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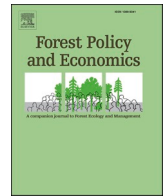


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Communication campaigns to engage (non-traditional) forest owners: A European perspective

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ABSTRACT

In Europe, private forest owners play an important role in achieving sustainability goals, such as those set by the European Green Deal. Efficient communication and coordination with these actors is therefore central. However, ongoing structural changes in forest ownership have in many cases silenced traditional communication channels, especially those involving owners of small forests. Their economic performance is often negligible at an individual level, yet collectively their forests play a pivotal role in a context of increasing demand for wood products. In this article, we analyse and compare forest campaigns in nine European countries. Specifically, we assess one-way and two-way communication models applying different techniques to engage (non-traditional) forest owners. Our analysis of 34 campaigns shows that (i) one-way communication models are still more widely used in the forest sector to engage non-traditional forest owners than two-way communication models; (ii) one-way communication aims at informing and is effective for short-term awareness raising, while two-way communication aims at persuading and is essential to trigger forest management activities over the long-term, (iii) interactive learning tools can play a crucial role for reaching and engaging (non-traditional) forest owners. We further conclude that campaigns could be improved by having 1) joint campaigns with public and private actors, 2) convincing narratives developed based on a good understanding of forest owners' motivations, 3) adapting the timing of campaigns to windows of opportunities and 4) developing intermediary associations (e.g. non-traditional forest owner associations) as connectors and trust builders between different actors as they play a crucial role in providing information to forest owners and supporting their engagement.

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1. Introduction

In the European Green Deal, the European Commission asserts that the “EU’s forested area needs to improve, both in quality and quantity, for the EU to reach climate neutrality and a healthy environment (European Commission, 2019, p. 13). This focus on forests gives rise to new opportunities, but also highlights an increased responsibility for European forest owners. The number of privately owned forests is increasing in Europe, foremost due to restitution processes in most Eastern and South Eastern European countries, community buyouts in Western Europe (e.g. United Kingdom), and afforestation of agricultural land (Keskitalo et al., 2017; Weiss et al., 2017; Lawrence, 2020; Lidestav et al., 2020). However, these prospects are met by an increasing political concern over unmanaged or abandoned forested land, especially over privately owned small forests (Stern et al., 2010; Weiss et al., 2017). Concerns related to unmanaged and underutilized private forested lands refer to shortages of wood supply for forest-based industries, the fear of growing risks in unmanaged forests (e.g. fire or pests), as well as the necessity to address climate change issues (Schraml, 2018).

An important trend within private forest ownership is an increasing urbanisation of lifestyles and disconnection to agriculture. Consequently, forest owners may have different motivations and goals for their ownership, and may lack skills and capacities for forest management (Lidestav et al., 2020; Weiss et al., 2019b). These forest owners are mostly small-scale, labelled as non-traditional, urban, silent, passive or absentee owners (hereafter named as “non-traditional” in this article). The implication is that these types of owners are often not engaged in active forest management, and hence they do not engage with policy measures that promote harvesting or creating forest reserves for biodiversity and carbon sequestration. Such inaction poses challenges for policymakers and other stakeholders (e.g. forest associations and the forest industry) as inaction puts the provision of ecosystem services at risk (Duncker et al., 2017). In this context, communication campaigns to activate contact and to engage forest owners in active forest management play a crucial role to address the new and unfamiliar challenges forest owners have to cope with, such as adaptation to a changing climate with the associated risks (forest fires, storm, pest outbreaks), and forestry safety issues.

Policymakers and other stakeholders (e.g. forest associations and the forest industry) experience difficulties in reaching forest owners through traditional communication channels within the forestry sector to motivate them to engage with policy measures related to forest management. This includes, but is not limited to, the difficulty to reach the growing share of non-traditional owners. In addition, as changes in lifestyle and values occur within society, it is necessary to refine current communication tools and channels to reach forest owners of all kinds. In particular, digitalisation is an important trend that is changing communication (Feil et al., 2018). In this context, Koller and Gaggermeier (2018) show that there is a shift from traditional and linear one-way communication styles (e.g. printed campaigns) to digital, integrative and participatory two-way communication styles (e.g. virtual forest videos, diverse information on social media) with forest owners.

Based on Rice and Atkin (2013), we understand communication campaigns as strategies for producing effects on the knowledge, attitudes and behaviour of the target audience (in our case forest owners). Concretely, we define communication campaigns as a “purposeful attempt to inform, persuade, or motivate behavior changes in a relatively well-defined and large audience, generally, for non-commercial benefits to the individuals and/or society at large and typically within a given time period, by means of organized communication activities involving mass and online/interactive media, and often complemented by interpersonal support” (Rice and Atkin, 2013, p. 526–527).

The literature indicates that contemporary communication campaigns attain a modest rather than a strong impact (Snyder and LaCroix, 2003). This is partially due to meagre dissemination budgets, unsophisticated application of theory and models, as well as lack of support

from other policy tools (e.g. capacity building or subsidies). It is also due to the difficulty of promoting complex or difficult behaviour change, targeting resistant audience segments, or coping with limited resources. Recent studies on forest-related communication deal with communication strategies of forest owners’ associations to influence society and decision-makers (Fabra-Crespo and Rojas-Briales, 2013), and the effect of tailor-made communication campaigns targeting forest owners for adapting to climate change (Vulturius et al., 2019), as well as wood mobilisation campaigns.

Building on this literature, the aim of the study is to analyse how communication campaigns have been developed and implemented to engage small-scale nontraditional forest owners in active forest management. We do this by analyzing forest sector campaigns across nine European countries. Our analysis is structured based on a conceptual model of communication with the following main component: *sender, message, medium or channel, receiver, and impact or effect* (Atkin and Rice, 2013). We are guided by the following three research questions: How have the selected campaigns been designed? To what extent are these campaigns one-way or two-way communication models? Are both models mutually exclusive or can they be partly connected? Based on our assessment, we identify key elements for communication campaigns to reach non-traditional forest owners and to engage them in active forest management. Recommendations are provided for practitioners and policy makers on how to develop campaigns to more effectively target and influence non-traditional forest owners.

2. Conceptual framework

Communication is defined as the transmission of information, ideas, attitudes, or emotions from one person or group to another or others (Van Ruler, 2004). However, communication strategies may differ greatly in objectives and conceptualization. In their seminal paper on public relations, Grunig and Hunt (1984) identified four models of communication. The first model is the press agent/publicity model. In this basic one-way communication model, accuracy is not important and organizations do not seek audience feedback or conduct audience analysis. The objective is simply to inundate the audience with information. Second is the public information model, which disseminates relatively objective and accurate information, checked and edited by media professionals to influence the target audience. However, the sender does not use formal research to guide communication tactics. The third model is the two-way asymmetrical model. It is considered as a more “scientifically persuasive” way of communicating with the target audience. Here, content creators conduct research to better understand the audience’s attitudes, which in turn informs the message strategy and creation. However, the model is asymmetrical as it often benefits the organization more than the target audience. Fourth is the two-way symmetrical model. The term “symmetrical” reflects the attempt to create a reciprocal situation. In this model, practitioners serve as mediators between the organization and the target audience, rather than as persuaders. They act as negotiators who use communication to manage conflicts and to ensure that all involved parties benefit, not just the organization. This two-way symmetrical model is deemed the most ethical model. Although the one-way and the two-way models greatly differ in their strategic background and ethical statements, Grunig and Hunt (1984) considered that both types of models may be complementary, in particular if a feedback loop is added to the one-way communication model.

