurrent cross-sectional and trajectory analysis. Table recreated from Grossoehme & Lipstein 2016

| Considerations | Recurrent cross-sectional analysis | Trajectory analysis |
|---|---|---|
| Research focus | Describe the differences between time points | Describe how process or experience changes over time |
| Sample considerations | The cohort at each time point may be the same or different<br>May be preferred if sample is highly transient or has high mortality over study duration | Must maintain same cohort |
| Theoretical approach | Determined by the research question<br>An analytic approach may be used consistently throughout the study | Determined by the research question<br>An analytic approach may be used consistently throughout the study |
| Level of data analysis | Whole sample (or subsamples) | Individual people or individual groups (e.g. families) |
| Timing of analysis | May analyse as each time point is completed | Must wait until data is collected at all time points. |

In recurrent cross-sectional analysis, the topic of investigation is explored temporally across the entire sample as one unit. It is then repeated at a later stage, comparing similarities and differences between those points (Saldaña, 2003; Grossoehme and Lipstein, 2016). In essence, this approach is similar to conventional qualitative research analysis, but is repeated. The analysis can be

completed after each data collection stage and reported as stand-alone studies as well as drawing parallels between subsequent analyses. This analytical approach is less demanding than trajectory approaches (see below) and is more commonly applied to QL studies in certain fields (Grossoehme and Lipstein, 2016).

### 2.5.2 Case-based analysis

Case histories, case reports or narratives are often used to maintain the contextual background of each individual. Case histories are documents in which the key topics and researcher reflections from the interviews relating to a subject are documented to build a full picture of that subject's experiences (see Thomson, 2007). Field notes are made to record information about the respondents such as their living situation. Pen portraits are short summaries which are used to quickly glean who each respondent is and what has been learnt about them so far and can be an excellent tool for reminding oneself of each case before repeat interviews, or to refer back to during thematic analysis.

### 2.5.3 Trajectory analysis

Trajectory analysis is preferable for studies aiming to track the lived experiences of a panel over time (Grossoehme and Lipstein, 2016). This approach is helpful for investigating experiential or process-based changes and their outcomes because it contextualises individual trajectories. For example, in a study on parents' decision-making around treatment in children with chronic conditions, Lipstein and Britto (2015) found that this approach helped illuminate how decisions were rooted in different factors at different points in the patient's journey. The authors conclude that a cross-sectional approach would not have revealed such changes in factors as these happened on an individual rather than sample population level.

It appears that different authors have slightly different approaches and terminologies for this approach. Trajectory analysis generally combines time-ordered displays with sequential matrices. Grossoehme and Lipstein, 2016 outline one approach; once the data is coded, it is reproduced in matrices, starting with a

set of matrices representing the largest unit of analysis (or grouping), with the themes listed in the rows and the time points (research encounter 1, 2 etc.) in the columns. A second set of matrices is then produced where the time is omitted, the themes are listed in the columns and the subjects are listed in the rows. Below are two other examples of framework matrices (named framework grids by the authors; Table 2 and Table 3) from a study on experiences of early fatherhood named Following Young Fathers. As you can see, these advanced analytical approaches require considerably more effort on behalf of the researcher, but help contextualise the research while also easing comparability.

Table 2. Framework matrix for a subject, summarising information against the study themes and points of research interactions. Table reproduced with permission from Bren Neale.

| Theme | Pre-interview | Wave one | Wave two | Wave three |
|---|---|---|---|---|
| Housing | Living with his mum and brother | Lived with partner at her mum's house for a while, now returned to live at his mum's house | Jimmy, his partner and their child are now living between his mum's house and his partner's mum's house | Now lives with a friend from college after a fall out with his mum |
| School employment | In school when became an expectant dad | Had left school and without a job | Temporary job but was sacked. Looking at training schemes | Joined a college course |
| Relationship with co-parent | In relationship with mother at age of 15 | Volatile but still in relationship during pregnancy | Relationship positive: living with partner and child across households | Relationship with partner highly volatile |

Table 3. A framework matrix of data relating to the 'housing' theme against each subject and the research encounters. Table reproduced with permission from Bren Neale.

| Participant | Pre-interview | Wave one | Wave two | Wave three |
|---|---|---|---|---|
| Jimmy | Living with his mum and brother | Lived with partner at her mum's house for a while, now returned to lie at his mum's house | Jimmy, his partner and their child are not living between his mum's house and his partner's mum's house | Now lives with a friend from college after a fall out with his mum |
| Tarrell | Living with his mum (father is deceased) | Still living with mum | Unable to contact participant | Now living with partner and two of his four children at partner's house |
| Jason | Living alone local authority flat, after moving out of foster care | Still living alone | In prison | Unable to contact participant |

### 2.5.4 Timelines and life maps

As with other qualitative interviews, the use of creative and participatory approaches can be valuable (whether repeated or not). Two methods which have particular value due to the longitudinal aspect are timelines and life maps. These can help build a view of the temporality of experiences, but can also hint to the past events and future aspirations that carry weight for an individual. In the example below (Figure 2) from Dwyer and Patrick (2021), one of the very few ambitions of a social welfare benefits recipient was to continue to be able to care for his dogs. In a subsequent interview, this individual revealed how he had to give

his dog up as he became homeless as a result of welfare sanctions. The researcher would have understood the significance of this event to the participant based on the construction of this timeline. The timelines can also be used as discussion and reflection prompts in subsequent interviews.

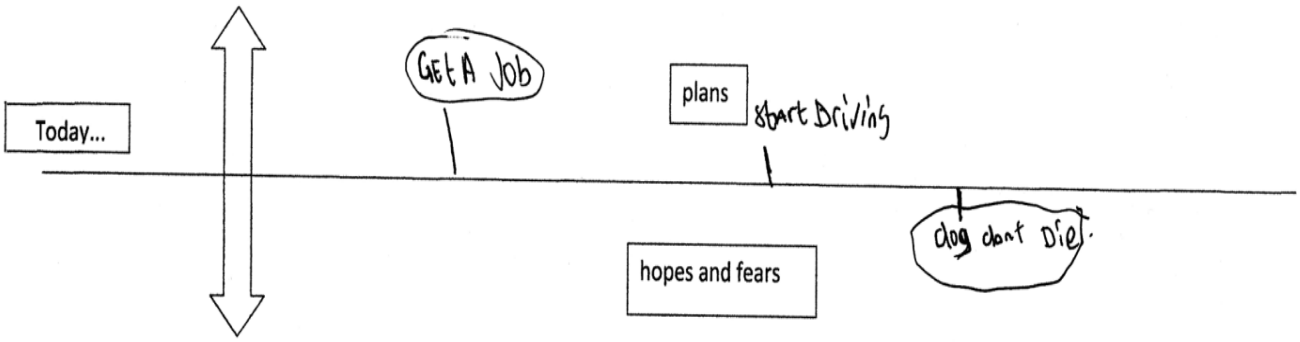


Figure 2. An example of a timeline used in a QL study. From Dwyer and Patrick, 2021

Other prompts can be used to stimulate conversations. For example, Vogl and Zartler, (2021) used network graphs, asking participants to map out important persons in their lives, while Patrick (2017) went one step further and developed a film in collaboration with her participants (see also Dwyer and Patrick, 2021).

### 2.5.5 Sixteen analytical questions

Whatever analysis is chosen, QL researchers will need to be reflexive when considering the analysis approach and the interpretation of the data. One oft-cited book on analysing QL research (Saldaña, 2003) poses sixteen descriptive, interpretive, and framing questions to help QL researchers reflect on their approach. The questions are listed below:

**Descriptive questions**

1. What increases or emerges through time?
2. What is cumulative through time?
3. What kinds of surges or epiphanies occur through time?
4. What decreases or ceases through time?

5. What remains constant or consistent through time?
6. What is idiosyncratic through time?
7. What is missing through time?

**Interpretive questions**

8. Which changes interrelate through time?
9. Which changes through time oppose or harmonize with natural human development or constructed social processes?
10. What are participant or conceptual rhythms (phases, stages, cycles, and so on) through time?
11. What is the through-line of the study?

**Framing questions**

12. What is different from one pond or pool of data through the next?
13. When do changes occur through time?
14. What contextual and intervening conditions appear to influence participant changes through time?
15. What are the dynamics of participant changes through time?
16. What preliminary assertions (propositions, findings, results, conclusions, interpretations and theories) about participant changes can be made as data analysis progresses?

