

**DEVELOPING A SUSTAINABILITY ASSESSMENT  
FRAMEWORK - CASE ENVIRONMENTAL  
PROGRAMME OF CENTRAL FINLAND**

**Jyväskylä University School  
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JYVÄSKYLÄN YLIOPISTO

**ABSTRACT**

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<p>The second environmental programme of Central Finland for 2010-2015 was prepared through wide stakeholder collaboration to encourage the whole region to take concrete actions towards sustainability. The study consisted of two parts; firstly, through a literature review on the concept of sustainability assessment, a tailored framework is developed to assess the realization of environmental programme of Central Finland. Secondly, this framework is implemented to investigate empirically concrete actions contributing to the programme aims and general development of the region, and to assess the achievement of the objectives of the programme. The empirical data is based on a data analysis of quantitative regional environmental data from the years 2009-2015, as well as a content analysis of eight individual interviews and one focus group interview. All interviewees participated in the creation of the programme as expert representatives of various stakeholder groups and have been employed by the same organization or in similar duties throughout the programme period.</p> <p>Out of 101 objectives of the programme, 52 % were achieved, 33 % partially, 4 % not achieved, and 11 % were not able to assess. In all 16 themes of the programme, a positive progress could be identified in accordance with the objectives. State of the waterways, climate impacts from the transportation and biodiversity indicated also negative development trend. The programme influenced the region mainly during the preparation phase on individual and organisational level, while during the programme period, other policy documents overshadowed the environmental programme. Wide participation of stakeholders enabled establishing feasible objectives, enhanced mutual learning, and laid the basis for further collaboration and regional development work. The findings also provide suggestions for possible future environmental programmes. The assessment framework created for this study provided an appropriate tool and a theoretical basis for assessing flexibly a regional programme in a Finnish context.</p>		
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## TIIVISTELMÄ

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<p>Keski-Suomen toinen ympäristöohjelma 2010-2015, Sanoista tekoihin, laadittiin laajan maakunnallisen sidosryhmäyhteistyön tuloksena vuonna 2009 päätavoitteenaan kannustaa koko aluetta konkreettisiin toimenpiteisiin kohti kestävämpää tulevaisuutta. Kaksiosaisessa tutkimuksessa muodostettiin ensin kestävä kehityksen arviointiin liittyvän kirjallisuuskatsauksen pohjalta räätälöity teoreettinen malli ympäristöohjelman arviointiin. Empiirisessä tutkimuksessa sovellettiin mallia käytäntöön kartoittamalla, mitä toimenpiteitä oli toteutettu ja millainen yleinen kehityssuunta maakunnassa oli ollut ohjelmakauden aikana. Näiden pohjalta arvioitiin ympäristöohjelman tavoitteiden toteumaa kahdelta näkökantilta; 1) vuosilta 2009-2015 kerätyn alueellisen numeerisen ympäristötiedon data-analyysin sekä 2) kahdeksan yksilöhaastattelun ja yhden ryhmähaastattelun pohjalta laaditun sisällönanalyysin pohjalta. Kaikki haastateltavista osallistuivat ympäristöohjelman laatimiseen eri sidosryhmien asiantuntijaedustajina ja he olivat jatkaneet työskentelyä vastaavissa tehtävissä alueella koko ohjelmakauden ajan.</p> <p>Yhteensä 101 tavoitteesta 52 % toteutui, 33 % osittain, 4 % ei toteutunut ja 11 % ei arvioitu. Kaikissa ohjelman teemoissa oli edetty vuodesta 2009, valtaosassa tavoitteiden mukaisesti, tosin vesien tila, liikenteen ilmastovaiikutukset ja luonnon monimuotoisuus osoittivat myös negatiivista trendiä. Ohjelman ohjausvaikutus maakuntaan keskittyi valmisteluryhmien toiminta-aikaan sekä yksilö- että organisaatiotasolla - varsinaisella ohjelma-ajalla ympäristöohjelma jäi muiden ohjelmien varjoon. Laaja sidosryhmäyhteistyö mahdollisti realistisen tavoiteasetannan, edisti yhteistä oppimista sekä pohjusti myöhempää alueellista kehitystyötä. Tulokset myös tarjoavat ehdotuksia mahdollisia tulevia ympäristöohjelmia varten. Arviointia varten luotu kehikko sopi maakunnallisen ympäristöohjelman arviointiin antamalla työlle luontevan mutta joustavan viitekehyksen.</p>		
Asiasanat	Kestävä kehitys, kestävä kehityksen arviointi, ympäristöohjelma	
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# 1 INTRODUCTION