To analyse the communication processes that aim to engage forest owners in forest management, we design a twofold conceptual framework. We combine the one-way model to describe how the first contact between the target audience can be established, and the two-way model (Grunig, 2013 and Rice and Atkin, 2013) to analyse the interactions between partners of the campaign (Fig. 1). The first part of our mixed model is based on the one-way communication model and conceptualizes messages as flowing from senders to receivers (Lähtinen et al.,

2017). Despite its simplicity, this one-way model can be useful to map the flow of information through systems, or to think of messages as containers of meaning or of communication as an intentional act performed to achieve an anticipated effect (Craig, 1999). Related papers in the field of forestry campaigns and communication discuss the social marketing approach (Butler et al., 2007) where communication is based on an accurate segmentation of the audience to more efficiently reach the right target audience through specific channels. Even though the one-way communication model has been further advanced over time in the field of public communication campaigns (Atkin and Rice, 2013), it still consists of the five same components: the sender (a communicator), the content of the message, the channel of communication (the medium), the receiver of the message (the audience), and the impact of communication (the effect).

2.1. Component 1 – Sender

The sender is often an organization such as the ministry in charge of forestry, private forest owners’ associations, forest advisory services, and forest industry organizations who employ dedicated communication departments. It can also be an alliance of these actors where all elements of the campaign will be negotiated according to the interests of each financing participants. In seeking to influence behaviour, senders may decide to promote positive behaviour (e.g. to manage the land) or to prevent problematic behaviour (e.g. to conserve trees infested by bark beetle or prevent forest fires).

2.2. Component 2 – Message

A message is a signal - such as information, knowledge, or an attitude - transmitted by a sender to a receiver. The message may convey technical, formal, or scientifically validated knowledge. Successful communication between the sender and the receiver also involves characteristics of making sense of messages (Schoeneborn and Tittin, 2013). Those who specialize in producing information must actively anticipate the receiver’s ability to interpret it. This approach requires using information about receivers in designing information products and pretesting them under client conditions (Röling and Engel, 1990). In the forestry sector, typologies can help to design accurate messages targeting specific groups (Ficko et al., 2019). Based on the sender strategies two types of messages can be differentiated: *Informational* messages seek to create awareness or provide instruction, while *persuasive* messages emphasize reasons why the audience should adopt the advocated action or avoid the proscribed behaviour (Atkin and Rice, 2013).

2.3. Component 3 – Channel of communication/medium

To interact communicatively, a medium is needed. Burkart (1995) distinguishes between three types of media. Primary media formed by human contacts include verbal and non-verbal aspects (e.g. body-language, facial expressions). Secondary media need a device on the production side (e.g. brochures, newspapers, or letters). Tertiary media need a device on both the production side as well as on the reception side

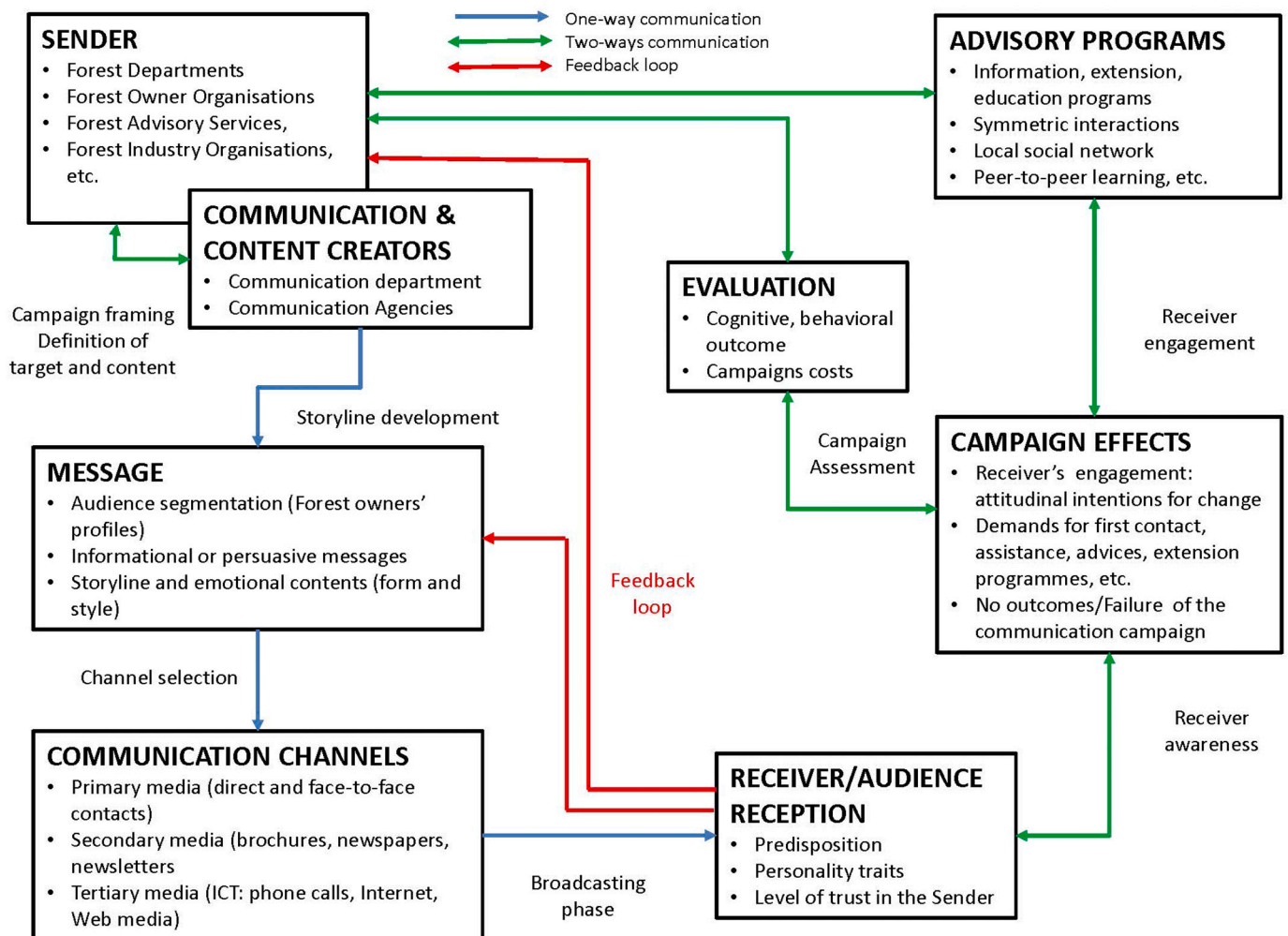


Fig. 1. Conceptual framework. Source: own representation (adapted from Grunig, 2013; Rice and Atkin, 2013)

(e.g. telephone, radio, TV, online). New digital information technologies have offered additional dimensions of communication through interactivity, tailoring, and narrowcasting (Atkin and Rice, 2013). However, the real impact and appropriation of internet tools as communication instruments seems to be ambivalent. Khanal et al. (2020) showed that forest owners' preferred medium for receiving forestry information varied with their membership status, with members of forest owners' associations (FOA) preferred information such as workshop and classes; while non-members preferred distance or non-personal means of communications. Håggqvist et al. (2014) argue that forest owners, especially non-traditional owners, have relatively few information sources. On the contrary, for traditional forest owners, the most common ways of learning are from their parents, from attending forestry events, newspapers and television (Butler et al., 2007).