## 2.6 The role of the researcher and ethical concerns

The role of the researcher in QL research is much more involved than in one-off encounters, and therefore brings further questions around the researcher's positioning in relation to their subject and arising ethical issues. The researcher must strike a balance between building trusting relationships which encourage sharing and in-depth reflections by the participants on the one hand, and reducing the risk of participants becoming overdependent on the researcher on the other hand (Dwyer and Patrick, 2021). Meanwhile, this type of research also has the potential to impact on the researcher herself. On reflection of their experiences of

QL research with cancer patients, Calman, Brunton and Molassiotis, (2013) highlight that building a relationship with the participants and hearing about the significant impact of cancer on their lives can be emotionally challenging for the researchers. They also note that the participants may share information which they have not otherwise discussed with anyone else. The authors recommend ensuring that an appropriate support network is in place to support these researchers. They also comment on how to prepare both the researcher and the participant for the end of their engagement in the study. While this is a more extreme example than perhaps relevant for forestry social science, challenges around this more complex researcher-participant relationship arising from repeat interactions have been echoed by others (Patrick, 2012; Neale, 2013; Dwyer and Patrick, 2021), and will be applicable to most studies to some extent. In addition, ethical concerns arise in relation to consent and anonymity as researchers store large volumes of data related to each participating individual (Bernardi and Sánchez-Mira, 2021).

## 2.7 Review aims and objectives

Clearly, QL research has the ability to explore research topics in new ways by adding depth and improved processual understanding. This review aims to investigate the feasibility and benefits of using qualitative longitudinal methods specifically to understand the social implications of forest-based interventions. To address this, we will answer the following research questions:

- What does qualitative longitudinal research look like, and how does it differ from quantitative longitudinal research or from non-longitudinal qualitative research?
- What are current examples of qualitative longitudinal research which can inform the design of studies evaluating the social impacts of woodland creation?

- What are the costs and benefits of undertaking qualitative longitudinal research? Can anything additional be gleaned from this approach compared to other approaches?

# 3 Case studies

Before considering specific examples of tree and forestry related studies, I have chosen a few noteworthy case studies from other sectors to draw on their experiences and lessons learnt. These examples are valuable for reflecting on the implications of adopting QL approaches in forestry research and can be used to draw comparison between 'classical' QL studies and those typically carried out in forestry sciences.

## 3.1 LivedEWelfare and WelCond

In the LivedEWelfare and WelCond studies, Dwyer and Patrick (2021) reflect on two UK-based QL studies investigating welfare conditionality, or policies combining interventions with compulsory engagement to bring welfare benefits recipients into work or encourage other targeted behaviours. In particular, the authors explored outcomes and consequences against policy framings around the increasingly popular approach. The approaches in the two studies differed:

- A study named LivedEWelfare (Patrick, 2017) was a doctoral research project carried out by a single researcher at one research site, with four waves of research (and a fifth planned) since 2011. The study engaged 15 single parents, jobseekers and people living with disability (from an initial sample of 22 in the first wave). By the fourth wave, another three participants had dropped out.
- The second study, WelCond (WelCond, 2018), was a large-scale study which sought to combine depth in findings with breadth of policy scale, employing a team of 18-20 researchers from six universities working across England and Scotland. The researchers conducted 52 semi-structured interviews with policy stakeholders and 27 focus groups with frontline welfare workers. They also employed nine groups of 60 recipients of social security benefits in each (with each group representing different types of social welfare benefits

recipients). 1082 interviews were conducted between 2014 and 2017 with each respondent interviewed up to three times.

QL research strives for depth, and limitations therefore generally relate to the trade-off between depth and breadth of the findings. Dwyer and Patrick (2021) compare these two studies approaching this differently and comment on the costs and benefits of both.

The authors highlight how the LivedEWelfare study, with the smaller sample size, better enabled effective relationship-building between the sole researcher and the participants; "…participants became used to welcoming Ruth Patrick into their houses (and indeed into their lives) and sharing updates on how they were faring with benefit changes and movements into (and often back out of), work" (p.71). This was found to improve trust and ultimately lead to sharing of personal information which had not been revealed in earlier interviews. Another benefit was the scope to engage the participants in creative, participatory research approaches, with collaboration around production of a film.

The WelCond study encountered more challenges in terms of logistics, establishing nine purposively sampled panels across 11 locations, completed by a large team of researchers from across six universities. Researchers were assigned respondents, and the respondents therefore interacted with the same researcher at all data collection events as far as possible. The researchers produced rich case narratives as part of the analysis, which helped explain how behaviour changes took place. The authors also note that this study allowed them to comment on how choices and actions over time were rooted in personal factors such as gender, ethnicity etc. as well as the specific sanctions or support they experienced. Furthermore, it was able to demonstrate how the core components of welfare conditionality led to various outcomes for the participants over time. Overall, the study demonstrated how welfare sanctions led to perverse outcomes (i.e. it rarely led to the transition from

welfare support into employment) and highlighted the causal pathways behind these perverse outcomes.

The authors concluded that QL research has particular strengths for studying people's engagement with policy interventions, and in particular, welfare interventions. The authors mainly used the approach to explore how the participants' lives were changed by changes in welfare policies, noting that the approach allows scope to explore why changes happen and why they may have different consequences for different groups. They also saw value in exploring the ways in which these interventions changed how individuals thought about their past and planned for their future. These findings bear promise for prospective studies focusing on the societal benefits of forest-based interventions.

## 3.2 Pathways to Future

Vogl and Zartler (2021) discuss the trade-offs between flexibility and continuity in data collection waves, drawing on their experiences studying adolescents finishing their lower secondary schools in the Pathways to Future study in Austria. The main objective of this research is to understand how life opportunities arise during early adolescence and related transitions that take place upon completion of mandatory schooling. The study follows a mixed methods approach and is ongoing with the first two rounds of data collection completed with another three yet to come, following a structure of annual interviews over five years. The study follows 48 adolescents between 14 and 17 years old from underprivileged backgrounds in Vienna. The participants were recruited from five schools which were chosen to be as different in their socio-economic composition from one another as possible. The researchers chose an opt-in approach at each wave. The sample reduced from 107 respondents at the initial round to 48 respondents at the second round and down to a further 27 respondents in the third wave.

The issues around retention are discussed in detail in this study. Numerous strategies were employed to increase participation including: a choice of interview

location; a choice of face to face or phone interviews; contact through different channels; incentives; and engagement between research encounters. However, the researchers conclude that this flexibility from the researchers' side did little to increase actual participation, although it did help make the participants feel appreciated. In addition, the study which experienced unusually high researcher turnover by design, did not point to a correlation between whether students were interviewed by the same or different interviewers at the first and second rounds, and their agreement to participate in the third round. In fact, contrary to common belief, the authors highlight how having different interviewers at different stages with different questioning styles can in some cases be beneficial in drawing out new information. However, they caveat this with the need for researchers to increase their preparation by familiarising themselves with the data from previous interviews with the respondent.

The researchers argue that high drop-out rates are more common in studies focusing on vulnerable or hard to reach groups and they note that participants from vulnerable backgrounds and with experiences of failure or unclear plans for their future were more likely to drop out. Meanwhile, respondents who chose to continue in the study cited the 'therapeutic value' of these research encounters as the main reason for ongoing participation, followed by a desire to help with the study.

The authors discussed the use of unstructured, narrative format interview guides versus semi-structured guides, and used a blended approach. They noted however that some interviewees were less comfortable with the unstructured approach in the first interview. In the second round of interviews, the interviewees remembered what to expect and knew better what the researchers were looking for. They therefore went into these interviews more freely with more detailed accounts. On reflection, the researchers wonder whether the interviewees would have benefited from more structure in the first set of interviews.

Finally, the authors conclude by discussing the need for continuity in order to draw comparisons between research events, stating that "Without continuity, change does not become visible" (page 92). At the same time, however, researchers are not always able to predict when significant changes will take place in respondents lives and QL research inherently requires flexibility and adaptability in response to these changes.

## 3.3 Participant retention

Participant retention is one of the key challenges of QL research, and high attrition rates can unfortunately be expected for many QL studies (Saldaña, 2003). This was widely discussed in the case study examples above. Therefore, useful methodological insights by these studies are reviewed here in greater depth.

The ask of participants in QL research is much bigger, and researchers will need to consider how to maintain engagement over the project timespan while being reflective on the ethical implications of this. In the aforementioned LivedEWelfare project, (see Patrick, 2017) the author engaged with participants via telephone, text messages and social media in between interviews to maintain engagement. Similarly, Vogl and Zartler (2021) invited their participants to a tour of the University of Vienna followed by an outdoor picnic. They used this opportunity to update contact details, reflecting that adolescents who tend to change mobile numbers more frequently, and most invitations were successful via phone, SMS or WhatsApp. Other attempts were made through social media, with postal mail invitation used as a last resort. In the WelCond study (see WelCond, 2018), multiple contact details were recorded from the outset including phone numbers, Twitter handles, Facebook profiles, and even details of close friends and family. However, the project experienced a drop-out rate of approximately 30% between each data collection round (although note that the sample is drawn from particularly socially vulnerable groups) (Dwyer and Patrick, 2021). The authors did not mention how retention was encouraged or incentivised. In the Future of

Pathways study, participants were offered a voucher for cinema and popcorn and were also entered in a lottery for two tablet devices (Vogl and Zartler, 2021). Incentives were seen as gestures of appreciation, but the authors conclude that participants engaged for their own reasons unrelated to the incentives.