## 1.1 Background

A sea cucumber farm in Madagascar (Vincent & Morrison-Saunders 2013), a small Slovenian municipality (Kostevšek et al. 2015) and 15 European countries (Ang et al. 2011) – all subjects in which sustainability assessment can and has been implemented. To understand the multi-layered, complex, and emerging concept of sustainability assessment (SA), one need to trace back to the roots of sustainability in the 1980's, when Brundtland Commission defined sustainable development (SD), as *“a development that meets the needs of current generations without compromising the ability of future generations to meet their needs”* (WCED 1987). Later, definition was supported by the action points for sustainability from Rio Earth Summit in 1992 (UN 1992) and recently refreshed sustainable development goals (UN 2015). The term is closely linked or sometimes even used as a synonym for sustainability due to its two dimensions; the notion of development (making better) and sustainability (maintaining). Both aspects are focused on human-centred activities such as agriculture, natural resource management, health care provision and urban centres. (Bell & Morse 2003, 3.)

The impacts of human actions are most commonly approached from a three-pillar or a triple-bottom line perspective, though the number of pillars can vary between two to five. Three-pillar approach have been claimed do distract and limit research since not all local level development issues are clearly either environmental, social, or economic. (Gibson 2006a; Gibson 2006b.) Other challenges with limited number of categories are the controversies and overlapping between the categories and creating situations in which people are required to balance between two aspects, e.g. health and environmental impacts (Hodge 2014) and not examining their interconnections (Richter et al. 2015). The ambiguity of SD has been claimed to disperse the field of sustainability by creating a variety of practices and different understandings the concept (Holden et al. 2014). On the other hand, Nitin Desai, a senior adviser to the Brundtland Commission and a key draftsman of the report sees the ambiguity of SD as strength, since it can connect economics, ecology, and ethics (UNCSD 2007), and *“keep everyone at the table”* involved in continuous discussion around a loose framework in which conversation can occur without losing time for conceptual disagreements (Pope et al. 2017; Dryzek 2013; Connelly 2007).

However, 30 years later there is still no consensus on how to integrate sustainable development into action (UNCSD 2007), nor how it should be assessed. Hacking and Guthrie (2008) simply define sustainability assessment (SA) as a process that directs the planning and decision-making towards sustainability. OECD defines assessment in a narrower sense than evaluation. Though both are used to support policy tools, assessment focuses on the effects of the intervention,

whereas evaluation is likely to cover a wider range of issues such as the appropriateness of the intervention design, the cost and efficiency of the intervention, its unintended effects and how to use the experience from this intervention to improve the design of future interventions. (OECD 2014.)

However, any of the definitions of SA or SD do not set any clear indicators or levels for sustainable development, leaving assessment practitioners much to define themselves (Somogyi 2016), including the crucial questions of how to conduct the process, with which purposes, and what all aspects to include. As a result, SAs are often more debatable than other forms of assessments due to a confusing amount of different approaches (Dalal-Clayton & Sadler 2014). The great variety of frameworks from sustainability appraisal (Dalal-Clayton & Sadler 2014; Pope et al. 2004; Pope et al. 2017), sustainability impact assessment (OECD 2010), integrated assessment (Sala 2013; Sala 2015), integrated sustainability assessment (Weaver & Rotmans 2006), strategic environmental assessment (OECD 2006) and environmental impact assessment (EIA) also challenges the practitioners when identifying suitable tools for different contexts (Noble et al. 2012). While the emerging SA frameworks aim at comprehensiveness, in some cases they actually reduce complex systems into simplified concepts (Bond & Morrison-Saunders 2011) resulting in arbitrary structures deteriorating the legitimacy of SA as a policy tool (Landerretche et al. 2017). Also, increasing interest in either highly participatory assessments for future impacts of a policy, or expert-based impact assessments conducted afterwards, has created an unrealistic processual perception that sustainability outcomes can be established at the time of decision and they remain unchanged during the process (Morrison-Saunders et al. 2014).