2.4. Component 4 – Receiver of the message/the target audience

Identifying specific segments of the overall population in terms of demographic characteristics, predispositions, personality traits, and social contexts is of strategic importance (Atkin and Rice, 2013). It improves message efficiency through prioritizing subsets of the audience according to their centrality in attaining the campaign's objectives. It also increases the effectiveness of a message's content, form, style, and channels to the attributes and abilities of subgroups. In the forestry sector, audience segmentation through typologies allows to more accurately grasp forest owners' expectations, be they monetary or non-monetary motivations (Hujala et al., 2013; Mostegl et al., 2019). The identification of motivational categories of forest owners is an important first step but typology building alone is not a sufficient base for targeting recommendations for practice (Van Herzele and Van Gossum, 2008; Ficko et al., 2019) as some groups still have fuzzy traits, in particular the less active ones.

2.5. Component 5 - Effects (of the communication action) and their evaluation

To assess the effectiveness of the campaign and fine-tune future campaigns, periodic evaluations need to be conducted. Research findings suggest that campaigns have a moderate to strong influence on cognitive outcomes, less influence on attitudinal outcomes, and still less influence on behavioural outcomes (Snyder and LaCroix, 2003). The impacts of a campaign will depend on diverse and strategic factors such as the total volume of topics addressed in the messages, the amount of repetition, the prominence of placement, the scheduling of message presentation, the temporal length of the campaign, and the receivers' socio-economic characteristics (Rice and Atkin, 2013).

Even if a message has been properly designed and adjusted to a specific target audience, the acceptance of the message by the target groups will depend on the credibility of the responsible protagonists (e.g. forest authority, forest owners associations or forest industry). Trust is a prerequisite if the target audience is to engage in a dialogue or change their attitude and/or behaviour. In addition, transparency of information and of the underlying rationale behind the campaign is important to reinforce mutual trust (Eriksson, 2017). This mutual trust, the co-construction of advisory programmes and the final mutual benefits for the organization and the public is a key element of the two-way communication model once a stable and long-term relationship is planned by the protagonists.

For many scholars (Hamunen et al., 2015) innovations, information and knowledge cannot be transferred only according to the traditional sender-channel-receiver model of communication from expert to layman, but rather require a social network or negotiation model of communication and horizontal knowledge exchange. As meanings arise out of the interaction of the individual with others (Pregernig, 2002), the relevance and meaning of a message often needs to be discussed between peers before being adopted. This also implies that the design of one-way

and two-way communication campaigns cannot be totally separated. In a broader view and over time, one-way communications (e.g. single campaigns) may become part of a two-way communication. The role of social networks in communication has often been emphasized in the forestry context, as they operate as creative learning environments allowing participation of different levels (Hamunen et al., 2015). Further, forest owner associations are also a key source to provide information and to support engagement (Khanal et al., 2020). While the outcomes of this two-way communication model may be greater over the long term, it also requires more financial and human resources than the one-way model. As one-way and two-way communication models co-exist in the forestry sector, each of them with their own objectives (information/persuasion), time span (short/long term), public target (mass, specific profiles) and are part of a wider communication process, we combined both approaches. For our analysis, we use a mixed model, based on the one-way model with a feedback loop added to represent a simple two-way model, which comes close to an asymmetrical communication situation and which is typical for many campaigns in practice.

3. Material and methods

We chose a case study approach due to the complexity of the forestry sector, where the context affects the case in a real-world situation with many uncontrollable variables (Yin, 2014). As the case study approach enables analytic generalization rather than statistical, the sampling is theoretical (Eisenhardt and Graebner, 2007), where the case is selected because it can illuminate a specific phenomenon, in our case, on the transmission of information from one person or group to non-traditional forest owners. We have thus selected case studies of one-way or two-way communication models applying different techniques and investigate how campaigns have been designed and used to motivate non-traditional forest owners to manage their forests, as well as analyse how each model contributes to NTFOs' engagement respectively. In this context, we aimed to select relevant cases across European countries from different European regions.

To select the cases, we proceeded in three steps. First, scientists working in the field of forest policy, forest communication and forest management, and who were part of the EFI Network Project ENGAGING (Engaging owners of small private forests in active Management), assessed ongoing and past campaigns for ten countries distributed across four regions of the Ministerial Conference on the Protection of Forests in Europe (Forest Europe et al., 2015). These include: 1) Northern Europe: Finland (FI), Sweden (SWE), 2) Central West-Europe: Austria (AT), Czech Republic (CZ), France (FR), Germany (DE), Slovakia (SK), Switzerland (CH), 3) South East-Europe: Croatia (HR), 4) South-West Europe: Spain-Catalonia (CAT, autonomous community). A first list of campaigns was assessed based on the knowledge of the scientists of their existence, informal discussions with experts working in the field of forest communication and a Google search using the combination of keywords "campaigns", "forest" and "silent/inactive/non-traditional forest owner". Second, a workshop with these scientists was held in 2018, where they discussed the campaigns they pre-selected (38 in total). From this list, 34 campaigns were selected as suitable to be integrated in the analysis. The selected campaigns stem from nine countries (AT [9], CT [1], HR [2], CZ [2], FI [8], FR [4], SK [2], SWE [3], CH [3]). From the selected campaigns, 18 explicitly address non-traditional forest owners, 9 address non-traditional forest owners and another types of stakeholders (e.g. general public or wood sector professionals), 6 explicitly address the general public and one addresses elderly forest owners. The last two categories were integrated in our sample, as non-traditional forest owners are often not reached by traditional channels in the forestry sector. Thus, we assume that they could be reached together with the general public or with the elderly.

Additionally, these campaigns were selected as they provide relevant information that could be retrieved from actors involved in the

campaign and address contemporary topics, such as emerging challenges due to climate change. The selected campaigns further fulfill the criteria of having taken place in the last 10 years (2010–2020). This time-span has been selected as the issue of non-traditional forest owners has continued to be debated at the national and European level during this time (e.g. [Hogl et al., 2005](#)). Finally, a further workshop was run in 2019, where five campaigns from the 34 selected campaigns were chosen as interesting cases to be described in detail in the analysis. The criteria for selecting these cases were that they should exemplify different approaches, show a thorough description of the campaign and its key elements in order to highlight relevant examples that could potentially be replicated in other parts of Europe.

