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Forests, Trees and
Agroforestry

The socioeconomic impacts of large-scale tree plantations on local communities

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Contents

Acknowledgments	iv
1 Background	1
2 Aims and objectives	3
3 Methods	4
3.1 Theory of change	5
3.2 Literature search	5
3.3 Screening	7
3.4 Quality assessment of the selected studies	8
3.5 Data extraction and analysis	9
4 Conclusion	10
References	11
Annexes	14
1 Members of the stakeholder group	14
2 Search terms	14
3 Search strings	15
4 Databases	16
5 Key references list	18

List of figure and tables

Figure

1 Potential pathways behind the socioeconomic impacts of large-scale tree plantations on local communities (adapted from Ingram et al. 2016).	6
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Tables

1 Overview of the PECOC framework.	4
2 Quality assessment tool for studies.	8
3 Data extraction categories.	9

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1 Background

Growing global populations and changing patterns of consumption could more than triple the demand for timber and forest products by 2050 (Indufor 2012; WWF 2012). Meeting this demand, while trying to address the concurrent challenges of deforestation, forest degradation, climate change, energy and livelihood needs, is reflected in the major increase in the area of planted forests from 167.5 M ha in 1990 to 277.9 M ha in 2015, equal to 7.0% of global forest cover (Shackleton et al. 2007; Thompson et al. 2014; Payn et al. 2015; Wittman et al. 2015).

In 2012, 46.3% (770.2 M m³) of all industrial round wood harvested was removed from planted forests, the majority of which were large-scale tree plantations that occupied a total of 54.3 M ha of land (Indufor 2012; Payn et al. 2015). Large-scale tree plantations, most of which are located in Asia and the Americas, can occupy anywhere from hundreds of hectares to hundreds of thousands of hectares under government or commercial management (Kanowski and Murray 2008). Such plantations often comprise a single monoculture or a few relatively productive and predominantly exotic tree species that are intensively managed for varying commercial purposes, mainly for timber and pulpwood, but also for biofuels and carbon credits (Batra and Pirard 2015; Borrás et al. 2015; Ingram et al. 2016).



A pulpwood plantation of *Eucalyptus grandis* in Durazno, Uruguay.

Photo by Arttu Malkamäki

The projected increase in plantation investments across Africa, Asia, Latin America and Oceania, however, could nearly double the current area of large-scale tree plantations by 2050 (Indufor 2012). This can be explained by the expected profitability of investing in large-scale tree plantations to meet increasing demand, as well as limited land availability in Europe and North America (Rudel 2009; Cubbage et al. 2014; Korhonen et al. 2014). Subsidies provided by a number of governments in the Global South have further incentivized investments in large-scale tree plantations in developing countries (Bull et al. 2006; Kröger 2014; Payn et al. 2015).

Such plantations have, however, raised concerns relating to their environmental and socioeconomic impacts. Changes in environmental function, mainly concerning biodiversity and water resources following the establishment of tree plantations, have been previously evaluated (Farley et al. 2005; Brockerhoff et al. 2008). Nevertheless, the projected doubling of plantation area by 2050 will introduce widespread socioeconomic impacts on the local communities in their vicinity, as they are often located in countries characterized by high rates of rural poverty and insecure property rights over natural resources (Bromley 2009; Deininger and Feder 2009; Alkire and Santos 2014).

Previous studies have found socioeconomic impacts of large-scale tree plantations to be highly mixed across geographical and managerial contexts, with the potential to cause both positive (e.g. revitalization of the rural economy) and negative (e.g. conflict stemming from lost customary access to land) impacts on local communities (Cossalter and Pye-Smith 2003; Charnley 2005; Schirmer 2007; Gerber 2011; McDermott 2012). Impacts may also be mixed: the promise of employment can be seen as positive, although displacement of previous land uses and limited job creation can force people to migrate elsewhere (Schirmer et al. 2015). However, there has been little research emphasis on reviewing the whole array of plantation impacts and their interdependency in different contexts, ranging from the realization of the anticipated creation of employment and infrastructure, to direct impacts on local livelihoods, to the changing provision of ecosystem services (cf. Baral et al. 2016; Matthies et al. 2016).

The range of issues associated with large-scale tree plantations has given rise to oppositional civil society movements, which considers their establishment a negative trajectory for rural development (Schirmer 2013). This has also sparked efforts to better design and manage plantations that will contribute to both environmental and socioeconomic conditions locally (Paquette and Messier 2010; Schirmer et al. 2015; Ingram et al. 2016; WWF 2016). A deeper understanding of the local socioeconomic impacts of existing large-scale tree plantations, their interlinkages, and those conditions that have resulted in positive impacts is required to further these reforms and support the development of better targeted policy interventions (Rudel 2009; Landry and Chirwa 2011; Barua et al. 2014).