Sustainability assessment research is not versatile just due to number of similar concepts but also, the levels in which the studies are conducted; global, national, organisational. Some studies focus purely on macro-level, in which the research is focused on literature reviews on the concepts and frameworks created by others and normative categorizing of different approaches (Pope et al. 2017; Sala 2013; Sala 2015; Gibson 2006b; Reed et al. 2006; Waas et al 2014; Wang et al. 2015; Morrison-Saunders et al. 2014). These studies are fuelled by geographically, timely and sectoral more specific studies, which create a new approach, model, or a framework (Adinyira et al. 2007; Douthwaite et al. 2003; Pintér et al. 2012; Dalal-Clayton & Sadler 2014; Ali-Toudert & Ji 2017). Still, the most common form of sustainability assessments are case studies concerning a specific country with a focus on one sector (Kuosmanen 2014) or more often at regional level (e.g. Laatikainen 2013; Lohilahti 2014; Panula-Ontto-Suuronen 2012).

In Finland, the pace of development of SA practices have been modest compared with international level due to focusing more on monitoring and collection of data than the promotion and dissemination of indicators (Rinne et al. 2013). In early 21<sup>st</sup> century there has been a shift towards more strategic and regional policy-making requiring for integration of new approaches to traditional environmental assessments that can consider also cumulative effects (Olagunju & Gunn 2016). In Finland this has been reflected for instance in the National strategy for sustainable development (Prime Minister's Office 2006, 29) and the Government programme for 2007-2010 (2007, 62), which both appealed all the municipalities



and cities to create their own SD programme. SD strategies as steering instruments both in EU and Finland are criticised for having only little weight compared with other strategies (MoE 2009) and a single strategy being unable comprehensively integrate sustainability issues to all sectors by itself (Nordbeck & Steurer 2016). Still, in 2017 all the 18 regions in Finland had an environmental strategy or similar. In total seven regions in Finland had an ongoing environmental programme (Ilvessalo-Lax 2015, Laatikainen 2013; ELY Centre for Southwest Finland 2017; Uudenmaan ympäristökeskus 2007) in six regions the programme had expired (Pohjois-Pohjanmaan ympäristökeskus 2014; Council of Tampere Region 2011; Panula-Ontto-Suuronen et al. 2008; Regional Council of South Karelia 2017; Pohjois-Karjalan ympäristökeskus 2010; ELY 2010) and five did not have a separate document, instead they had included the environmental objectives into regional plans or climate strategies. In addition, most of the largest cities have their own environmental or sustainability strategies and evaluations (Jalonen 2002; Kouvola city 2015).

Environmental programme is sometimes used as a synonym for environmental strategy, environmental policy, or the word environmental is replaced with 'sustainability'. Similar terminological variety exists in Finnish language as well, however the term environmental programme (*ympäristöohjelma*) remains one of the most commonly used and therefore it is used in this paper. In an environmental programme, the aims and general alignments of an organisation or a community are defined to diminish the environmental harm (Kestävän kehityksen ohjelma n.d.; Ympäristöohjelma n.d.) and reinforce positive environmental impacts (EC 1221/2009, art. 2, 8; ISO 14001:2004). In addition, it can have a general description of the current state of the organisation and a plan of action with a detailed schedule, objectives, actions, responsibilities, and an assessment (Pääkaupunkiseudun Kierrätyskeskus 2008). Similar with an environmental policy, an environmental programme provides a framework for action and for the setting of environmental objectives and environmental targets (ISO 14001:2004), without limiting the content, amount of details of criteria used for creating the programme. Thus, environmental programme can be very concrete and practical compared to policies. For instance, the EMAS regulations consider environmental programme as the description of the measures, responsibilities and means taken or envisaged to achieve environmental objectives and targets and the deadlines for achieving the environmental objectives and targets (EC 1221/2009, art. 2, 10), which in other sources may be referred as an action plan rather than a programme.