The data collection was based on a qualitative approach using several empirical sources. On the one hand, we collected data based on the analysis of campaign webpages, official documents and internal reports provided by stakeholders involved in the campaigns. On the other hand, qualitative interviews with experts who were either directly or indirectly involved in a campaign were conducted by the authors of the paper between 2018 and 2019 to add missing information. Per campaign one to two interviews were conducted. As the concept and the expected impact of campaigns are often poorly documented, the interviews provided relevant information for the analysis. The data were analyzed inductively based on the five components as described in [section 2](#). These were differentiated into the following categories: sender – which could be a private or public institution, the message – which could be informational, seeking to create awareness or provide instruction, or persuasive, seeking to emphasize reasons why the audience should adopt the advocated action or avoid the proscribed behaviour ([Atkin and Rice, 2013](#)), the receiver – which is the receiver of the message and can be differentiated in three categories: non-traditional forest owners, general public and non-traditional forest owners in combination with another stakeholders, the medium used – relating to face-face, printed and other type of mediums, the evaluation of the campaigns and intended effect the sender wants to reach through the campaign – differentiated in five categories as shown in [Table 1](#). Two additional elements were added to emphasize dissimilarities between the cases: 1) time frame of the campaign, meaning how long the campaign was run, and target region, meaning the geographical level the campaign is targeting (e.g. regional, national).

4. Results

4.1. Campaigns to engage non-traditional forest owners – A European perspective

[Table 2](#) provides an overview of the campaigns analyzed based on the five components of the conceptual framework (i.e. sender, receiver, message, medium and evaluation and effect) and the two additional elements (i.e. target region and time frame) as proposed in the methods section. As shown in this table, six campaigns use a combination of both one-way and two-way communication models, eight campaigns use two-way communication models and 20 campaigns use one-way communication models.

Based on [Tables 2](#), 23 out of 34 campaigns in the forestry sector are initiated and designed by public stakeholders such as the Finnish Forest Centre (a state-funded organization aiming to promote forestry and advising landowners), the canton of Grisons, Swedish Forest Agency. From the 23 campaigns initiated by the public stakeholders, 11 use one-way and 7 use two-way communication models. Most of the **senders** are forest policy makers. Subsequently, these campaigns are designed from a forest policy perspective. Accordingly, forest policy makers do not always consider the perspective of stakeholders outside the forest sector (e.g. non-traditional forest owners, environmental organizations). Depending on the topic raised (e.g. forest fires, multi-objective forestry) institutions from other fields of interest (e.g. environment) may sometimes participate in the design of campaigns (e.g. prevention

Table 1

Assessment of data of campaigns based on the five Components of the conceptual framework. Source: own representation.

Components	Sub-category	Possible answers
Component 1 Sender	Campaign name	[Open answer]
	Country	[Open answer]
	Sender	Public institution; Private institution
Component 2 Message	Message	Informational, Persuasive, Combination of both
Component 2 Message	Which topic does the campaign raise?	[Open answer]
Component 3 Medium	Channel of communication	<i>Face-to-face campaigns</i> (Direct contact, Events in cities, Events indoors, Events outdoors, A combination of these); <i>Printed campaigns</i> (Posters, Brochures, Campaigns letters, Newspapers); <i>Other types of campaigns</i> (Telephones, Websites, Videos, Social media)
Component 4 Receiver	Receiver of the message (the audience)	Non-traditional forest owners, General public, Non-traditional forest owners + other (e.g. forest owner)
Component 5 Effect and evaluation	Intended effect of campaign	Inform, Raise awareness, Create cooperation between forest owners, Create sense of community, Gather forest owners, Enroll or engage forest owners, Educate, Other, please specify
Component 5 Effect and evaluation	Was the campaign evaluated?	Yes, No, If yes, has the evaluation been published?
Additional element 1	Target region	National, Regional
Additional element 2	Time frame of the campaign	Less than 1 year, 1–3 years, Less than 5 years, More than 5 years

campaigns). Another characteristic of the sender relates to their status, as two-thirds of the campaigns are initiated by public organizations (state bodies, public agencies, local regional public institutions) and a quarter by private organizations. Finally, we find that few (2 out of 34) of the analyzed campaigns involve both private and public senders in a communication process using one-way communication models. From the nine campaigns initiated by private stakeholders, seven use one-way communication models. In contrast with other countries, most of the campaigns in Austria (6/9) were initiated by private actors mainly through the use of one-way communication models (5/6).

As described in the methods section we focused on non-traditional forest owners as **receivers**. Additionally, we looked to include further receivers with similar characteristics to non-traditional forest owners such as the general public or elderly forest owners. In our sample, 18 campaigns explicitly address non-traditional forest owners of which 13 use one-way and three use two-way communication models. A combination of both non-traditional forest owners and the general public or private forest owners is found in few (6/34) campaigns of which four use one-way communication models. In 6 of the campaigns only the general public is addressed through one-way (3/6), two-way (1/6) and a combination of both (2/6) communication models. Just one of the selected campaigns targets elderly forest owners through a combination of both communication models. Through this group non-traditional forest owners may be reachable. Few campaigns target very specific receiver groups (e.g. female forest owners, older forest owners) and combine both one-way and two-way communication models. In campaigns targeting very specific receivers, it is expected that the intended effect will be higher in comparison to the other campaigns, as the message will be specifically targeted to a specific group of receivers. Switzerland was the only country that did not specifically target non-traditional forest owners in any of the analyzed campaigns.

The majority of the campaigns (30/34) analyzed used informational **messages** (e.g. inform the general public about the importance of forest management - Our forest. Benefits for all, Switzerland) through one-way (20/30) and two-way (5/30) communication models. On the contrary,

Table 2

Overview campaigns in each country. Campaigns marked in grey show that these campaigns used several communication channels. Campaigns in bold were selected as good cases and are described in detail in the results section. **Acronyms senders:** BMNRT - Ministry of Natural Resources and Tourism; WV – Waldverband; ACA – Agricultural Chamber Austria; CUPFOA & FES - The Croatian Union of Private Forest Owners' Associations & Forest extension service; CFWP - Chamber of Forestry and Wood Processing; CNPF – National Centre for Private Ownership; CFTT - Czech Forest Think Tank; FE & EMA – Finnish Forest French Environment & Energy Management Agency; 3 FSA – 3 forest sector associations; FOEN – Federal Office for the Environment; FFC – Finnish Forest Centre; PI & CFRI - Public institution for management of protected area Krapina-Zagorje County & Croatian Forest Research Institute; ME & MAF - Ministry of the Environment & Ministry of Agriculture and Forestry; NFC - National Forest Centre; SFA - Swedish Forest Agency; FPS - Forestry protection service; RAC - Regional Agricultural Chamber; PCB - Provincial council of Barcelona; SUA - State of Upper Austria; PCB - Provincial Council of Barcelona; TSFA - The Swedish Forestry Association; UCFF - French Union of Forest cooperatives. Source: own representation based on empirical data.