2 Aims and objectives

The aim of this systematic review is to provide an up-to-date synthesis of the empirical evidence base on the socioeconomic impacts of large-scale tree plantations on local communities worldwide. The findings from this review will contribute to the discussions around the impacts, indicators, design and management of large-scale tree plantations. The objective of the review is to answer the following primary and secondary research questions:

Primary question

- What are the direct and indirect socioeconomic impacts of large-scale tree plantations on local human populations?

Secondary questions

- How do the impacts differ across geographical, managerial and institutional contexts?
- What are the trends, biases and gaps in the available literature on the topic?



A beekeeper's apiary inside a eucalypt plantation in Río Negro, Uruguay.

Photo by Arttu Malkamäki

3 Methods

The review draws upon established guidelines for systematic reviews in both environmental and social policy; systematic reviews aim to provide a comprehensive assessment of relevant literature while identifying and minimizing potential biases (Collaboration for Environmental Evidence 2013; The Campbell Collaboration 2015).

We use a Population–Exposure–Comparator–Outcome–Context (PECOC) framework to structure our research questions (Table 1). *Population* refers to the subject upon whom an intervention or exposure is applied. *Exposure* refers to the management regime, policy, action or any external variable to which the subject is exposed. *Comparator* refers to control groups that have not received the same exposure or have received an alternative intervention. *Outcome* refers to all relevant outcomes (or impacts) that result from the relevant population being exposed to a relevant intervention based on a reliably established causal chain. *Context* refers to the contextual factors that are likely to modify the outcomes and explain their heterogeneity (e.g. demographics, institutions, markets, and biophysics) (Pullin and Stewart 2006).

Table 1. Overview of the PECOC framework.

Population	Local households and communities, including small-scale forestry practitioners, who reside inside or near to a specific area where at least one large-scale tree plantation is present. Here, the term <i>local</i> is not used to delineate populations within a particular distance or radius from the plantation site as these may vary from area to area. Populations who are not directly impacted by the physical presence of the plantation site, such as processors and consumers of plantation products, are not considered.
Exposure	Large-scale tree plantations established for a commercial purpose, established or managed by private or public actors external to the local community in question.
Comparator	Comparable populations at sites without the establishment of large-scale tree plantations, populations prior to the establishment of large-scale tree plantations, or sites that meet both criteria.
Outcome	Relevant socioeconomic outcomes and impacts may include those that are felt directly or indirectly as a result of the establishment of a large-scale tree plantation, including changes in employment opportunities, income levels, changes in livelihood strategies, formal or informal tenure rights, local infrastructures, and indirect socioeconomic impacts caused by changes in ecosystem services such as a change in water availability for agricultural irrigation.
Context	Large-scale tree plantations and their impacts may well be affected by contextual factors, some of which are listed under three main categories below: <i>Geographical</i> <ul style="list-style-type: none">• Ecoregion• Landscape features (e.g. remoteness, slope, soil fertility and water scarcity)• Distance between plantation area and the human population <i>Managerial</i> <ul style="list-style-type: none">• Plantation size• Plantation management (e.g. even or uneven-aged, mono or polyculture)• Third-party certification scheme (e.g. Forest Stewardship Council)• Type of output from plantation (e.g. timber, pulpwood or carbon credits)• Species features (e.g. fast or slow-growing, exotic or native)• Former land use in plantation area (e.g. natural forest or degraded agricultural land)• Time and number of harvests since plantation establishment <i>Institutional</i> <ul style="list-style-type: none">• Level of cooperation and mutual engagement between the plantation manager and the local community (e.g. community consultations)• Formal and informal land tenure in the area (e.g. overlapping claims for land)• Other types of land use and livelihoods in the area (e.g. agriculture or grazing)• Demographic baselines in the area (e.g. population density)• Socioeconomic baselines in the area (e.g. pre-existing poverty density)

3.1 Theory of change

Positing a theory of change proved helpful in developing an initial understanding of the potential pathways between the establishment of a large-scale tree plantation and its socioeconomic impacts on local communities. After an initial brainstorming workshop with a stakeholder group, which included academics and representatives from private sector and civil society organizations (Annex 1), an illustration of the potential steps in a causal chain was developed based on the recent work of Ingram et al. (2016). Whereas their work considers both environmental and socioeconomic impacts of sustainable plantations and associated operations across the value chain, our model considers only the socioeconomic impacts on local communities (Figure 1).