Related to this, the researcher will need to consider the best location for their research encounters. As previously mentioned, Patrick (2021) would visit some of her respondents in their homes. Adolescents participating in the Pathways for Future study were given a choice of locations and travel was reimbursed. 42 of 48 participants chose to meet at the researchers' university (Vogl and Zartler, 2021)

In summary, as perfectly captured by Vogl and Zartler (2021):

> "QLR treads a narrow path and has to establish and maintain a balance between multiple factors: persevering in recruiting but exerting no pressure; maintaining continuity but being open to change; allowing flexibility but protecting rigour; placing value on closeness but keeping distance in the relationship between researcher/interviewer and respondent; and planning carefully but remaining open to unexpected opportunities" (P.94)

# 4 Methods

The results presented in this report are based on a semi-structured literature review of papers from a tree, woodland or forestry context using qualitative longitudinal methods. A set of criteria for the review papers was initially developed:

- Studies limited to those investigating qualitative longitudinal research with people as the unit of measure (not places or other objects)
- Methodological papers on qualitative longitudinal research
- Studies from a range of disciplines which have implemented a qualitative longitudinal research design to evaluate social impacts of interventions
- Any tree or forestry related qualitative longitudinal papers
- To include mixed methods longitudinal research as long as the qualitative component is longitudinal in addition to the quantitative component.

A search string reflecting the setting (trees, woods and forests) and the methods (qualitative longitudinal) was used to identify relevant papers in Scopus:

(TITLE-ABS-KEY ((tree* OR wood* OR forest* )) AND ALL (( qualitative AND longitudinal))) AND (LIMIT-TO (SUBJAREA , "soci") OR LIMIT-TO (SUBJAREA , "envi") OR LIMIT-TO (SUBJAREA , "agri") OR LIMIT-TO (SUBJAREA , "psyc") OR LIMIT-TO (SUBJAREA , "eart") OR LIMIT-TO (SUBJAREA , "mult"))

There were no restrictions on publication year, language or document type in order to identify as much relevant research as possible. To reduce the number of irrelevant hits, only papers from the following disciplines were included:

- Social sciences
- Environmental sciences
- Agricultural and biological sciences
- Psychology
- Earth and planetary sciences
- Multidisciplinary sciences

The search returned 1073 hits on the 13th of October 2022. The majority of the papers were from the United States followed by the United Kingdom and Australia (Figure 3). There was a similar distribution of papers from the social sciences (20%), environmental sciences (19%) and agricultural and biological sciences (18%), dropping to 7% papers from psychology 6% from medicine and the remainder from other disciplines. There was a rising body of literature since 2007, with over 50 papers published and recorded annually since 2015 (Figure 4).

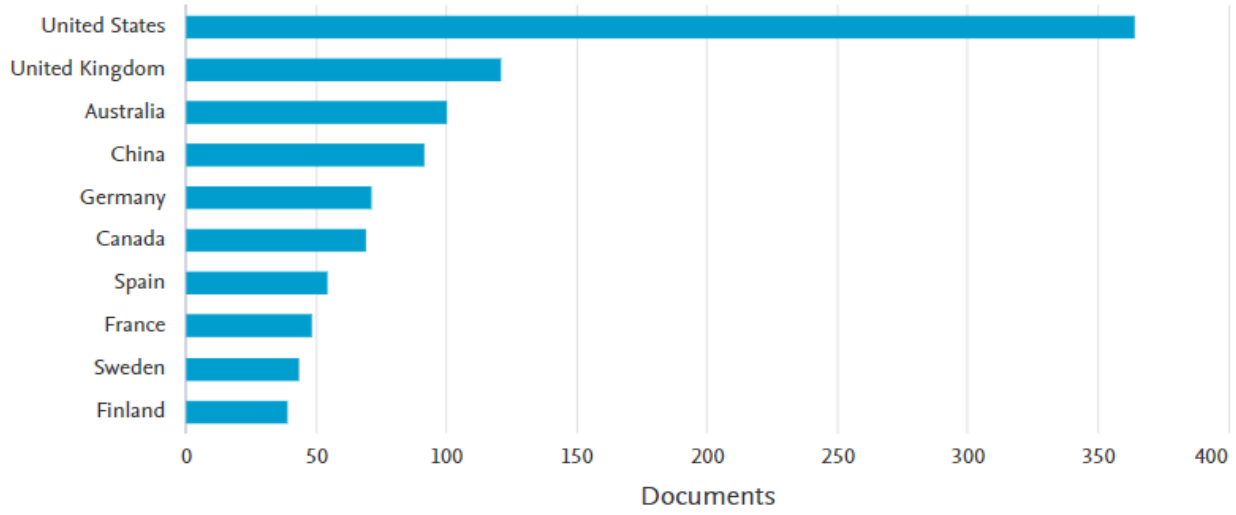


Figure 3. Top 10 countries in which the most relevant studies were published based on the initial Scopus search

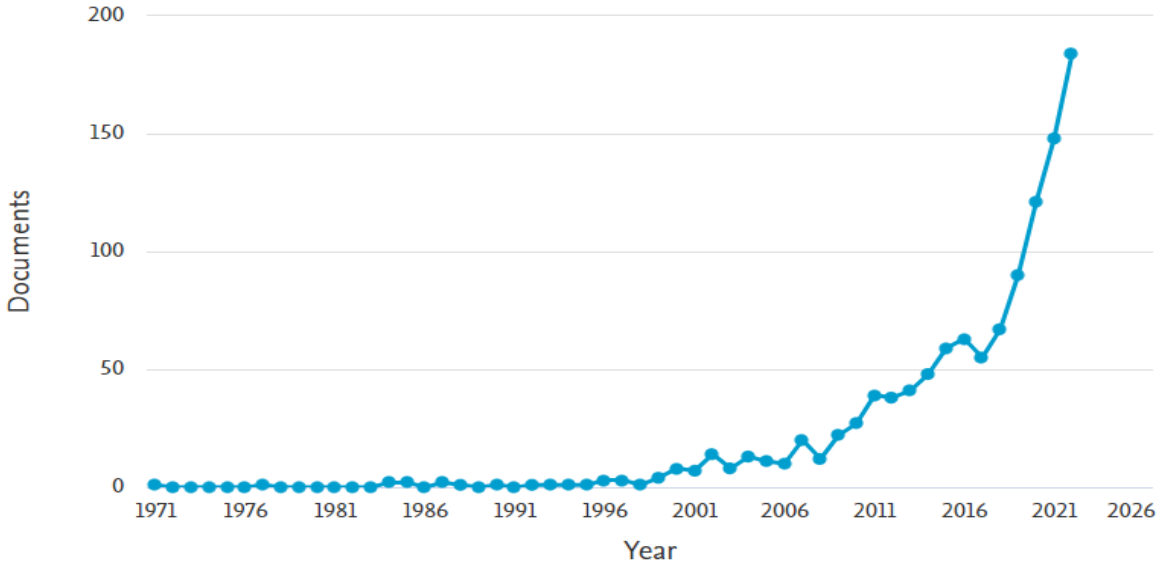


Figure 4. The number of relevant publications per year based on the initial Scopus search

The initial titles, and abstracts if necessary, were screened to identify potentially relevant publications. Only abstracts with some indication that the research had taken place over a period of time rather than at a single data collection event were included. Of the 1073 hits, 37 were considered relevant, or required full text screening to determine their relevance. At this stage, papers that claimed to be longitudinal were included to glean as much as possible about how long-term studies of relevance to forest research are currently conceptualised and conducted. Of the 37 relevant publications, 5 could not be accessed. Upon full-text screening, another 19 publications were excluded. The review process is outlined in Figure 5, and the reasons for exclusion are provided in Figure 6.