## 1.2 Aim of the study

The main aim of this paper is to assess the environmental programme of Central Finland 2010-2015, how the objectives were met and were the planned action realized. The findings of the study describe the general development trends both on regional as well as on national level, and serve as a background information

for possible future environmental programmes or policies. The study was subscribed by the Centre for Economic Development, Transport, and the Environment (ELY Centre) of Central Finland, which is responsible for the regional implementation and development tasks of the central government. In total, the 15 ELY Centres are spread throughout the country and in almost all the counties have one Centre, which are tasked with promoting regional competitiveness, well-being and sustainable development and curbing climate change. Administratively, the ELY Centres are under the Ministry of Employment and the Economy, however, they receive tasks from other ministries such as Ministry of the Environment, Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Ministry of Education and Culture and Ministry of the Interior. (Centre for Economic Development, Transport, and the Environment 2016.)

Central Finland is a challenging area for sustainability assessment since it comprises of 23 very different municipalities varying from 750 to 140 000 inhabitants. The city of Jyväskylä with the largest population is the clear economical and educational capital city of the region, neighbored by three mid-sized towns and the rest having population less than 10 thousand people each and the smallest one, Luhanka, being the home for 750 people. (SVT 2017.)

*Sanoista tekoihin* (From words to deeds) regional environmental programme 2010-2015 is the second environmental programme for Central Finland, the first one covering the period between 1997-2005 (Keski-Suomen ympäristökeskuksen neuvottelukunta 1997). The second programme was created in cooperation with municipalities, the Regional council of Central Finland, local businesses, inhabitants, and NGOs. The programme period was kept relatively short – only five years – since the main aims were to encourage the whole region to concrete actions, to be part of regional planning, promote cooperation in preparation of regional plan and programme as well as combine and supplement other regional strategies and programmes. Besides concrete actions, the programme had an emphasis on regionally most significant environmental issues such as regional planning, climate change, water systems, biodiversity, and biomass. (ELY 2010; Onkila et al. 2008.) The Regional council of Central Finland conducted a mid-term evaluation of the programme in 2012-2013 via email questionnaires and a public online survey. However, the number of answers were modest, and the assessment was considered challenging, since many of the projects were still ongoing, change in personnel and lack of statistical data to refer to. (Jäntti 2013; Kokki 2013; R. Väliavaara, personal communication 8.2.2017; Kunttu 2013.)

The study consists of two phases; the development of the sustainability assessment framework for the environmental programme through a literature review in the theoretical section, and secondly, an empirical assessment of the realization of the environmental programme. The first part of the theory discusses the concept of SA on a conceptual level, while the second part focuses on individual frameworks for SAs. As a result, the approach for sustainability assessment in this study is defined by Bellagio STAMP (Pintér et al. 2012) and Gibson's (2006a) principles for SAs, and common features found during the literature review, namely top-down and ex-post assessment, combining qualitative, quantitative as well as subjective and objective approaches. In the second phase, the

framework is implemented in the assessment of the environmental programme of Central Finland. Based on the aims in the programme and discussions in the local ELY Centre, the following research questions were identified for the empirical part of the study:

1. What concrete actions were conducted during the years 2010-2015 towards sustainability in Central Finland?
2. How has sustainability of Central Finland developed?
3. Were the objectives of the environmental programme achieved?