The figure emphasizes the multitude of potential impact pathways, as well as their interconnectivity and complexity (cf. Ingram et al. 2016). It should be kept in mind that the figure and proposed linkages are generic and require adaptation to local circumstances as the impacts are expected to vary across contexts. Plantation managers' motives to engage in plantation forestry as well as their attitudes on how the industrial operations are run are other factors expected to explain differences. While third-party certification schemes are hypothesized to represent the best available forest managerial practices both from the environmental and socioeconomic viewpoints (Romero et al. 2013; Miteva et al. 2015), they can also be helpful in ensuring and verifying the chain of custody, i.e. the legality and traceability of the material output from a plantation (Eden 2009), possibly triggering further differences in lived impacts on a local level. There may also be differences arising from the indicators used, such as whether impacts are based on local perceptions or measured by an external auditor on the ground.

In addition, we expect several trade-offs to occur across spatial and temporal scales. Benefits such as employment could be provided for communities residing near a plantation, thus attracting migrant workers from other communities leading to socioeconomic changes elsewhere. There could also be a significant trade-off between the plantation's financial performance in the short-term and longer-term commitments to local welfare. Many of the short-lived positive impacts could also gradually come at the expense of other ecosystem services. For instance, an increase in erosion due to plantation-related activities could increase sedimentation in nearby rivers, hamper irrigation agriculture on the riverbanks and, eventually, reduce local food security.

3.2 Literature search

Following initial review team discussions, a workshop with a group of experts and stakeholders was held in Helsinki in May 2016 to identify a comprehensive list of search terms organized according to the population, exposure, and outcome elements of the PECOC framework. Terms were tested on Web of Science and CAB Abstracts, and the least relevant terms were excluded from the final search string (Annex 2). We also included the common names of the eight most widely planted tree species in planted forests among our search terms (Del Lungo et al. 2006).

An information specialist from the University of Helsinki's library proposed combinations of search strings employing Boolean operators, proximity operators and wildcard symbols to consider alternative spellings and endings; final search strings are documented here (Annex 3). Searches for peer-reviewed literature will be conducted in Web of Science (Core Collection and SciELO), Scopus, CAB Abstracts and Google Scholar in English, Spanish, French, Portuguese, Finnish, and Swedish. Additional grey literature searches will be undertaken on the websites of organizations suggested by stakeholders and the review team (Annex 4).

Both the review team and stakeholders contributed to a list of key reference studies that should be captured by the literature search. This list of 24 studies (Annex 5) was used to appraise the comprehensiveness of the searches, and led to revisions of the search terms and strings. Where subscription access was necessary, searches were conducted through the University of Helsinki libraries. In addition, these sources were complemented by searching of bibliographies of previous reviews on similar topics.