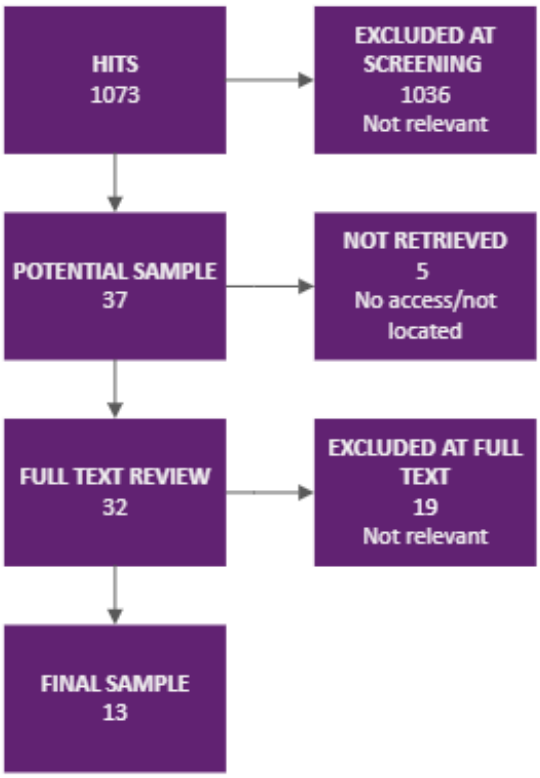


Figure 5. The review paper selection process

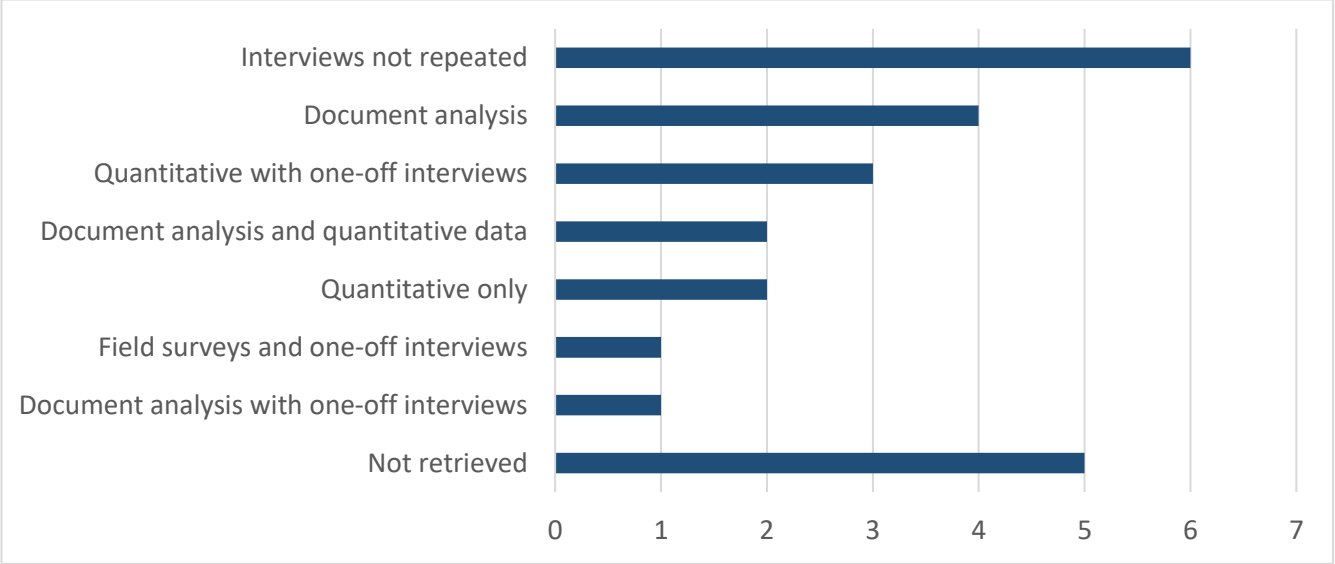


Figure 6. Reasons for exclusion of studies at the full-text review stage

The final sample was imported into NVivo v.12 and read in full. Specific data were extracted and entered into an Excel spreadsheet. The spreadsheet captured information about the papers, their general topics and findings, their methods and the longitudinal aspects of that, their sample and whether they returned to the same people or area, and notes on the feasibility, challenges and benefits of the longitudinal approach. In addition, interesting quotes from the papers, and longer paragraphs of useful text were coded in NVivo using open coding. This provided more context for the analysis of the final sample.

# 5 Results

The final 13 publications can be seen in Table 4 with details summarising the study topics. The publications were published between 2000 and 2022, mostly after 2015 (see Figure 7) and most were undertaken in the Europe and the United States, with three studies undertaken in the global south (including one multinational study investigating sites in Brazil, Cameroon, Indonesia, Peru, Tanzania and Vietnam) (Figure 8). Most studies were undertaken over one to four years. However, one evaluation took place from autumn 2006 to spring 2007 and one ethnographic study drew on 15 years of research (Figure 9).