The environmental programme includes 16 themes varying from biodiversity to cultural heritage and transportation. Each theme contained several qualitative and quantitative sub-objectives, 101 in total. In this study, the 16 themes are categorised into three main topics; 1) regional planning, 2) natural resources and environmental protection, and 3) research and awareness. The first topic covers the themes concerning the town planning, infrastructure, and regional development. The second category is linked with direct environmental impacts caused by human habitation such as emissions, usage of natural resources and biodiversity. The last topic supplements both former categories discussing the research, data availability and the level of environmental awareness in the region.

The main data sources were 12 semi-structured interviews with experts participated in the preparation of the programme and 36 quantitative environmental indicators describing the development of the natural environment in the region such as the level of emissions, waste, transportation, and energy usage. Eight interviews were conducted individually and one in a focus group with four participants, and all interviews were analysed through content analysis. The mixture allowed assessing all 16 themes individually, even if not all the 101 objectives could be covered due to lack of measurability, monitoring or access of data. The data collection and methods are discussed with more details in chapter 3 and the findings in fourth section. Finally, in conclusions, the feasibility of the developed framework for this study is analysed, the reliability of the study is assessed and implications for future are presented.

## 2 SUSTAINABILITY ASSESSMENT

### 2.1 The concept and principles

Sustainability assessment (SA) as a process that directs the planning and decision-making towards sustainability (Arodudu et al. 2017; Hacking & Guthrie 2008) while ensuring environmental, social, and economic well-being (Vincent & Morrison-Saunders 2013) is still highly nuanced concept (Pope et al. 2017) even if it has been used for several decades. At first, SA used to be influenced by the environmental assessment and planning regimes adapting both design and methodology from those fields as well as conventional law and policy tools. Later, SA has spread into other regimes such as land-use planning, site restoration, corporate greening, community-level development assistance and trade-option evaluation, thus, introducing a wide range of new tools such as certification schemes, corporate behaviour codes, ethical investment criteria, sustainable livelihood analyses and multi-stakeholder collaborations. (Gibson 2006a.)

While SA have spread through different disciplines, the number of different conceptualisations of sustainability have emerged influencing also how sustainability assessments are understood, as well as the aims in SAs (Pope et al. 2017). On philosophical level, sustainability assessments tend to range from anthropocentric to eco-centric perspectives, in other words from monetary aspects and human well-being to resource consumption and natural carrying capacity (Gasparatos & Scolobig 2012). Commonly the two perspectives are integrated in various ways. Depending on the normative background, different approaches, models, and methodology have been applied (Ali-Toudert & Ji 2017) creating a diverse net of terminology for each case (Pope et al. 2017). Besides SA, the evaluation of sustainable development has been named as sustainability appraisal, sustainability impact assessment (OECD 2010) integrated sustainability assessment (Weaver & Rotmans 2006), strategic environmental assessment (OECD 2006), and integrated assessment (Sala 2013; Sala 2015). In some cases, evaluation is used as a synonym for an assessment, even if the former is defined simply an act of judging which occurs in a limited time (Assessment 2017; Evaluation 2017), which is a misleading and too narrow perspective to sustainability assessments.

As a tool for planning and decision-making, SA is expected to generate valuable information in structured form but also to foster a forum for participation, debate, and social learning (Arodudu et al. 2017; Waas et al. 2014). Therefore, SA is both about the content of assessment and the process of dealing with it, especially in terms of participation, transparency, precaution, and responsiveness to change (Waas et al. 2014). The purposes of SA can simply be summarized into four questions of *what, where, when* and *who*, in which *what* refers to anticipated impacts, *where* and *when* to specific space and time, and *who* to the stakeholders included (Arodudu et al. 2017). Especially the dimension of stakeholders may have caused social tensions, since the decision-making processes do not always

follow rational paths, instead attitudes and emotions play a role as well (Waas et al. 2014) giving SAs also value-based dimension (Podger et al. 2016). In some cases, the results of SAs have been even contested since they lack the participation of stakeholders entirely (Gibson 2006a) or can contribute to the legitimization of governmental action (Rydin 2007) or compel stakeholders to face sustainability issues which they do not want to confront. Thus, SA practitioners have started to divide stakeholders into different interest groups, such as decision makers and decision takers (Arodudu et al. 2017).