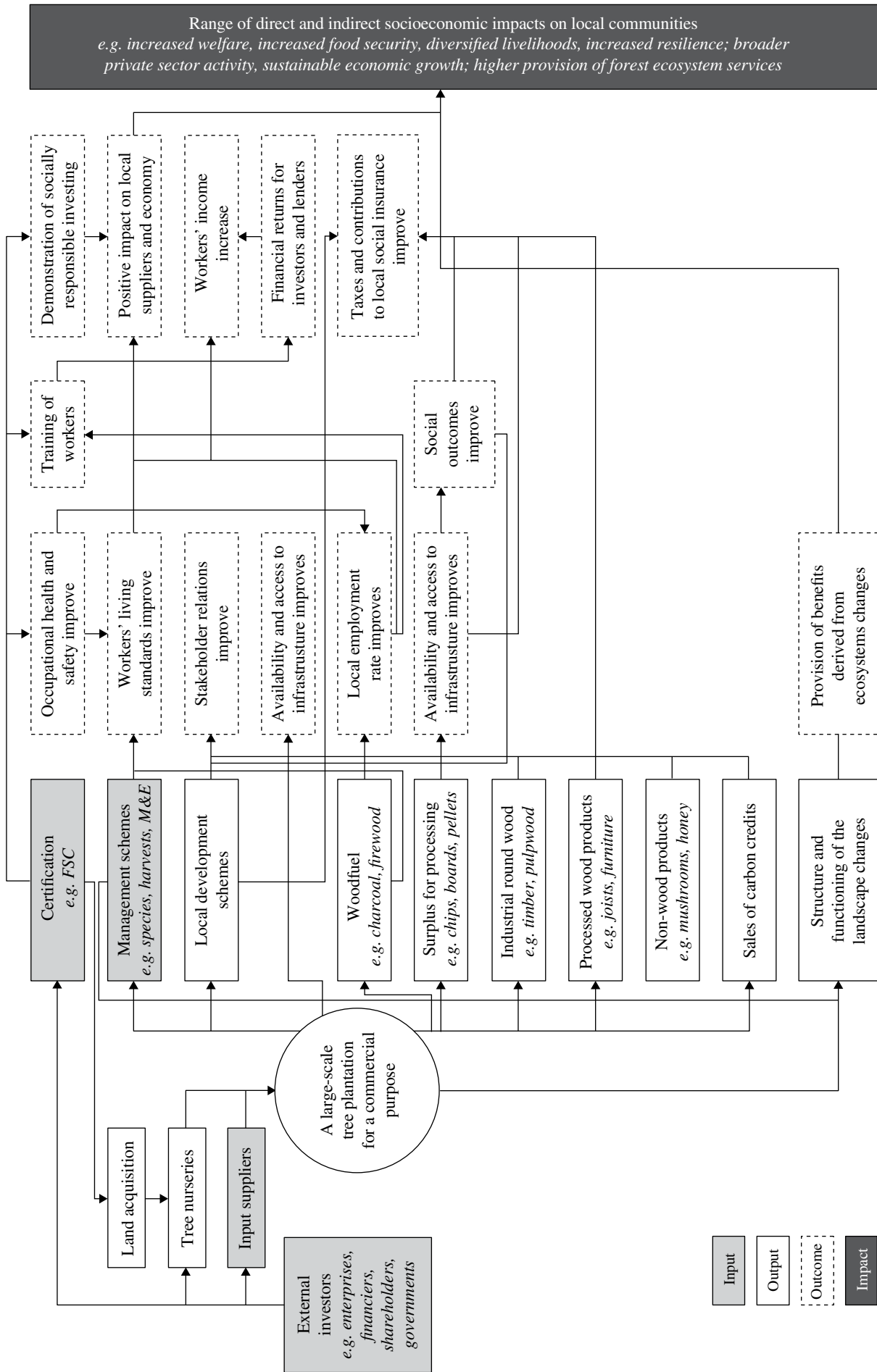


Figure 1. Potential pathways behind the socioeconomic impacts of large-scale tree plantations on local communities (adapted from Ingram et al. 2016).

3.3 Screening

All the studies resulting from our searches will be reviewed through two stages of screening in order to ensure that they meet the definitions given in the PECOC framework (Table 1). Titles and abstracts will be screened first, followed by a screening of full texts.

The screening of titles and abstracts will be performed using the online software Abstrackr (Wallace 2012). To ensure inter-rater consistency, we will conduct pilot screening with all participating reviewers on a subset of 50 randomly selected studies at the beginning of each stage, and calculate Randolph's free-marginal multi-rater kappa to determine the degree of interrater agreement (Randolph 2008). As suggested by Brennan and Prediger (1981), we apply a kappa value of 0.7 as the minimum threshold of acceptable agreement between reviewers; should the kappa value fall below this threshold, we will discuss differences in the interpretation of the inclusion criteria and repeat the screening on another subset of 50 studies. This process will be repeated until an acceptable kappa value is reached, after which reviewers will conduct screening independently. Should there be uncertainties regarding the relevance of certain studies, reviewers will consult each other to make a final decision. During full text screening, records of excluded studies will be kept to enhance transparency of the screening process.

In addition to the PECOC criteria stated in Table 1, we will apply the following selection criteria during study screening:

Population

The relevant populations that form the unit of analysis in this systematic review are restricted to groups of local human populations as specified in Table 1.

Exposure

The study must deal exclusively with plantations that consist of tree species that fall under the Food and Agriculture Organization's (FAO 2012) definition of a *forest*, referring to land spanning more than 0.5 ha with *trees* higher than 5 m and a canopy cover of more than 10%, or trees able to reach these thresholds *in situ*. Grasses, including palms and bamboo, as well as woody plants that do not meet the height requirement of 5 m under the aforementioned definition are excluded. We will only focus on terrestrial ecosystems, thus excluding mangroves in coastal ecosystems.

Plantations must be established for commercial purposes, or for the aim of producing materials and/or services to be sold on a market. Thus we will also include plantations established for the sale of carbon credits. The impact pathways of *carbon forests* on local communities is similar to those established for other profit-making purposes such as timber or pulpwood production, but their inclusion could also provide an opportunity to determine whether or not there are different impacts according to different planting purposes.

To avoid the arbitrary selection of thresholds for plantation size, papers must self-define plantations under study as being *large in scale*. This definition also aims to distinguish externally driven plantation investments from smaller-scale forestry enterprises that are characterized by tree planting initiated by the local community, including community forestry, village forestry, social forestry, agroforestry projects, as well as smallholder woodlots.

Different forms of contract tree farming or outgrower schemes coordinated by governments or large private enterprises, where smallholders receive technical and/or financial support to grow trees on their own lands for repurchase by the coordinator (e.g. Cairns 2000; Rode et al. 2014), are also excluded. In some cases, an outgrower scheme could actually form a continuous aggregation of smallholders' lands with little practical engagement from the smallholder's side, and thus resemble

the dynamics of a large-scale tree plantation (e.g. Kallio et al. 2011). All such arrangements, however, are excluded from the review to ensure that the results and conclusions drawn from the review are consistent and concentrated around large-scale tree plantations, of which there may still be more than one at the local level.