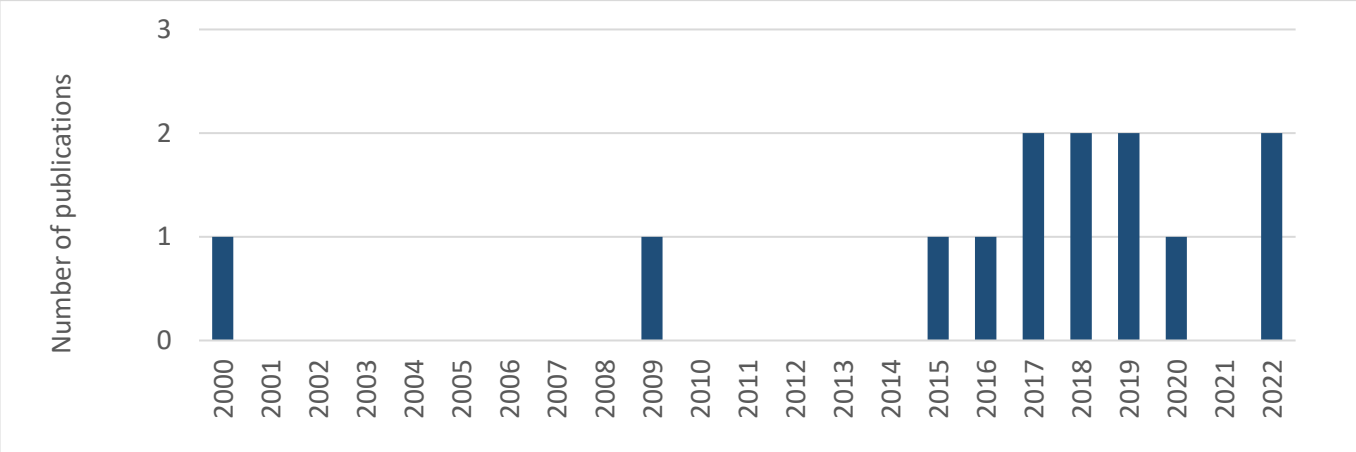


Figure 7. Number of review publications published per year since 2000

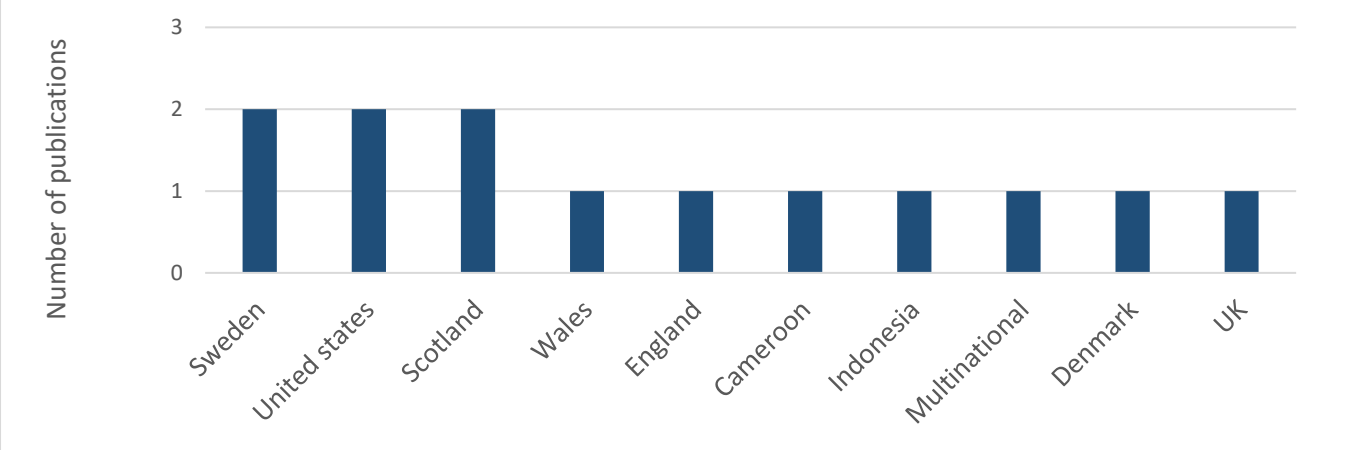


Figure 8. Countries in which the reviewed publication studies were undertaken

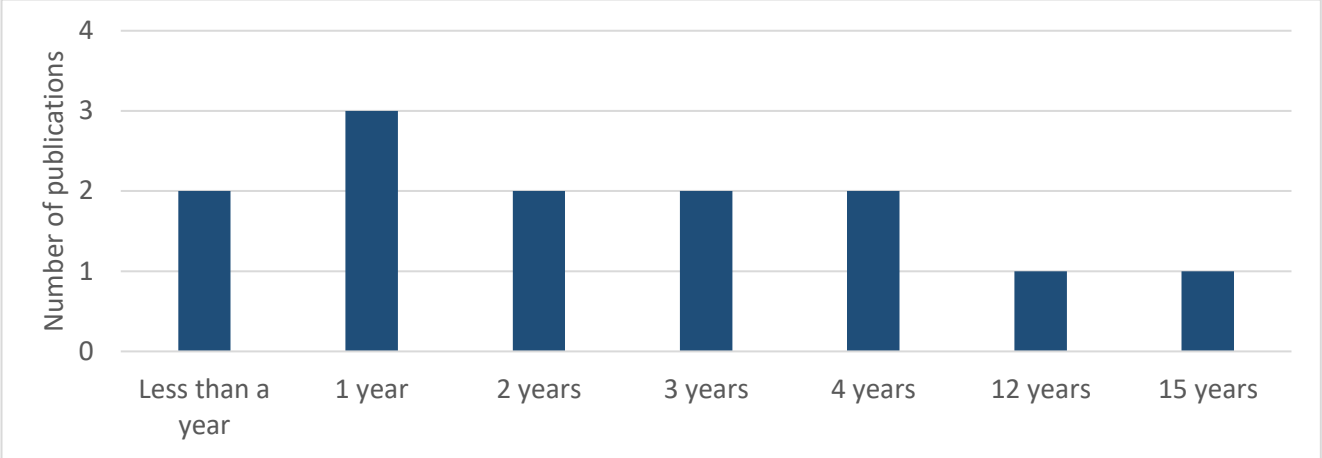


Figure 9. The timespan of reviewed studies

## 5.1 Methods of the reviewed studies

The methods and samples of the reviewed papers have been summarised in Table 5. Four of the reviewed studies were mixed methods studies and nine were purely qualitative (two of which reported on qualitative data only from larger mixed methods studies) (Table 4). Eight qualitative studies all focused on interviews although one study on the governance of a natural resource management committee in Cameroon (Nuesiri, 2022) was ethnographic and also included unstructured key informant interviews, direct observation and document review, another study similarly included archival data analysis and participant observation (Jolly, Grillitsch and Hansen, 2020) and another study drew on informal community meeting notes (Sutherland, 2022). The ninth qualitative study focused on focus group discussions with residents in REDD+ intervention villages and matched control villages which they termed 'focus group interviews', and included a structured and a semi-structured element (Larson *et al.*, 2018). For the mixed methods studies, one study focused on the outcomes of a forest school for disadvantaged children (McCree, Cutting and Sherwin, 2018) and was based on direct observation, focus group discussions and questionnaires. One study on the effects of a forest-based work rehabilitation programme aiming to reduce exhaustion and sick leave (Nordh, Grahn and Währborg, 2009) used participant

observation, diary notes, walking interviews and questionnaires with psychometrics. A study on the positive health and wellbeing outcomes of the Woodland In and Around Towns programme in Scotland used structured household interviews, post-intervention focus groups and environmental audits (Thompson *et al.*, 2019). Finally, one evaluation study on a group-based action-learning programme for small businesses in agriculture and forestry was based on questionnaire results, but with an analysis of open text responses (Owen, 2017).

The minimum number of planned data collection waves was two (Carroll *et al.*, 2000; Larson *et al.*, 2018; Thompson *et al.*, 2019; Vickery, Brenkert-Smith and Qin, 2020), another study conducted three interviews (Shirani *et al.*, 2015) and the remainder have not yet completed all planned rounds of data collection (Langston *et al.*, 2017) or used a combination of methods such as observation, questionnaires and interviews throughout (Nordh, Grahn and Währborg, 2009; McCree, Cutting and Sherwin, 2018; Nuesiri, 2022)

Table 4. Details of the reviewed studies

| Authors | Year | Journal title | Title | Country | Topic | Qual /quant |
|---|---|---|---|---|---|---|
| Carroll M.S., Blatner K.A., Alt F.J., Schuster E.G., Findley A.J. | 2000 | Society and Natural Resources | Adaptation strategies of displaced Idaho woods workers: Results of a longitudinal panel study | Idaho, US | Staff of a large wood working company's experiences of being laid off and what they went on to do following this | Qualitative |
| Jolly S., Grillitsch M., Hansen T. | 2020 | Geoforum | Agency and actors in regional industrial path development. A framework and longitudinal analysis | Sweden | Understanding how different actors exercise agency within industry development from forestry towards a bio-economy | Qualitative |
| Langston J.D., Riggs R.A., Sururi Y., Sunderland T., Munawir M. | 2017 | Land | Estate crops more attractive than community forests in West Kalimantan, Indonesia | Indonesia | Smallholder communities and adoption of oil palm and rubber plantations on forest land. Research on a project adopting a landscape approach to reconciling conservation and development trade-offs in situ | Qualitative |
| Larson A.M., Solis D., Duchelle A.E., Atmadja S., Resosudarmo I.A.P., Dokken T., Komalasari M. | 2018 | World Development | Gender lessons for climate initiatives: A comparative study of REDD+ impacts on subjective wellbeing | Brazil, Cameroon, Indonesia, Peru, Tanzania and Vietnam | Gender issues and subjective wellbeing in REDD+ initiatives | Qualitative |
| McCree M., Cutting R., Sherwin D. | 2018 | Early Child Development and Care | The Hare and the Tortoise go to Forest School: taking the scenic route to academic attainment via emotional wellbeing outdoors | England | Impacts of forest school on disadvantaged children | Mixed methods |
| Nordh H., Grahn P., Währborg P. | 2009 | Urban Forestry and Urban Greening | Meaningful activities in the forest, a way back from exhaustion and long-term sick leave | Sweden | The effectiveness of a forest-based work rehabilitation programme in reducing exhaustion and sick leave | Mixed methods |

| | | | | | | |
|---|---|---|---|---|---|---|
| Nuesiri E.O. | 2022 | Forest Policy and Economics | Good governance of local forest is neither easy nor cheap: Policy learning from Bimbia-Bonadikombo | Cameroon | Examination of governance practices by a natural resource management committee | Qualitative |
| Owen W. | 2017 | Studies in Agricultural Economics | Action learning to enable organisational change in rural businesses | Wales | An evaluation of a programme for group-based action-learning for small businesses in agriculture and forestry | Mixed methods |
| Poulsen D.V., Stigsdotter U.K., Djernis D., Sidenius U. | 2016 | Health Psychology Open | 'Everything just seems much more right in nature': How veterans with post-traumatic stress disorder experience nature-based activities in a forest therapy garden | Denmark | The experiences of veterans with PTSD of nature-based forest therapy activities | Qualitative |
| Shirani F., Butler C., Henwood K., Parkhill K., Pidgeon N. | 2015 | Environmental Politics | 'I'm not a tree hugger, I'm just like you': changing perceptions of sustainable lifestyles | UK | Describe the experiences and efforts of people who choose to live sustainably | Qualitative |
| Sutherland L.-A. | 2022 | Society and Natural Resources | Picturing Gentrification: Co-Producing Affective Landscapes in an Agrarian Locale | Scotland | How gentrified, 'affective landscapes' are co-produced on rural smallholdings by amenity migrants and the existing landscapes | Qualitative |
| Thompson C.W., Elizalde A., Cummins S., Leyland A.H., Botha W., Briggs A., Tilley S., de Oliveira E.S., Roe J., Aspinall P., Mitchell R. | 2019 | Sustainability (Switzerland) | Enhancing health through access to nature: How effective are interventions in woodlands in deprived urban communities? A quasi-experimental study in Scotland, UK | Scotland | Whether an intervention to increase access and exposure to local woodlands in deprived areas led to reduced stress and other health related outcomes. Interventions included physical changes to the woodlands and community engagement activities within the woodlands | Mixed methods |
| Vickery J., Brenkert-Smith H., Qin H. | 2019 | Environmental Sociology | Using conjoint constitution to understand responses to slow-moving environmental change: the case of mountain pine beetle in north-central Colorado | Colorado, US | understanding social responses to tree pest outbreaks over time. Focuses on environmental-social interactions rather than looking at these in isolation. | Qualitative |