	Name of campaign	Year of campaign	Communication model used (one-ways, two-way or both)	Sender (public or private)	Receiver of the message (the audience; main & secondary receiver)	Message (informational or persuasive)	Medium	Time frame (years)	Target region (or Level; regional, national, both)	Evaluation
Austria	Plant an oak tree [(Z)Eichen setzen]	2014-2020	Two-way	Private [RAC]	Non-traditional forest owners	Informational and persuasive	Face to face	<1	Regional	No
	My forest finances me a... [Mein Wald finanziert mir]	2016-2020	One-way	Public [BMNRT]	Non-traditional forest owners & general public	Informational	Printed	<5	National	No
	Forest consultant [Forstberater]	2019-ongoing	One-way	Private [WV]	Non-traditional forest owners	Informational	Printed	1-3	National	Yes
	Wood is genius [Holz ist genial]	Since approx. 2000	One-way	Private [pro Holz]	General public	Informational	Printed	<5	National	No
	Forest services in the own forest [Forstlicher Dienstleister in eigenen Wald]	2014	One-way	Private [ACA]	Non-traditional forest owners	Informational	Printed	<5	National	No
	Biomass from my forest - my contribution to climate protection [Biomasse aus dem Wald - mein Beitrag zum Klimaschutz]	2014-2020	One-way	Private [ACA]	Non-traditional forest owners	Informational	Printed	<5	National	No
	Choice of tree species in Upper Austria [Baumartenwahl in Oberösterreich]	2015-ongoing	One-way	Public [SUA]	Non-traditional forest owners	Informational	Printed	>5	Regional	No
	silviculture consultant [Waldbauberater]	2013-ongoing	One-way	Private [RAC]	Non-traditional forest owners	Informational	Online	1-3	National	Yes
	climate smart forest [Klimafitter Wald]	2016-ongoing	One-way	Public [BMNRT]	Non-traditional forest owners	Informational	Online	>5	National	No
Catalonia (Spain)	Forest fires prevention and rural development [Prevençió d'incendis forestals i desenvolupament rural]	Started in 1999 and has been developed further over the years	Both	Public [PCB]	Non-traditional forest owners	Persuasive	Face to face, printed, online	>5	Regional	Yes
Czech Republic	Age of wood [Doba dřevěná]	2017/2018	One-way	Both [CFWP]	General public	Informational	Printed, online	1-3	National	Yes
	Do not feed the beetle [Nekrm brouka]	Since 2018	One-way	Public [CFTT]	Non-traditional forest owners	Informational	Online	1-3	National	No

Croatia	Introduction of native forest fruits species in private forests [Unošenje zavičajnih vrsta drveća i voćkarica u šumski ekosustav privatnih šuma]	2012-2014	Two-way	Public [PI & CFRI]	Private forest owner & non-traditional forest owners	Informational	Face to face	1-3	Regional	No
	Occupational safety training [Edukacija za siguran rad u šumi]	2008-2010	Two-way	Public [CUPFOA & FES]	Forest owners & non-traditional forest owners	Informational	Face to face	1-3	National	No
Finland	Activity to the forests of Central Finland [Sykettä Keski-Suomen metsiin]	2016-2018	Both	Public [FFC]	Non-traditional forest owners	Informational	Face to face, printed	<5	Regional	Yes
	Activity to the forests of Pirkanmaa [Toimintaa metsiin Pirkanmaalla]	2016-2018	Both	Public [FFC]	Other, elderly forest owners	Informational	Face to face, printed	<5	Regional	n.a.
	Female energy to forest [Naisenergiaa metsiin]	2016-2018	Both	Public [FFC]	Other, female forest owners & non-traditional forest owners	Informational	Face to face, printed	<5	Regional	Yes
	Action to the forests of SW Finland [Ryskettä Lounais-Suomen metsiin]	2017-2019	Two-way	Public [FFC]	Non-traditional forest owners	Informational	Face to face	<5	Regional	No
	Metsään.fi -website [Metsään.fi]	Since 2012	One-way	Public [FFC]	Non-traditional forest owners	Informational	Online	<5	National	No
	Metsään.fi online magazine [Metsään.fi verkkolehti]	Since 2012	One-way	Public [FFC]	Non-traditional forest owners	Informational	Online	>5	National	No
	Metsään.fi newsletter [Metsään.fi uutiskirje]	Since 2012	One-way	Public [FFC]	Non-traditional forest owners	Informational	Online	>5	National	No
	Forest centre's forest owner communication [Metsäkeskuksen asiakastyö]	Since 2015	Two-way	Public [FFC]	Non-traditional forest owners	Informational and persuasive	Online	>5	National	Constant evaluation of results

France	Wood dynamics [Dynamic bois]	2015-2018	Two-way	Public [FE & EMA]	Non-traditional forest owners & private forest owner	Persuasive	Face to face	<5	Both	Yes
	Forest fire. To prevent and to avoid them [Les feux de forêt. Les prévenir et s'en protéger]	Since 2018	One-way	Public [ME & MAF]	General public & non-traditional forest owners	Informational	Printed	<1	Regional	No
	Forest on move [la forêt bouge]	Since 2015	One-way	Both [CNPF]	Non-traditional forest owners	Informational and persuasive	Online	<5	National	No
	New forest owners [Nouveaux propriétaires forestiers]	Since 2017	One-way	Private [UCFF]	Non-traditional forest owners	Persuasive	Online	<5	National	Yes
Slovakia	Forest days [Lesnicke dni]	Since 2007	Two-way	Public [NFC]	General public	Informational	Face to face	>5	National	No
	Forest protection videos [Videofilmy o ochrane lesa]	2014	One-way	Public [FPS]	Non-traditional forest owners & wood sector professionals	Informational	Online	1-3	National	No
Sweden	Continuous cover forestry [Hyggesfritt Skogsbruk]	Since 2005	Two-way	Public [SFA]	Forest owners	Informational	Face to face	n.a.	Both	Yes
	Forest Echo [Skogseko]	Since 2010	One-way	Public [SFA]	Non-traditional forest owners	Informational	Printed	>5	National	No
	The Forest [Skogen]	2006 (changed from other journals)	One-way	Private [TSFA]	Non-traditional forest owners & wood sector professionals	Informational	Printed	n.a.	National	n.a.
Switzerland	Woodvetia	2017-2019	Both	Public [FOEN]	General public	Informational	Face to face, Online	1-3	National	No
	Our forest. Benefits for all [Unser Wald. Nutzen für alle]	Around 2010 (no clear year)	Both	Private [3 FSAs]	General public	Informational	Face to face, Online	n.a.	Both	n.a.
	Multitask forest [Multitalent Wald]	Ongoing	One-way	Public [Canton Grisons]	General public	Informational	Online	n.a.	Regional	n.a.

just two campaigns used persuasive messages (e.g. to engage non-traditional forest owners in timber production - Wood dynamics, France) through a two-way model and a combination of both communication models. Two campaigns used a combination of both persuasive and informational (e.g. to engage and inform receivers about smart forestry and timber production - Plant an oak tree, Austria) messages through two-way communication models. Campaigns with persuasive messages are less often employed because these types of campaigns need to be run over longer periods of time as the aim is to persuade the receiver to change behaviour or adopt new management approaches. Both take time and are intensive processes. Our survey sample also shows that the topics raised in the campaigns varied widely (e.g. from informing about native forest fruits species in private forests to forest fires prevention and rural development). In Austria, where several campaigns were run at the same time, receivers may be overwhelmed by the volume of information and number of topics raised. In such situations, it is necessary to repeat campaigns periodically to reach the intended effect. However, as the cases presented in Table 2 show, most campaigns are designed to convey one message on one specific topic or issue. While forest authorities intend to persuade receivers to take action (as is the case in a few campaigns, e.g. Catalonia and France), they often repeat the campaign after a while or turn it into an ongoing open-ended campaign, or if possible, integrate it in the political agenda (e.g. Catalonia).