Due to the struggles of defining SA and developing practices, there has been attempts of creating a universal set of principles for guiding both researchers as practitioners. A group of experts invited by OECD, ISSD and Rockefeller Foundation developed an eight-point Bellagio STAMP (the Bellagio SusTainability Assessment and Measurement Principles) defining four dimensions relevant in SAs; the questions to be answered (*content*), ways of carrying the SA (*process*), the range of the assessment in terms of time and geography (*scope*), and maximizing the influence in decision-making (*impact*) (Gutierrez-Espeleta 2009; Pintér et al. 2012). Gibson (2006a) worked as an individual researcher but with extensive literature review, he resulted in suggesting also eight main principles with different approach. Figure 1 visualizes the comparison between the principles of Gibson's and Bellagio's, suggesting three points are similar in both lists but the other principles differ significantly. The basis for Gibson's version lays in eco-centric perspective with a strong focus in innovative thinking, whereas Bellagio STAMP is more anthropocentric concerning on stakeholders and transparency.

The common factors regarded comprehensiveness and precaution, continuity, and consisting of both local and universal dimension. Firstly, both guidelines emphasized comprehensive understanding of sustainability in terms of biophysical and socio-economic issues, as well as their interactions. At the same time, due to highly complex and multi-layered nature of SA, the practitioners need precaution to balance between comprehensiveness and uncertainty. Gibson (2006a) divided comprehensiveness and precaution as two individual principles (1<sup>st</sup> and 2<sup>nd</sup>) but in STAMP they were both included in the second principle (Pintér et al. 2012). Related with complexity, sustainability was considered as an open-ended process requiring continuous improvements. Finally, though the assessments can be conducted on case-by-case basis with a limited time horizon and geographical scope, the issues reach to global level and global aspects influences the local level. (Gibson 2006a; Pintér et al. 2012; Lamorgese & Geneletti 2013.)

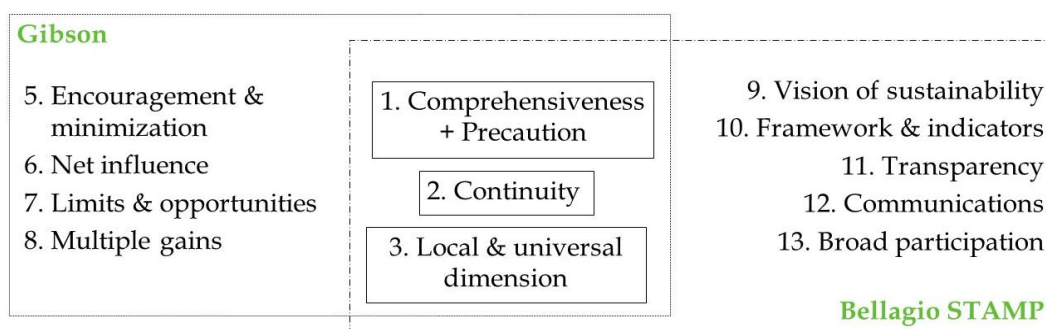


Figure 1: Comparison of Gibson's and Bellagio STAMP principles for sustainability assessment.

The differences between the guidelines demonstrate the various expectations related with SAs. Gibson (2006a) emphasizes positive aspects, aiming at multiple reinforcing gains and corrective actions in complex systems. While the multi-layered nature of sustainability causes limitations in SAs, the principles suggests it also leaves space for opportunities and innovativeness. (Gibson 2006a.) Thus, the principles stay at rather philosophical level compared with Bellagio stamp, which announces its vision of sustainability as the '*goal to deliver well-being within the capacity of the biosphere to sustain it for future generations*', proceeding then to more practical level of framework and indicators, the process of conducting SA, involving stakeholders and external communications (Pintér et al. 2012). In both, the influence of Brundtland Commission's definition for sustainable development with the triple-bottom-line thinking (WCED 1987) is visible, still the pursuit of the principles is rather different. The way of expression in Gibson's work is encouraging and empowering, delivering inspiring and abstract images about sustainability, whereas, Bellagio STAMP proceeds from abstract level and visioning towards practicalities and concrete steps. Therefore, Gibson leaves more flexibility to the practitioner to adapt the guidelines in various ways, while STAMP establishes a framework to be followed in a standardised manner.