Table 5. Methodologies of the reviewed studies

| Authors | Methods | Timespan | Sample | Same people? |
|---|---|---|---|---|
| Carroll M.S., Blatner K.A., Alt F.J., Schuster E.G., Findley A.J. | Interviews | 1 year - The first interviews were conducted roughly 6 to 8 months after the layoff. The second set of interviews was conducted 18 to 20 months after the layoff. | 84 ex-employees, purposively sampled. The study area was divided into three geographic regions, and the panel assembled was constructed to include workers from all three regions. | Yes. Three participants dropped out. |
| Jolly S., Grillitsch M., Hansen T. | Interviews. Also used archival data analysis and participant observation | 2 year interview period | 15 'regional experts' in forest-based bioeconomy inc. researchers and professionals from paper and pulp industry. Only 4 follow-up interviews | The follow-up interviews were with a new set of participants |
| Langston J.D., Riggs R.A., Sururi Y., Sunderland T., Munawir M. | Did a process of participatory modelling followed by interviews (this paper only reports on the first round of interviews). | 4 years, the interview period is 3 years | Local key informants (sample size unspecified). Stakeholders involved in the participatory modelling were representatives of conservation and development organizations, staff of landscape level government agencies, and local people from communities | The plan is to return to the same people |
| Larson A.M., Solis D., Duchelle A.E., Atmadja S., Resosudarmo I.A.P., Dokken T., Komalasari M. | BACI - Before and after control and intervention design with focus group interviews | Before the intervention in 2010-11, and after in 2013-14 | 62 villages and 61 control villages. Focus groups with both mixed gender villagers and with women only. "focus group interviews" with a total of 3920 households interviewed (2118 in intervention villages and 1842 in control villages) in Phase 2. | Same villages but it wasn't stated whether the individuals were the same |
| McCree M., Cutting R., Sherwin D. | Includes interviews with the children (based on drawing and activities etc.), field observations, focus groups with parents and questionnaires with children and parents. Also used Nature connectedness scale and academic performance. | 3 years | 11 disadvantaged children (disadvantaged in multiple ways, i.e. social, behavioural and economic). 5-7 years at entry | Yes |

| | | | | |
|---|---|---|---|---|
| Nordh H., Grahn P., Währborg P. | Participant observation through participation and diary notes, walking interviews, and questionnaires (including: Shirom-Melamed Burnout Questionnaire and Stress and Crisis Inventory, Occupational Self-Assessment form and Self Mastery Scale, The Psychological General Well-Being Questionnaire and The Hospital Anxiety and Depression Scale). Programme personnel were also interviewed once | The course lasted 10 weeks and ran 3 times. The study started in the autumn 2006 and ended in autumn 2007 | 24 participants across three groups. These were on sick leave with depression and anxiety; most had been on the sick list for a long time and suffered from depression and anxiety disorders | Yes although 15 participants dropped out throughout the study |
| Nuesiri E.O. | Longitudinal ethnographic case study: document review, semi-structured interviews, direct observation, and unstructured interviews with key informants. | Field work in 2005-2006 and then 2019-2020. additional data was obtained from fieldwork in Cameroon in 2007-2015. Key informant interviews were in 2019-2020 | 12 key informants recruited from an online discussion group of former Project staff; plus another 4 key informants from former and current officers of the natural resources management Council and 3 research assistants from the forestry department. | The interviews might have been one-off. |
| Owen W. | Survey (Bandura's Self Efficacy scales, Spector's Locus of Control scale, and Oreg's resistance to change scale). The survey also had 3 open ended questions | The project started in 2011 and analysis took place in 2014. The questionnaire was distributed on three occasions. | over 1,000 Agrisgôp (the name of the programme) group members | Not clear. If they are, there is no analysis tracking individual responses. |
| Poulsen D.V., Stigsdotter U.K., Djernis D., Sidenius U. | Interviews | 10 weeks plus a one-year follow up (4 interviews in total with each participants). | 8 Danish veterans with PTSD (Exclusion criteria were psychotic conditions, abuse of alcohol or drugs, personality disorders or suicide risk.) | Yes. Two participants dropped out partway through the programme. |
| Shirani F., Butler C., Henwood K., Parkhill K., Pidgeon N. | Semi-structured interviews. Between interviews, participants were involved in multimodal activities designed to evoke further insights into energy use as part of the life course. | 1 year with three interview points although they aim to investigate the topic throughout the participants' life course | 74 members of the public participated in first-round of interviews, and a subsample of 36 took part in subsequent research | Yes |

| | | | | |
|---|---|---|---|---|
| Sutherland L. | Interviews using photo-elicitation. The participants took photos of their landholdings themselves. The method helped produce deeper and more detailed responses. | Second interview within 6 months. The researchers returned to interviewees previously interviewed for the study and focused mainly on this second wave. | 56 initial participants were re-contacted. about 2/3 agreed to participate but only 19 submitted photos and participated in the second interview wave. The initial sample was made up of around 2/3 of amenity migrants living in the case study area. | Yes |
| Thompson C.W., Elizalde A., Cummins S., Leyland A.H., Botha W., Briggs A., Tilley S., de Oliveira E.S., Roe J., Aspinall P., Mitchell R. | Evaluation based on logic model and using intervention and control locations. Face-to-face structured interviews but also environmental audits by trained auditors and local community members, and focus groups post-intervention. | data collected at baseline (2013) and post-intervention (2014 and 2015). Surveys of residents happened at the same time of year in each of the three waves of the survey, i.e., late April to July, and a minimum of two months post interventions. | 6317 interviews across the 3 waves which includes a nested cohort of 609 people who participated in repeat interviews. Interviewees were randomly sampled local residents in deprived communities within 1.5km of a case study site | Some |
| Vickery J., Brenkert-Smith H., Qin H. | Key informant Interviews and notes from informal community meetings (part of a larger research project which included mail surveys, secondary biophysical and socioeconomic data analysis (e.g. aerial surveys and US census data), and a media analysis of five local and regional newspapers between 2006–2018) | 12 years between first and second data collection waves (almost treated as separate studies) | 54 informants from nine north-central Colorado communities affected by the outbreak. Information on the initial sample is lacking. | 12 participants were the same. Where the same participant couldn't be identified, they interviewed individuals who fill the original participants' positions. |

## 5.2 Costs and benefits of longitudinal approaches

Not all included studies reflected on the longitudinal methodology as well as reporting on their results. The below results are based on reflections made by the authors as well as notes by myself on what these studies do well compared to non-longitudinal studies.

### 5.2.1 Durations, timelines and number of waves

Most of the reviewed studies had a small number of data collection waves (2-3). One study on the adaptation strategies of laid-off loggers in Idaho, US, undertook interviews 6-8 months after the workers had been laid off, and again at 18-20 months later and at this point decided not to continue with the panel study as they felt patterns post-lay-off vocation had stabilised (Carroll *et al.*, 2000). Others, however, noted that their study durations were not sufficient. Larson et al. (2018) conducted an evaluation of the impacts of REDD+ initiatives across six countries on health and wellbeing. They noted that the pre- and post study duration of three years was not fully sufficient for the anticipated outcomes of the interventions to realise. On the contrary, they found that subjective wellbeing had decreased at the second data collection wave, and that this decrease was bigger than the control sites. A potential explanation was thought to be the raised expectations of the residents related to the REDD+ programmes which had not yet come to fruition. Similarly, a study on the outcomes of participation in a group-based action-learning programme for small forestry and agriculture businesses (Owen, 2017) suggested that a fourth questionnaire around two years after participation could have helped shed light on the longer-term outcomes of participation in the project, such as whether participants had developed a long-term business strategy. Finally, Thompson *et al.* (2019) argue that longer term post-intervention follow-up research may be needed for the Woods In and Around Towns intervention evaluation. The Woods In and Around Towns was a programme aiming to increase access and exposure to local woodlands in deprived areas in Scotland, and the intervention

included both physical changes to woodlands and community engagement activities. The authors note that more time might be needed for health benefits to materialise, or for new benefits to reveal themselves, and therefore interpretation of the evaluation results are also limited.