Large-scale reforestation programs undertaken by national governments, where the aim is either commercial or environmental, but in which smallholders retain control over management decisions taken on their lands, will be excluded (e.g. Vietnam's 5 M ha 'Regreening the Barren Hills' program and China's 25 M ha 'Conversion of Cropland to Forest program').

Outcome

We will include studies analyzing past and current socioeconomic impacts based on primary data at the community level, including measured biophysical and socioeconomic impacts as well as perceptions of impacts. However, publications modeling future or potential impacts will be excluded.

Study design

Relevant types of study design include those using quantitative and qualitative methods, including: (a) surveys of participant and non-participant populations (cross-sectional); (b) surveys of populations prior to and after the plantation establishment (longitudinal); (c) experimental and quasi-experimental designs; (d) case-control experiments; and (e) individual case studies of populations that have been influenced or impacted by a plantation.

Study designs that will not be considered for analysis include reviews, meta-analyses, summaries, conceptual, theoretical and methodological frameworks, and editorials and commentaries, although these will be considered in the study background and discussion.

3.4 Quality assessment of the selected studies

Assessing the quality of the selected studies is necessary to ensure the validity of conclusions derived from systematic reviews (Bilotta et al. 2014). Following the completion of full text screening, studies will be assessed against the following set of critical and general quality criteria (Table 2). Studies that meet the two critical quality criteria will be considered for data extraction, but studies will also be assessed against seven additional quality criteria to evaluate the overall robustness of the evidence base.

Table 2. Quality assessment tool.

Category	Quality parameter
Critical	Key results are logically derived and supported by the data and methods.
	Confounding factors that could have influenced the results are considered and explained.
General	Key terms and concepts are clear, replicable and reliable.
	Data collection methods are clear, replicable and reliable.
	Sampling selection is explained and justified.
	Data analysis methods are clear, replicable and reliable.
	A clear and appropriate comparator is present.
	Key conclusions and recommendations are logically derived and supported by the results.

3.5 Data extraction and analysis

Studies that meet the inclusion criteria and quality criteria will enter data extraction, which collects information according to the PECOC framework (Table 1) as well as additional factors or data of interest that were raised in the review team discussions. An overview of the data extraction categories is presented below in Table 3. In terms of studies that present data from multiple cases, those that can be clearly distinguished from each other based on the geographical (e.g. ecoregions), managerial (e.g. tree species) or institutional (e.g. populations or socioeconomic baselines) contexts around the plantation–community interactions, will be extracted separately.

Because of the heterogeneity of methods and measures we expect to be used in relevant studies, we are limited to a narrative synthesis of the empirical evidence. However, if there is a sufficient subset of cases that address a particular issue, e.g. livelihood diversification, and also provide sample sizes, mean values and standard deviations, the narrative synthesis will be complemented with meta-analyses that can be used to statistically estimate the direction and magnitude of the overall impact (Schwarzer et al. 2015).

We will also consider data extraction from those studies that do not meet the two critical quality criteria standards, and consider whether these studies show significantly different results from those studies that did meet quality criteria. We will also try to compare the known location of large-scale tree plantations with the locations of those included in the review in order to identify geographic knowledge gaps and biases. With geographical bias we refer to the potential for certain geographical areas to have been overrepresented in the evidence base if particularly positive or negative impacts, such as prolonged conflicts, have occurred (Wolf et al. 2007).

Table 3. Data extraction categories.

Category	Data to be extracted
Bibliography	Author(s); possible conflicts of interest in authors' affiliations of funding sources; publication year; title; type of publication; language
Methods	Year(s) that the data cover; Type of study; Main method of data collection; Nature of the data (local perceptions of impacts or impacts elicited from the data on locals); comparator
Exposure	Ecozone; country; location where plantation-community interactions occur; commercial purpose; material processing; main reason or incentive for planting trees in this location; characterization of the tree plantation area under study; area (hectares); formal tenure regime; time since the first trees were planted at the time of the study; number of rotations at the time of the study; certification; forest managerial operations implemented by; primary, secondary and tertiary species planted; integration of local livelihoods with tree planting; main land use prior to tree plantation establishment; current main land use around the tree plantation
Population	Urban-rural delineation; average distance from plantation; type of consultation with the local community in the early stages of operations; local response to the type of consultation; land acquisition approach; additional incentives offered to the local community, if any; noteworthy demographic or socioeconomic baselines prior to tree plantation establishment
Outcome	Selection of the three main impact categories, followed by a short description and a characterization of each of the three impacts as stated by the authors (categories: land, infrastructures, health, employment, livelihoods, income, social capital, cultural ecosystem services, regulating ecosystem services, none of the previous); impact interlinkedness; nature of the interlinkages; gender-specific impacts; ethnicity-specific impacts; other impacts or specifications, if any

4 Conclusion

This protocol has described in detail the background, aims, and methods of a proposed systematic review on the socioeconomic impacts of large-scale tree plantations on local communities. The contextual factors that have contributed to either positive or negative impacts as well as the nature of impacts themselves will be reviewed and synthesized accordingly, and potential knowledge gaps and geographical biases in the empirical evidence base will be highlighted. If any deviations from this protocol are made at any stage during the review, they will be explained in the forthcoming synthesis report.