## 2.2 Assessment methods and frameworks

When approaching the question how to conduct sustainability assessment, there are no single answers, rather a massive number of different options (Noble et al. 2012). Pope et al. (2017) summarized it well by stating "*the challenge is to recognize the diversity of practice*", meaning that most SA frameworks are designed for specific and restricted examples and they cannot be grouped together or compared with each other without recognizing this (Pope et al. 2017) and requiring transparency from the framework developers (de Olde et al. 2017).

Weighting between different categories and pillars of sustainability varies significantly. The literature review of Ali-Toudert and Ji (2017) compared six sustainability rating models revealing great differences between the understanding of sustainability. Models were compared in themes and how they emphasized each of those themes when assessing the level of sustainability. As a result, land use was weighted highly in all the models and in one of them even as the most significant factor. Infrastructure and resources were also often rated high, whereas climate change, economy and culture varied largely. (Ali-Toudert & Ji 2017.) SA frameworks have been accused of having too narrow focus on short-term improvements, not considering adequately the complexity of human and ecological effects and treating environmental aspects as constraints (Gibson 2006a). Also, many of the models are relying on a limited set of indicators even if they do not necessarily describe the development or the level of sustainability comprehensively or pre-set indicators prove to be ineffective (Wang et al. 2015). Due to narrow approach, SA tools may result in different conclusions regarding

the sustainability (de Olde et al. 2017), and thus, lose its purpose as a mean of directing decision-making.

Large expansion of sustainability assessment frameworks has inspired research also to study the models themselves, categorize them and compare with each other (Ness et al. 2007; Pope et al. 2017; Gasparatos & Scolobig 2012). Pope et al. (2017) divided SA practices based on the main aim of SA into three following categories: 1) baseline-driven integrated assessment aiming at minimizing negative impacts in all three pillars of sustainability, 2) objective-led integrated assessment maximizing positive outcomes in all three pillars, and 3) assessment for sustainability aiming to assess whether an activity was sustainable. (Pope et al. 2017.) Apart from general aims of SA, more common is to categorize tools according to methodology they are utilizing such as monetary, indicators-based, or integrated models (Gasparatos & Scolobig 2012; Ness et al. 2007). Emerging number of tools and frameworks challenges the practitioners (Noble et al. 2012), since often the selection of tools for SAs are the responsibility of an analyst, which may not have a comprehensive understanding of the theoretical background nor the cultural, political, and economic context in which the assessment is implemented (Gasparatos & Scolobig 2012). The information gap has produced a variety of guidelines from UN bodies and other agencies such as European Commission's Impact assessment guidelines (EC 2009), OECD's DAC guidelines (2006) and guidance on sustainability impact assessment (2010).

In addition, Gasparatos and Scolobig (2012) identified four proposals how to select an appropriate tool for SA. Firstly, determining the desired perspective between anthropocentric and eco-centric, in other words, monetary and biophysical aspects. Second proposal suggests the features of the SA, for instance does the assessment integrate all three pillars of triple-bottom-line, future impacts, inter- and intra-generational aspects, the needs, values, and expectations of stakeholders while recognising the uncertainties. The third proposal is adopted from Pope et al. (2017) discussed earlier in this chapter, depending on whether the assessment is wanted to minimize negative impacts (*baseline-driven*), maximise positive results (*objective-led*) or assessing the level of sustainability. The final proposal is based on the values of the affected stakeholders and whether they are concerned of other humans (*social-altruistic values*), non-human species (*biospheric orientation*) or self-interest (*egoistic values*). (Gasparatos & Scolobig 2012.) For this study, categorizing SAs according to different features is most feasible option and will be further discussed in the following chapter.