Perhaps the 'purest' example of a QL study among the reviewed studies is that of changing perceptions of sustainable lifestyles from the Energy Biographies Project (Shirani *et al.*, 2015). While only two waves of interviews have taken place, they plan for this to be a lifecourse study. The paper does not just report on changes taking place between the two waves, but takes a retrospective view, building an understanding of how sustainability identities have been built throughout the participants' lifetimes. For example, the following quote from one of the participants identifies a turning point:

> "I was retaking my A-Levels in the 1980s, and I was getting the New Scientist every week. And that was the first beginnings of people talking about climate change seriously and the biodiversity crisis and the threats to the rainforest. And I remember being incandescent with rage reading articles on the way back from the Sixth Form College on the bus and reading these … it was an emotional reaction, it just felt wrong and immoral to be destroying nature. So that's where an environmental thing came from." (Jonathan, 40s, Peterston)

### 5.2.2 Findings revealed by the longitudinal approach

The studies often did not reflect on which additional insights had been gleaned by a longitudinal approach. However, some studies reported changes between the data collection points which had not otherwise been revealed. For example, in the study on laid-off loggers in Idaho (Carroll *et al.*, 2000), the second set of interviews revealed changes in adaptation strategies that the first round didn't reveal. In the first round, nobody had moved out of the area whereas two participants had left in the second round. This adaptation strategy would therefore not have been included

without the follow up interviews. The biggest change, however, was that 13 participants were unemployed at the first interview, but only 6 remained unemployed at the second interview. Many of those participants had since chosen to retrain, which signified a shift for some from the first round of interviews where retraining was seen as unfeasible due to the time and financial restraints associated with this, a desire to maintain in the logging occupation, or a perceived lack of realistic alternatives. This approach therefore enabled an understanding of in-depth attitudes as well as how those attitudes changed over time. Similarly, despite being questionnaire-based, the study on group-based learning for forestry and agricultural businesses was able to demonstrate a shift in mentality of the participants from focusing on their personal gains at the beginning of their participation, to a focus on benefits for the group or for their businesses at later stages (Owen, 2017). They also showed how the participants went through a journey from expressing enthusiasm for learning something new in the beginning, to building an appetite for implementing what they had learnt and finally to improved confidence in their skills at the end. The study thereby highlights interesting processual changes from information and learning to knowledge and capacity as well as the ultimate outcomes. The authors themselves explain that they feel this mixed-methods longitudinal approach helped to unveil 'softer' qualitative outcomes and believe the tool bears promise for future coaching and action learning programmes.

As discussed, one of the risks of non-longitudinal studies is that a snapshot evaluation risks missing changes and impacts that take place at an earlier or later stage, with outcomes of interventions often realising over longer time periods. One study on the benefits of a forest-based work rehabilitation programme for psychological wellbeing (mainly exhaustion and anxiety) showed positive benefits (reduction in illness and improved general functioning) at earlier stages of the programme, but also a decline in quality of life at the end of the programme and at a follow-up (Nordh, Grahn and Währborg, 2009) – a transition which would have

been missed by a one-off evaluation. This decline in quality of life was linked to a lack of post-programme support and insecurities about the future. The authors were also able to capture changes in language and group dynamics through participant observation at the beginning of the project, the participants would discuss their everyday problems, including experiences with the authorities, and feelings of being 'outsiders'. These conversations diminished towards the end when most participants desired a change to focusing on positive things. As the group was very heterogenous with varying abilities, some group members also appeared to become frustrated with those who had different levels of abilities to themselves. These kinds of dynamics were clearly the outcome of the longitudinal investigation even though this study had the shortest time period of the reviewed studies.

A similar programme with Nature-Based Therapy for Danish veterans with PTSD similarly showed a shift over the duration of the programme. In the beginning, veterans enjoying time to themselves (as one part of the programme) chose to spend this time alone in 'safe environments', away from the public. As the project progressed, the participants increasingly chose more open areas or to spend this time together with other participants. The authors suggest that this could be a result of increased mental capacity leading to a reduced need for low-demand, supportive environments as stipulated by the Supportive Environment Theory (Stigsdotter and Grahn, 2002). One-year follow-up interviews also allowed the researchers to see how the programme had led to changes in the participants' personal lives outside of the programme setting. Again, this example was able to demonstrate improved restoration from nature and mental capacity based on their observed changes over the programme duration (Poulsen *et al.*, 2016).

Perhaps the best example of a QL study within this sample is the study based on the Energy Biographies Project in the UK (Shirani *et al.*, 2015). This study analysed the data using case biographies, and is the only paper to report on an analysis approach which specifically corresponds to the longitudinal form of the data. The approach aims to illustrate how narratives emerge, and while the amount of data

generated by QL studies is often referenced as a limitation, the authors point out that this accumulation of data provides an improved understanding of the individual and the changes they undergo (citing Thomson and Holland, 2003). The authors report on two specific individuals in the publication while situating their findings within the context of the wider dataset of 74 participants. This provides a great depth to the chosen examples and their wider societal interactions. In addition, there is one situation where the authors note a change in reflections on early life between interviews, demonstrating how reality is co-constructed in these interviews. It appears that the benefit of the multiple interviews in this study (so far) is the depth of the understanding of the individual's experiences rather than an ability to track them as they change.

### 5.2.3 Resource implications

In general, the studies did not comment on resource implications of the chosen methodology. Sample sizes varied quite a bit with the smallest studies focusing on eight to a dozen individuals, most studies adopting a larger initial sample size above 50 participants and a few studies adopting a more structured interview or survey approach including thousands of respondents (see Table 55). The studies tended not to be very intense, with a few data collection waves and fairly simple data analysis, but a few exceptions stood out.

The biggest study conducted focus groups in 123 villages across six countries with two data collection waves (Larson *et al.*, 2018). This approach trades off depth for breadth and the results are partly based on quantitative results from a more structured part of the focus group discussions, while they were also able to embellish these findings with the less structured elements of the discussions. The evaluation of the Woods In and Around Towns was also a large study with three sets of paired control and implementation sites and a total of 6317 interviews conducted across three waves (Thompson *et al.*, 2019). Here, a trade-off was made based on the recognition that a panel approach would lead to attrition, and the

authors instead opted for a repeated cross-sectional approach with a nested panel of 609 participants participating in more than one interview. Participants from wave one were recontacted for participation unless they had opted out after receiving a post-interview 'thank you' card. The remaining participants were recruited from within the same communities.

As noted in the introduction, one of the limitations of QL research is the large volumes of data generated by these studies. One study on the link between outdoor learning through participation in a forest school three times a week and academic performance in disadvantaged children noted this limitation (McCree, Cutting and Sherwin, 2018). As they highlight the analysis process, they explain how they have come to focus on one theme of several in the publication (self-regulation and resilience through emotional space), thereby not making use of much of the remaining data, at least for this publication. As previously mentioned, another paper similarly focused on a small proportion of their data for their publication, building their narrative around just two participants while embellishing their findings with those of the remaining participants (Shirani *et al.*, 2015).

### 5.2.4 Other limitations and benefits

In the study on health and wellbeing benefits of REDD+ interventions (Larson *et al.*, 2018), the authors noted that unexpected result (decreased subjective wellbeing) could be at least partly related to external country and regional level changes. In the Woods In and Around Towns evaluation (Thompson *et al.*, 2019), benefits in terms of stress reduction, connectedness to nature and social cohesion was identified, but no improvement in overall quality of life was shown. This similarly points to the importance of external factors and the limitations of measuring overall wellbeing benefits. Ultimately, the authors conclude that evidencing the health benefits of greenspace interventions is difficult.

Participant retention was a big concern in the reviewed longitudinal studies, mirroring the findings of the narrative review. Attrition rates were not made clear in

all the studies, and for a few papers it was unclear whether the sample remained the same or whether the authors had originally intended to conduct a longitudinal study, recontacting the original sample. Where attrition rates were reported, there were clear variations in these. Interestingly, differences in attrition rates did not immediately appear to be driven by the duration of the study.

The study on the benefits of a forest-based work rehabilitation programme (Nordh, Grahn and Währborg, 2009) in particular suffered from a big attrition rate. The study started with a cohort of 24 but finished with just eight follow-up interviews (33% of the initial sample) after less than a year. The authors describe in detail how this is likely largely influenced by the data collection methods. The participants were asked to fill in questionnaires with 11 psychometric scales at multiple points (although on reflection the number of psychometric scales was reduced to reduce the burden on the participants). The authors note that this was potentially a burdensome activity for the often mentally exhausted sample, and that the qualitative interactions were received much better by the participants who appreciated the opportunity to share their feelings in these interactions. A study on the co-production of 'affective landscapes' on rural smallholdings between amenity migrants and the existing landscapes similarly had an attrition rate of 66% with 19 participants completing a photo-voice exercise and participating in wave two interviews out of the original sample of 56 migrants interviewed (Sutherland, 2022; see also Sutherland, 2020) within just six months. The author suggests that this is due to the participants being asked to complete the photo-voice exercise prior to the second interview (Sutherland, 2020). One long-term study on social responses to a tree pest outbreak potentially suffered a larger attrition rate with 12 respondents of 54 being recruited from the original sample (22%) 12 years earlier (Vickery, Brenkert-Smith and Qin, 2020). The initial sample size was not made explicit but it was implied to be the same size as the current sample, as original participants who could not be located were replaced by new respondents in the same vocational position as the previous respondent had occupied.