Printed campaigns (brochures, flyers, papers) involve a traditional **medium** that is used copiously to convey messages (identified in 14 out of 34 campaigns). Digital tools are gaining in importance and are used as much as the printed type of campaigns (13 out of 34). While digital supports have substituted many traditional media during the last 20 years, we notice that printed campaigns still compete equally in the forestry communication field. The age average of forest owners in some European countries (Germany, France) can explain the persistence of traditional media as a privileged tool to reach the older class of forest owners. The face-to-face communication medium is less relevant for mass communication but remains a robust tool to communicate on specific topics (safety, risk communication), which was mobilized in 13 out of 34 campaigns through the use of two-way communication models. By using a face-to-face informational campaign such as direct contact, events in cities, events indoors, events outdoors, or a combination of these, public actors aim to: raise awareness about the importance of biodiversity protection (Croatia), educate and train non-traditional forest owners in forest management (Croatia), inform about the importance of safety at work (Croatia) and the importance of sustainable forest management, e.g. for protection against natural hazards and the provision of ecosystem services (Slovakia, Switzerland).

As presented in Table 2, only nine out of 34 campaigns have so far been **evaluated**, three did not mention anything about an evaluation and one is under constant evaluation. Of the assessed campaigns four used one-way, two used two-way and three used a combination of both communication models. The majority (21 out of 34) of the campaigns were not evaluated at all. From the evaluated campaigns just two have published the results (both from Finland). As most campaigns have not been evaluated or evaluations have not been published, it is difficult to say if the intended effect (such as engaging owners in active forest management) of the campaigns was reached. As shown in the Finnish example, through constant evaluation (e.g. of online campaigns) it is possible to see if the number of receivers is increasing or not. This campaign reached around 4000 forest owners in 2018 and after the first contact around 2500 forest owners signed into the Metsää.fi-eservice. Around 2700 applied for sharing the cost of forest management within 12 months resulting in 2000 ha being signed to the environmental protection program. Additionally, it is possible to assess whether the intended effect has been achieved. Through this information, it is possible to reframe the campaign to improve effectiveness.

Just few campaigns (8 out of 34) have constantly been run for several years. The oldest campaign raising the topic of forest fires, which is still

running, stems from 1999 (Catalonia) and has used a combination of both communication models. This campaign is now being integrated in the political agenda (it is part of a policy program within the public authorities that are promoting it). However, this is not the case for most of the campaigns analyzed. Instead, 10 out of 34 campaigns were/are singular events at a single point in time (run between 1 and 3 years) or run for several years (12 campaigns were run for up to five years). The **time frame** of the campaigns varied depending on the message (e.g. forest fire in Catalonia; forest protection in Slovakia) and the medium (e.g. face to face and printed in Catalonia vs. videos in Slovakia) used.

The **target region** of the campaigns was most often the national level (21 out of 34), of which 17 campaigns used one-way and just three used two-way communication models. There are also few campaigns that combine both (regional and national) levels at the same time (3 out of 34). Depending on the medium, message and the intended effect, the target region may vary between the campaigns.

4.2. Examples of campaigns with varying approaches

4.2.1. Austria

'(Z)Eichen setzen', or 'make an impact', being a two-way communication campaign, was a creative campaign run in the region of Styria in Austria. The sender is an association of different actors along the timber value chain. The main objective of the campaign was to motivate non-traditional forest owners (receiver) to carry out overdue reforestation and to supply them with seedlings of a tree species believed to be able to cope with climate change. Subsequently, the campaign used both informational and persuasive messages. The campaign aimed to persuade non-traditional forest owners to be actively involved in forest management, as well as to inform them about the importance of choosing deciduous trees (Eichen/oaks) for reforestation projects in order to cope with climate change and to reduce the amount of vulnerable secondary spruce forests. This campaign used a combination of communication channels. First, a personal letter (channel of communication) was sent and a webpage was set up to inform the receivers about the objectives of the campaign and to persuade them to participate. Second, each participant was entitled to a number of free oak seedlings in containers that could personally be collected during an information event. During the information event, forest owners were asked if they were interested in a more long-term relationship. The forest owners could plant the trees on their own accord. The entire campaign ran for less than one year. However, it demanded a considerable investment of time. The effect of the campaign was not evaluated, but the senders received feedbacks from the participants.

4.2.2. Finland

The campaign "Forest centre's forest owner communication" (Metsäkeskuksen asiakastyö) was initiated in 2015 by the Finnish Forest Centre (sender) and is still running. This campaign uses two-way communication models, as well as informational and persuasive messages. It aims to engage non-traditional forest owners (receiver) in active forest management, and to inform them about the importance of nature conservation and risk prevention through active forest management. Since 2015, 4000 to 8000 forest owners have been contacted by phone each year (channel of communication). In the early years, the forest owners that were contacted were chosen based on their non-registered information about notification of forest use or application for forest management subsidies over the previous ten years. Since 2019, sampling of contacted forest was based on the high volume of forest management suggestions in national forest resource data. In all phone calls, the main topics to discuss included the need for stand improvement, the harvesting possibilities and potential nature conservation sites. Additionally, if forest owners wished, further topics of their interest were discussed. In 2019, 50% of the calls led to a consultation meeting at the Forest Centre's office or on site. This campaign is constantly evaluated based on the amount of new registrations and based on their forest use

notification or application for cost sharing for forest management. During 2019, for example, 64% of the contacted forest owners registered to Metsään.fi-service (Valonen et al., 2019) and 49% of the contacted non-traditional forest owners made notifications of forest use or applied for forest management subsidies in the last year.

4.2.3. France

In France, two campaigns were run at the same time. The first, “Forest on move” (*La forêt bouge*) was launched by the National Center for Private ownership (CNPFF, sender) in 2015, as a showcase internet website (channel of communication). The campaign was extended to the national level in 2018. This campaign used informational and persuasive messages and included a free online digital toolkit through which forest owners (receivers) could localize and visualize their properties, find a list of forest professionals next to their property and access a wood price database. Additionally, forest owners have the possibility to use a platform on which they can sell or purchase forest lands. The website is designed as both “a digital coach” and a “forestry Bible”, i.e. an exhaustive guideline that should provide answers about a wide range of forestry issues. Through this campaign, the sender expects to reach non-traditional forest owners and encourage them to submit an online application for a forest management plan. However, this tool does not compensate for the lack of forest advisors on the ground to help private forest owners on a daily basis. The campaign has not been evaluated.

The second campaign, “New Forest Owners” (Nouveaux propriétaires forestiers) was launched by the French Union of Forest cooperatives (UCFF, sender) using one-way communication models. This campaign followed a very different strategy from the first. This campaign uses persuasive messages, aiming to engage non-traditional forest owners in timber production and the bioeconomy. Through the website the sender wants to initiate a first contact between non-traditional forest owners (receiver) and forest professionals, rather than to provide exhaustive information on every topic. The website is designed as a kind of “forestry meeting” – a “dating” website where the forest owners can find a short list of forest professionals working in the direct surrounding of the forest owners’ properties. Once the owners complete the contact form online, the website designers commit to connect forest owners with forest professionals within three days. The idea is that a direct relationship between both parties is established. The campaign is evaluated through the number of website visitors and completed contact forms. Over the past two years, 150,000 unique visitors visited the website and 3000 contact forms were completed.