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Annexes

Annex 1. Members of the stakeholder group

Workshop held at the University of Helsinki, Finland, on May 4, 2016

Name	Title	Institution
Aleksi Heiskanen	Expert, Sust. forestry	World Wide Fund For Nature Finland
Pia Katila	Senior researcher	Finnish Natural Resources Institute
Jaana Korhonen	Doctoral researcher	Dept. of Forest Sciences, University of Helsinki
Kaisa Korhonen-Kurki	Research coordinator	Helsinki University Centre for Environment
Robert A. Kozak	Professor, Sust. business	Faculty of Forestry, University of British Columbia
Markus Kröger	Post-doctoral researcher	Dept. of Development Studies, University of Helsinki
Brent D. Matthies	Analyst	Indufor Ltd.

Annex 2. Search terms

Exposure

forest plantation; plantation forest; tree plantation; tree farm; afforestation; reforestation; tree monoculture; forest monoculture; production forest; green desert; plantation investment; plantation establishment; wood plantation; lumber plantation; fast-wood; fast-growing tree plantation; pulpwood plantation; large-scale plantation; plantation expansion; industrial tree plantation; forest concession; concession forest; tree concession; land grab; agro-industrial; woodfuel production; acacia plantation; eucalypt plantation; fir plantation; larch plantation; pine plantation; poplar plantation; spruce plantation; teak plantation

Population

household; small-holder; rural; local community; rural community; indigenous; ethnic; tribal

Outcome

livelihood; conflict; welfare; well-being; income; employment; job; subsistence; labor; socio-economic; social; economic; attitude; perception; poverty; infrastructure; outgrower; customary right; land right; property right; tenure; migration; displacement; power; gender; trade-off; health; ownership; access; benefit sharing; food security

Annex 3. Search strings

Web of Science

Databases: Core Collection; SciELO

Truncation: * allows for alternative beginnings and endings

Wildcards: "\$" stands for zero or one character

TS=(“forest plantation\$” OR “plantation forest*” OR “tree plantation\$” OR “tree farm\$” OR afforestation OR reforestation OR “tree monoculture\$” OR “forest monoculture\$” OR “production forest*” OR “green desert\$” OR “plantation investment\$” OR “plantation establishment” OR “wood* plantation\$” OR “lumber plantation\$” OR fast\$wood OR “fast-growing tree plantation\$” OR “pulpwood plantation\$” OR “large-scale plantation\$” OR “plantation expansion” OR “industrial tree plantation\$” OR “forest* concession\$” OR “concession forest*” OR “tree concession\$” OR “land grab*” OR agro\$industrial* OR “woodfuel production” OR “eucalyptus plantation*” OR “acacia plantation\$” OR “eucalypt* plantation\$” OR “*fir plantation\$” OR “larch plantation\$” OR “pine plantation\$” OR “poplar plantation\$” OR “spruce plantation\$” OR “teak plantation\$”)

AND TS=(livelihood\$ OR household\$ OR small\$holder* OR rural OR “local communit*” OR “rural communit*” OR indigenous OR ethnic OR tribal OR conflict\$ OR welfare OR well-being OR income OR *employment OR job\$ OR subsistence OR labor OR socio\$economic* OR social OR econom* OR attitud* OR perception\$ OR poverty OR infrastructur* OR out\$grower* OR “customary right\$” OR “land right\$” OR “property right\$” OR tenure OR *migration OR power OR gender* OR trade\$off* OR health OR ownership OR access OR displace* OR “benefit sharing” OR “food security”)

Scopus

Truncation: * allows for alternative beginnings and endings

TITLE-ABS-KEY(“forest plantation*” OR “plantation forest*” OR “tree plantation*” OR “tree farm*” OR afforestation OR reforestation OR “tree monoculture*” OR “forest monoculture*” OR “production forest*” OR “green desert*” OR “plantation investment*” OR “plantation establishment*” OR “wood* plantation*” OR “lumber plantation*” OR fast-wood OR “fast-growing tree plantation*” OR “pulpwood plantation*” OR “large-scale plantation*” OR “plantation expansion” OR “industrial tree plantation*” OR “forest concession*” OR “concession forest*” OR “tree concession*” OR “land grab*” OR agro-industrial OR “woodfuel production” OR “acacia plantation*” OR “eucalypt* plantation*” OR “*fir plantation*” OR “larch plantation*” OR “pine plantation*” OR “poplar plantation*” OR “spruce plantation*” OR “teak plantation*”)