The Energy Biographies Project also had a less significant attrition rate with 74 participants in the first wave reduced to 36 participants in the second wave (a 48% retention rate) conducted just one year later (Shirani *et al.*, 2015). It is unclear whether participants from the first wave will be recontacted during future waves. Meanwhile, the study on Danish veterans in a Nature-Based Therapy programme had 8 participants with just another two dropping out of the programme (rather than the research project) after just over a year (Poulsen *et al.*, 2016). The authors highlighted how the participants were interviewed in a combination of their own preferred locations and a natural environment in which the programme took place.

As well as limitations, one study which otherwise does not reflect much on the benefits of the longitudinal approach, suggests that the approach adds weight to their findings: "Given the longitudinal nature of the study, made alongside the NCDP project and supported by a growing body of evidence, there is every reason to suggest strong core funding and entitlement for all children to access outdoor play and learning." (McCree, Cutting and Sherwin, 2018, page 994).

# 6 Discussion

Following the narrative and structured reviews presented above, I will now outline the review findings in relation to the three review research questions with consideration of the suitability of QL approaches for forestry social science.

## 6.1 What does qualitative longitudinal research look like, and how does it differ from quantitative longitudinal research or from non-longitudinal qualitative research?

Although attempts have been made to define QL research, there is no clear consensus, and these definitions vary. Therefore, any research which repeats data collection with the same or a different group of respondents after any interval of time could in theory be labelled 'longitudinal'. As a result, many studies in the forestry industry which are labelled longitudinal are pre-and post intervention evaluations, sometimes with different samples at each wave, and usually analysed cross-sectionally.

QL research differs from quantitative longitudinal research much in the same way that qualitative research differs from quantitative research: it has much smaller sample sizes, is less generalisable and does not follow a positivist epistemology. However, it provides rich, descriptive data which can provide a fuller picture of an impact, change or system. Whereas quantitative longitudinal research can identify causal relationships between a number of specified factors across a population, QL research can describe specific causal processes and mechanisms and how these are deeply interlinked with other personal or contextual circumstances on an individual level.

The added benefits of QL research compared to other qualitative research are a) the volume and depth of data compiled for each participant, b) more opportunities for combining creative methods, and c) the ability to investigate temporal aspects

of lived experiences. This provides the researcher with a better understanding of how changes take place and what lies behind these changes as well as any responses to them.

## 6.2 What are current examples of qualitative longitudinal research which can inform the design of studies evaluating the social impacts of woodland creation?

The examples given in the narrative review and in the structured review provide a balanced view of both high-quality as well as less intense or in-depth studies. In combination, these examples highlight best practice examples, and challenges and limitations of different configurations of QL research. Some of the recommendations and lessons learnt are discussed here, drawing on relevant examples.

- **Maximising retention:** The Pathways to Future study (Vogl and Zartler, 2021) suggested a range of approaches for maximising retention including a tour of their university campus, cinema tickets and popcorn, and collection of multiple contact details for ongoing contact and recruitment such as through WhatsApp. The publication is an interesting read for anyone considering attrition rates in detail. A number of other studies from the structured review also pointed to the importance of conducting interviews in a setting which is comfortable to the participant (Nordh, Grahn and Währborg, 2009; Poulsen *et al.*, 2016) and the risks of using other methods which might be requiring more of the participants, such as lengthy questionnaires with psychometrics (Nordh, Grahn and Währborg, 2009) or asking participants to prepare content between interviews (Sutherland, 2020). Although high attrition rates were unfortunately common for most of the discussed and reviewed studies, this can be somewhat mitigated by adjusting the initial sample size accordingly and drawing on the various recommendations made throughout this review. Ultimately, smaller sample sizes are generally required for QL studies.

- **Optimising analysis:** The case-based and trajectory analysis approaches to data analysis outlined in the introduction should be considered for future forestry social science QL research. These approaches allow the researcher to move beyond static analysis of data from two separate time points, to instead gaining a deeper temporal and processual understanding of each research individual as well as cross-cutting research themes. Encountering changed or even contradictory attitudes between interviews is common in QL research and should be embraced as part of a constructivist approach to an evolving and ongoing analysis process. The Following Young Fathers study is an excellent example of how these approaches have led to a deeper understanding of the varied experiences of early fatherhood, with excellent examples of changes to relationships, circumstances, attitudes and aspirations over time.
- **Co-production of research outputs:** For the LivedEWelfare study, Patrick (2017) co-produced a short film with their study participants which was felt to provide an output in return to the participants for their time and contributions. Such creative approaches to co-producing outputs can be used in future forestry social science research to produce interesting outputs and encourage retention.
- **Drawing on creative methods:** One benefit of repeat interviews with the same individual is the scope to draw on numerous methods under the overarching methodology. A few of the reviewed studies included creative components such as the production of timelines (Dwyer and Patrick, 2021), the use of drawings (McCree, Cutting and Sherwin, 2018), and photo-elicitation (Sutherland, 2022). However, among the majority of the studies, this presented a missed opportunity and I recommend the incorporation of more creative approaches in future forestry QL research given their ability to elicit deeper, more elaborate responses (see for example Brailas, 2020;

Dumangane, 2022). However, the researcher must carefully consider whether this increases the ask of the participant.

- **Building relationships:** Much thought should be given to the establishment and building of positive relationships between the researcher and the participant. This aspect of QL research in particular carriers ethical considerations, but is essential to producing high-quality data and maintaining engagement with participants. While this is a commonly discussed topic among QL practitioners (Calman, Brunton and Molassiotis, 2013; Neale, 2013; Dwyer and Patrick, 2021) the forestry-specific QL studies did not tend to reflect (or report) on this aspect of their research.
- **Making the most of the temporal aspect:** Researchers have a novel opportunity in QL to expand the timeline of their research, not just by examining changes between research encounters, but also by adopting a retrospective lens of the participant's life (Shirani *et al.,* 2015; see also Riley, 2016) and/or exploring expectations and aspirations for the future (e.g. the timeline example by Dwyer and Patrick, 2021). Due to the extended amount of time spent together by the researcher and interviewee, this offers a unique opportunity to delve into these temporal lenses.
- **Methodological reporting:** Finally, some of the studies included in the structured review did not report on essential information including timings of research waves, methods of recontacting/retaining participants, whether subsequent participants were the same across waves, methods of analysis etc. In addition, some studies included data from just one wave rather than drawing back to data from previous waves. Finally, many studies did not reflect on the benefits of the longitudinal approach. There were therefore plenty of missed opportunities for learning and for drawing out interesting dynamic, temporal findings. It is therefore important that future QL studies at FR report fully on their methodologies and reflect on the benefits and limitations of the approach.

## 6.3 What are the costs and benefits of undertaking qualitative longitudinal research? Can anything additional be gleaned from this approach compared to other approaches?

To realise the benefits of QL research to their full potential, there is a need for more intense, 'true' QL research in forestry social science. The review identified a small number of studies using QL research based on our inclusion/exclusion criteria (n=13). Few of those studies had more than 2-3 data collection waves, engaged the same panel throughout and drew on QL specific methods of analysis. Much can therefore still be learnt about how people engage with trees, woods and forests by carefully crafting high-quality QL studies.

While the crafting of high-quality QL studies is necessary to realise the added benefits of QL research, such studies are also more resource intensive. The need to interview each respondent on several occasions and the time-consuming case-based and trajectory analysis approaches will lead to trade-offs such as the sample size.

Human relationships with nature are complex and difficult to measure. Much research is therefore dedicated to understanding how people experience and value nature, how nature makes us feel about ourselves and contributes to our physical and mental health, and how we make decisions on how we impact nature. For example, 'Societal benefits from trees, woods and forests' is one of the seven key research themes in the Science and Innovation Strategy for Forestry in Great Britain 2021-2026 (Forestry Commission, 2020). Qualitative research has helped elucidate the more intangible aspects of these lived experiences. Recently, more creative approaches have become popular to help advance this research and further tap into the less visible aspects of human-nature relationships. QL research can go one step further by combining different creative methods and building a relationship with the researcher who can get to know the research participant as a

person (Dwyer and Patrick, 2021). Adding these layers to current qualitative forestry social science is surely the best way of uncovering novel findings about these much-studied topics.

In addition, human-nature relationships are not static. Instead, they are interlinked with rapid environmental changes augmenting our experiences of nature as well as human interventions further driving environmental changes. QL research is particularly well placed to investigate such dynamic processes of human-environmental changes and interventions.

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