4.2.4. Sweden

As part of the implementation of the 1993 Forest Policy Act, which placed environmental goals on parity with production goals, the Swedish Forest Agency (the sender) has been given various assignments since 2005 with the aim of increasing the use of management practices without final felling (also called continuous cover forestry, <https://www.skogsstyrelsen.se/mer-om-skog/hyggesfritt/>). While the first period focused on the development of methods and recommendations, dissemination and advisory services to forest owners (objective) has been a major component since 2013. In total, 7292 persons (receivers) have participated in different thematic activities between 2013 and 2018 (Björkesjö and Karlsson, 2018). Of these, 960 received face-to-face consultation and written guidelines (communication channel) by trained forest rangers on specific forest stands that they own or manage. To evaluate the effect of this particular stand and owner specific campaign, a mail survey to a sample of 204 individuals (response rate = 61%) was carried out (Sund, 2020). The evaluation showed that a majority of the respondents (71%) reported that the suggested management activities have been fully or partially completed, while 15% report that they will be completed in the future. The reasons for non-completion included, for example, difficulty finding a contractor for the operation, changes in ownership, and indecision among co-owners. Further, the evaluation indicated that the individual consultation increases the

participants’ knowledge and motivation to practice continuous cover forestry methods (Sund, 2020). This campaign used a two-way communication model.

5. Discussion

To describe how one-way and two-way communication models are designed we compared both types of communication models using five components as described in the conceptual framework. As shown, beyond the one- and two-way modes of communication, we find a key difference in how the communication campaigns work depending on the type of actor initiating campaigns. These differences seem to play an important role for how the campaigns are able to communicate their message. On the one hand we find that public actors (as the most frequent **senders**), typically undertake long-term, multi-wave campaigns, which often combine different tools in a communication mix as a part of a two-way, planned and long-term communication strategy. They target mass communication and typically address a wide range of receivers (e.g. the general public) and have, in the majority of empirical cases, multiple messages (e.g. risk prevention, climate-smart forestry). On the other hand, we find that, private actors concentrate on short term goals addressing urgent issues for a specific public. They typically address forest owners and the main message tends to be timber production (e.g. Sweden). However, having just one message does not imply that other messages are not also implicitly considered (e.g. sustainable forest management). It seems that public campaigns have a message oriented toward long-term objectives (e.g. biodiversity conservation), while private campaigns most often concentrate on economic and marketing objectives (e.g. forest owners associations want to reach out new members; see French example). While sharp and short informational messages seem to be catchier and more effective, having multiple messages (e.g. risk prevention, smart forestry, biodiversity conservation) and multiple purposes (e.g. inform, engage, educate) creates a challenge in clearly defining who the receiver is. This makes the contents of this kind of “multiobjective” messages more difficult for the receiver to interpret, increasing the risk that the messages are less effective. In contrast to two-way communication, the one-way communication rarely allows opening an arena of debate where sender and receiver could interact, listen to each other, and reach a common understanding of their lifeworld and forestry issues. Accordingly, it does not really contribute to nurture trust between protagonists or to structure the communication arena in the long term. Supporters of the one-way communication model indirectly protect their vested interests by making visible topics they have selected to communicate on and deliberately ignoring others. While this strategy may deceive the lay public, opponents often strike back with counter-campaigns often based on the same one-way model. It would be incorrect to think that even the so-called new or “less-informed” forest owners are amenable enough to accept messages without reflexivity.

To further understand how campaigns can engage non-traditional forest owners, our analysis shows that **receivers** of a campaign need to be well defined. This applies for both types of communication models. It was recognized that the receiver’s interpretation of a message was usually quite different from that of the sender and that messages rarely have a fixed meaning. Senders and receivers have very different frames of reference and prior knowledge. To increase the chance of being listened to, senders of the one-way and two-way communication models have to anticipate the lifeworld of the receiver and have to be prepared to listen as well as to send (Röling and Engel, 1990; Leeuwis and Aarts, 2010). To do so, senders must invest in gathering information from and about their intended receivers. This is usually done by building a typology and/or creating discussion arenas. Although receivers (forest owners) are very diverse, are changing (e.g. Sweden, Nordlund and Westin, 2011) and are undergoing a transition in their goals and behaviour (Weiss et al., 2019a), the qualitative and quantitative aspects of these changes are not well documented in typologies. Few basic

figures, such as the distribution of public and private ownership, or the number and size classes of forest holdings, and diverse motivations for (or against) active forest management, are known (Ficko et al., 2019). Indeed, different classifications capture the owners of small forests to a large degree, while certain types remain fuzzy and context-specific. A remaining challenge is that some of the created classes assemble members who, so far, are not willing to participate in the dialogue. In the forest sector, the receiver definition has improved greatly with the elaboration of forest owner typologies over the last three decades. In this context, audience segmentation allows to grasp more accurately forest owners' expectations.

As pointed out by Salmon and Atkin (2003), the choice of the **communication channels** is also oriented by factors such as *reach* (proportion of population exposed to the message in relation to the selected channel), and *specializability* (channel capacity for narrow-casting to specific subgroups or tailoring to individuals). Concerning *interactivity* and *personalization*, face-to-face communication channels and websites seem to stand in contrast. On the one hand, with new technologies, digital tools can offer more direct and vivid contact points such as webinars, web conferences, online-forums, etc. On the other hand, effective forestry advisory practice is a socially motivated action embodied with talk and other means of communication. Thus, the current emphasis on internet-based services provides only halfway solutions, because virtual guidance lacks many of the interactive elements provided in face-to-face communication channels (Virkkula and Hujala, 2014). The role of social networks in transferring information has been often underlined in the forestry context as informal communities exist mainly in the countryside among neighbouring owners and within families and operate as creative learning environments allowing participation at different levels (Hamunen et al., 2015). In contrast, André et al. (2017) claim that forest owners' social networks currently serve only a minimal function of sharing knowledge because of the fairly infrequent contact between respondents.

Our study shows that online tools are relevant for a first and even superficial contact with people who usually drop off the forest advisors' radar. In line with Eriksson (2017), we found that the role of face-to-face communication and interaction with trusted advisors (e.g. building non-traditional forest owner associations as connectors and trust builders) proves to be essential to build a long-term relationship. This privileged relation between the forest owner and their connector may sometimes become too exclusive and asymmetrical, but it is also a substitute for the traditional local peer networks whose bonds may be weakened by distance and absenteeism. Another strategy we found in the Swedish and Finnish examples consists in moving and reconfiguring networks to better fit specific groups of forest owners (new, urban, and/or feminine forest owners, etc.). In this two-way symmetric model, building trust is important to increase reliance on information and persuasion rather than enforced compliance (bottom-up approach; Lawrence et al., 2020). Protagonists are not seen any more as "senders" and "receivers" of a message framed by the dominant voices but as partners or protagonists who accept mutually to adapt and agree upon their storylines, sense-making and discourses through which they order their lifeworld and in particular their forestry issues and objectives. In order to ensure transparency, all partners of the communicative action need to reveal their goals for the future and the timescale in order to reframe and redefine knowledge, in a process of achieving mutual understanding. Thus, by revealing underlying assumptions, the quality of relations is likely to be improved in the long run (Eriksson, 2017).