AND TITLE-ABS-KEY(livelihood* OR household* OR small-holder* OR rural OR “local communit*” OR “rural communit*” OR indigenous OR ethnic OR tribal OR conflict* OR welfare OR well-being OR income OR *employment OR job* OR subsistence OR labor OR socio-economic* OR social OR econom* OR attitud* OR perception OR poverty OR infrastructur* OR out-grower* OR “customary right*” OR “land right*” OR “property right*” OR tenure OR *migration OR displace* OR power OR gender* OR trade-off OR health OR ownership OR access OR “benefit sharing” OR “food security”)

CAB Abstracts

Truncation: * allows for alternative beginnings and endings

Wildcards: "\$" stands for zero or one character

1. CC: (AA000 or EE110 or EE112 or EE115 or EE120 or EE160 or EE EE350 or EE900 or EE950 or KK000 or PP000 or UU000 or ZZ330)
2. Subject: (“forest plantation\$” OR “tree plantation\$” OR plantation\$ OR “tree farm*” OR afforestation OR reforestation OR “tree monoculture\$” OR “forest monoculture\$” OR “production forest*” OR “green desert\$” OR “plantation investment\$” OR “plantation establishment\$” OR “wood* plantation\$” OR “timber plantation” OR fast\$wood OR “pulpwood plantation\$” OR “large-scale plantation\$” OR “plantation expansion” OR “industrial tree plantation\$” OR “forest concession\$” OR “concession forest*” OR “tree concession\$” OR “land grab*” OR agro\$industrial OR “woodfuel production” OR “private forestry” OR “acacia plantation\$” OR “eucalypt* plantation\$” OR “china-fir plantation\$” OR “douglas-fir plantation\$” OR “larch plantation\$” OR “pine plantation\$” OR “poplar plantation\$” OR “spruce plantation\$” OR “teak plantation\$”)
3. Subject: (livelihood\$ OR household\$ OR small\$holder* OR rural OR “local communit*” OR “rural communit*” OR indigen* OR ethnic* OR tribal* OR conflict* OR welfare OR well\$being OR income OR *employment OR job\$ OR subsistence OR labo\$r OR socio\$economic* OR attitud* OR perception\$ OR poverty OR infrastructur* OR out\$grower* OR “customary right\$” OR “land right\$” OR “property right\$” OR tenu* OR “tenure systems” OR *migration OR displace* OR power OR gender* OR trade\$off* OR health OR ownership OR access OR “benefit sharing” OR “food security” OR “living conditions” OR “social indicators” OR “social inequalities”)

Final search: 1 and 2 and 3

Google Scholar

tree forest large-scale industrial plantation concession livelihood income poverty jobs conflict employment rural smallholder household community rights

Annex 4. Databases

Scientific literature

Web of Science by Thomson-Reuters
<https://webofknowledge.com>

Scopus by Elsevier
www.scopus.com

CAB Abstracts by Centre for Agriculture and Bioscience International in OVID interface
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&MODE=ovid&NEWS=n&PAGE=main&D=caba>

Google Scholar by Google
www.scholar.google.com

Grey literature

African Development Bank Group
www.afdb.org/en/documents/

African Forest Forum
www.afforum.org/all-publications

Asian Development Bank
www.adb.org/publications

Australian Centre for International Agricultural Research
<http://aci-ar.gov.au/publication/latest>

Center for International Forestry Research
www.cifor.org/library/

Finnwatch

a. www.finnwatch.org/fi/julkaisut

b. www.finnwatch.org/fi/keitae-olemme/2-uncategorised/16-finnwatch-verkoston-julkaisut

French Agricultural Research Centre for International Development
www.cirad.fr/en/publications-resources

Food, Agriculture and Natural Resources Policy Analysis Network
www.fanrpan.org/resources/

Food and Agriculture Organization of the United Nations
www.fao.org/publications/en/

Forest Trends
www.forest-trends.org/publications.php

Friends of the Earth
www.foei.org/resources

Environmental Justice Organizations, Liabilities and Trade
www.ejolt.org/resources/

FIAN International
www.fian.org/library/publications/

Forest and Wood Products Research and Development Corporation
www.fwpa.com.au/about-us/corporate-documents.html

Forest Peoples Programme
www.forestpeoples.org/publications

Forest Trends
www.forest-trends.org/publications.php

Forest Stewardship Council
<https://ic.fsc.org/en/resources>

Global Partnership on Forest and Landscape Restoration
www.forestlandscaperestoration.org/resources

Greenpeace
www.greenpeace.org/international/en/publications/Campaign-reports/Forests-Reports/

International Finance Corporation
www.ifc.org/wps/wcm/connect/publications_ext_content/ifc_external_publication_site/publications/

International Institute for Environment and Development
<http://pubs.iied.org/>

Annex 4. Continued

Grey literature

- Inter-American Development Bank
https://publications.iadb.org/facet-view?locale-attribute=en&field=type_view
- International Institute for Sustainable Development
www.iisd.org/library
- International Land Coalition
www.landcoalition.org/en/resources
- International Union for Conservation of Nature
www.iucn.org/knowledge/publications_doc/
- International Union of Forest Research Organizations
<http://193.170.148.70:3002/PSI/init.psi>
- International Tropical Timber Organization
www.itto.int/publication_list/
- Oakland Institute
www.oaklandinstitute.org/publications
- Overseas Development Institute
www.odi.org/publications
- Oxford Committee for Famine Relief
www.oxfam.org/en/search-page?search_api_views_fulltext
- Programme for the Endorsement of Forest Certification
www.pefc.org/resources/brochures
- Program on Forests
www.profor.info/knowledge
- Rainforest Alliance
www.rainforest-alliance.org/publications?cat=58
- Resources for the Future
[www.rff.org/research?type\[\]=work&research_topics\[\]=119](http://www.rff.org/research?type[]=work&research_topics[]=119)
- Rights and Resources Initiative
<http://rightsandresources.org/en/resources/rri-analysis/#.VztA5kaJn-U>
- Swedwatch
www.swedwatch.org/sv/rapporter
- The Forests Dialogue
<http://theforestdialogue.org/publications>
- Transnational Institute
www.tni.org/en/search?sort_by=created&
- United Nations Development Programme
www.undp.org/content/undp/en/home/librarypage.html
- United Nations Environment Programme
www.unep.org/publications/
- United Nations Framework Convention on Climate Change
http://unfccc.int/essential_background/background_publications_htmlpdf/items/2625.php
- United Nations Industrial Development Organization
www.unido.org/publications.html
- World Agroforestry Centre
www.worldagroforestry.org/our-publications
- World Bank Group
<https://openknowledge.worldbank.org/browse?type=topic>
- World Conservation Monitoring Centre
www.unep-wcmc.org/resources-and-data
- World Rainforest Movement
<http://wrm.org.uy/category/books-and-briefings/>
- World Resources Institute
www.wri.org/publication
- World Wildlife Fund
www.worldwildlife.org/publications?initiative_id=forests
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CIFOR Working Papers contain preliminary or advance research results on tropical forest issues that need to be published in a timely manner to inform and promote discussion. This content has been internally reviewed but has not undergone external peer review.

Background. To meet increasing demand for forest products and services, the global area of planted forests has increased dramatically over the past 25 years. Further increases in large-scale tree plantations are expected due to their high productivity, economic profitability and contribution to climate change mitigation targets. This raises questions about their long-term sustainability, as well as their impacts on forest ecosystem services and local livelihoods, particularly in countries characterized by rural poverty and insecure property rights. Previous studies have revealed mixed impacts, but there is a lack of research on the contexts and practices that can contribute to positive and/or negative socioeconomic impacts. This protocol provides guidelines for a systematic review that synthesizes the current literature on the direct and indirect impacts of large-scale plantations on local communities, and which will also identify trends, bias and gaps in the empirical evidence base.

Methods. The primary research question of the systematic review asks “What are the direct and indirect socioeconomic impacts of large-scale tree plantations on local human populations?” We apply a Population–Exposure–Comparator–Outcome–Context (PECOC) framework to structure each stage of the systematic review, which comprises a comprehensive literature search, screening, quality assessment, data extraction and analysis. We define the *exposure* of interest to be the establishment or management of a large-scale tree plantation by external actors, *population* of interest as households and communities living in close proximity to plantation sites, *comparators* as other communities who have not experienced the same exposure as well as the same communities prior to plantation establishment, *outcomes* as the direct or indirect socioeconomic impacts felt by the population as a result of plantation establishment, and *context* as the social, political and environmental factors that may have led to differences in experienced impacts. We will search multiple bibliographic databases and organizational websites for relevant studies in both the published and grey literatures. These results will be screened by their titles and abstracts followed by their full texts based on predetermined eligibility criteria. To ensure that selected studies have controlled for potential biases, quality assessment will then take place alongside data extraction. Finally, the results of quantitative and qualitative analyses will be reported in a narrative synthesis.



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This research is carried out by CIFOR as part of the CGIAR Research Program on Forests, Trees and Agroforestry (FTA). This collaborative program aims to enhance the management and use of forests, agroforestry and tree genetic resources across the landscape from forests to farms. CIFOR leads FTA in partnership with Bioversity International, CATIE, CIRAD, INBAR, Tropenbos International and the World Agroforestry Centre.



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