The campaigns investigated have either not been **evaluated**, or if they were, the evaluation results have not been published (e.g. Austria, France, Catalonia, the Czech Republic and Sweden). Therefore, we were not able to estimate their **effects**. Nevertheless, for those campaigns that were not evaluated, the non-evaluation does not mean that a campaign has failed to achieve the desired effect. When addressing non-traditional forest owners, the intention is often to change their attitudes and increase their awareness of the challenges they face as forest owners, and

these changes are not instant. Eriksson (2017) found out that it is generally considered hard to know if there is an effect on the receivers, as forest management measures cannot promptly be seen. Yet, evaluating the effect of campaigns in terms of changes in receivers' behaviours, which is often delayed and is influenced by other factors, can be performed indirectly, e.g. using indicators such as increased web traffic (e.g. the Finnish campaign *Forest centre's forest owner communication*) or increased number of grant applications (e.g. the Czech campaign *Do not feed the beetle*). When an evaluation is explicitly requested, campaigners can employ less useful but easily available metrics, such as attendance, numbers of meetings, and number of contacted persons. Communication may therefore improve knowledgeability but not automatically create a feeling of responsibility and willingness to engage further in forest management (Vulturius et al., 2019).

Our analysis further shows that the **target region** or level has implications for the choice of the communication model and the communication channel, i.e. the way receivers are addressed. While both one-way communication models are rather easy to implement at a large (regional or national) scale for mass communication, the two-way communication models require specific organization modes and devices such as arenas of debate where a limited number of protagonists can interact in the long term and develop similar perspectives or goals and set boundaries (Leeuwis and Aarts, 2010). This dialectical debate also requires a radical change in the identity and roles of the parties involved who must consider each other as mutual partners and not as sender/receiver. As the forest owner structure is changing (e.g. increasingly live in urban areas; Weiss et al., 2019a), traditional face-to-face campaigns also need to take place where the forest owners reside (and not where the forest is located). Although there are examples of forest owners living in rural areas that are not willing to be exposed to new information and new management forms (e.g. Czech Republic), technological development and social media is not limited to urban areas and residents.

In our campaign sample, we find that one-way communication models (publicity model and information model), which are considered outdated (Leeuwis et al., 2010), still persist and are more widespread than two-way communication models in the forest sector: the sender frames a message that is passively received (or ignored) by the receiver. Thus, the one-way communication models are still widely used by public and private actors in the forest sector to inform, engage and motivate non-traditional forest owners to be more active in forest management. One explanation for why both one-way communication models still exist relates to their practicability, for example low cost. A further explanation lies in the objectives and the framing of the messages that is contingent on the characteristics of the sender (public vs. private), its objectives and the type of message (e.g. to inform). Additionally, both one-way communication models are often chosen by practitioners as both seem sufficient to convey the intended message. Both types of one-way communication model may be effective in the short-term for awareness raising (the receiver hears the message but may not really integrate it in his/her brain), but not for triggering engagement or behavioural change in the long-term.

Our analysis shows that even though the two-way asymmetrical model and the two-way symmetrical model are crucial in triggering real engagement in forest management in the long-term, both are less common in the forest sector. This communication model is being used in just eight of the 34 analyzed campaigns. One explanation is that both models are more complex to apply than the one-way communication models. A further explanation is that both are cost intensive and need thorough planning and devices to allow the interaction between sender and receiver, and because both aim to persuade receivers to change behaviour.

Our analysis also shows that a combination of both one-way and two-way communication models is used in few campaigns (6 of 34). This indicates that both models are not mutually exclusive but can be (partly) connected. Indeed, we find that a benefit for combining both is that such

an integrated model better targets stakeholders outside the forest sector (e.g. general public) and provides a better interaction between forest owners and forest advisors in the long term.

6. Conclusion

We find that both linear, one-way communication models as well as more integrative and participative models (two-way communication models) are applied in campaigns to engage non-traditional forest owners. However, we find that the one-way models predominate in the forest sector. In line with Butler et al. (2007) we conclude that there is no single solution on how to best engage non-traditional forest owners. The forest sector has historically mainly focused on one-way communication models (Janse, 2005). Even though scholars (Lähtinen et al., 2017) have criticized one-way communication models (e.g. newspaper articles, static websites, and advertisements) for the inherent weakness of lacking interaction between sender and receiver, this form remains widespread in the forest sector. In contrast, two-way communication offers interaction possibilities between sender and receiver. Subsequently, two-way communication is a constitutive process that produces and reproduces shared meaning. Despite its strength, this two-way model remains under-utilized. We also find combinations of both one-way and two-way models, which shows that both types of models can be complementary, in particular if a feedback loop is added to the one-way communication model.

As shown, one-way communication including web-based services, education programs and peer-to-peer learning can play a stable and sustainable role for reaching and engaging non-traditional forest owners (Lähtinen et al., 2017). To improve the performance of the sector, communication with different stakeholders must be based on a long-term communication strategy, which might necessitate more widespread use of two-way communication (Riedl et al., 2019). Furthermore, campaigns will be relevant to trigger engagement or behavioural change of any type of forest owner over the long-term, which again can be gained from the application of the two-way model. While precision and quality of information are key conditions for effective communication in the linear model, the combination of communicative and other resources such as anticipation and receptivity to forest owners' expectations and co-construction of meaning are necessary to keep the protagonists active over the long term and to avoid one-shot campaigns with no long term perspective. In sum, two-way communication models will play a pivotal role.

We conclude with four recommendations on how campaigns could be developed to better engage non-traditional forest owners using one-way or two-way communication models or a combination of both. First, since the *sender* influences who the campaigns will address and what the message is, joint campaigns by public and private actors could efficiently address the challenges the forest sector is currently facing. On the one hand, public actors use multi-wave campaigns targeting several receivers and sending multiple messages. On the other hand, private actors concentrate mainly on one goal addressing an issue for a specific public. Thus, campaigns could benefit of the combination of both types of senders. Additionally, through the integration of different types of senders, the campaign could gain from many positive effects such as having a collective budget and creating opportunities to broaden the diversity of communication channels (e.g. TV spot campaigns) and using new technologies (e.g. from the two-way communication) such as apps or blogs. Second, convincing *narratives* have to be developed on the basis of a good understanding of the motivations of forest owners (e.g. why do they want to manage their forests?). By knowing the motivations of forest owners, a proper slogan can be chosen, placing the forest owner centre stage. The timing of campaigns has to be adapted to *windows of opportunity*. For example, if a natural hazard happens in a mountainous region, probably this is the best time to launch a campaign in order to motivate forest owners to better manage their forests (e.g. the Czech Republic example). Additionally, the long-term perspective needs to be

considered. If campaigns run for a longer period of time it would be possible to reach more stakeholders and it may be possible to integrate the topic into the political agenda (e.g. Catalonia). Finally, the development of adapted intermediary organizations such as non-traditional forest owners associations as *connectors* and trust builders between public institutions and (non-traditional) forest owners is crucial in order to increase reliance on information and to engage non-traditional forest owners in forest management in the future.

Declaration of Competing Interest

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