### 2.2.1 Four vectors of SA

The second step of the literature review aimed at discovering common features for sustainability assessments, which could describe and define the approach for conducting the assessment, as well as demonstrate the variety of different ways to understand SAs. As a result, four counterparts were found; top-down and bottom-up, ex ante and ex-post, qualitative and quantitative, subjective, and objec-

tive (e.g. Douthwaite et al. 2003; Pope et al. 2017; Waas et al. 2014). Each SA framework balances between some or all the lines visualized in figure 2 below. For instance, some might be fully top-down assessments ending up in the far end of the line, whereas, others mix the two being rather located in the middle.

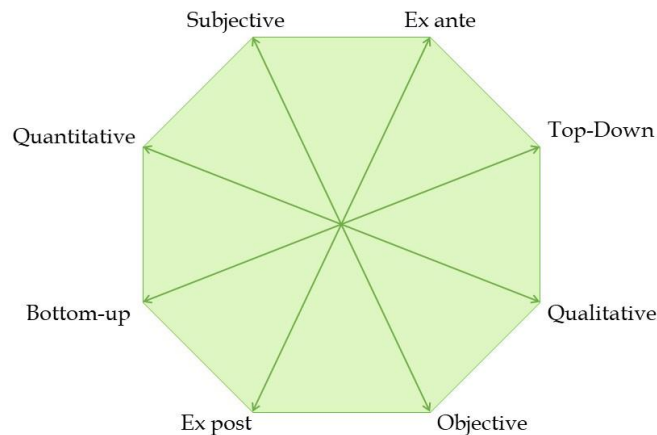


Figure 2: Four counterparts which define the approach for a sustainability assessment.

*Ex ante* – *Ex post*, sometimes also called as prescriptive – descriptive or normative - descriptive dimension refers to the timing and the main aim of the assessment. *Ex ante* SAs are conducted before a policy or a plan is implemented to anticipate possible future impacts or support decision-process between various options, whereas, *ex-post* assessments occur after the intervention (Pintér et al. 2012). *Ex ante*, such as van Hardeveld et al. (2017) and Sierra et al. (2017) is often due to a policy or a new technique which is planned to be launched with the possibility of a societal conflict (Pintér et al. 2012). In these cases, the assessment is often sectoral, considering only one field of industry and not the whole society (Arushanyan et al. 2017), relying on continuously updated databases and indicator systems (Pintér et al. 2012). *Ex-post* assessments have been conducted in two stages in which the first stage is a self-evaluation of a project to identify direct outcomes and the second stage after the finish of the project to learn about long-term impacts (Douthwaite et al. 2003; Dor & Kissinger 2017). The counterpart may define the approaches for other three counterparts as well, for instance, in *ex-post* bottom-up assessments the stakeholders are often the affected population. In *ex-ante*, however, they might be the parties which can affect the future such as politicians, municipalities, and producers. (Arushanyan et al. 2017.) Also, the terminology may differ in the assessments, for instance in *ex ante* SAs a criterion for assessments are often predefined in the form of questions, whereas, in *ex-post* SAs indicators are used and they are formulated as objectives rather than questions (OECD 2014; Ali-Toudert & Ji 2017).

*Top-down* – *bottom up* or also known as expert – community or reductionist – conversational approach describes the vertical direction of the SA (Waas et al. 2014). Top-down assessments are often relied on globally agreed frameworks and principles (Sala 2013; Arushanyan et al. 2017; Gasparatos & Scolobig 2012), quantitative criteria and indicators (Waas et al. 2014) defined by experts (Sierra



et al. 2017) with a wider scope on social, economic, and environmental issues (Gibson 2006a). However, inspired by the United Nations conference on Environment and Development in Rio de Janeiro in 1992, sustainable development was more often assumed to be achieved through community-led initiatives, thus, increasing the value of bottom-up approaches for SAs as well (Vincent & Morrison-Saunders 2013). Bottom-up SA's are mainly driven by public concerns related with specific cases or initiatives on community level, often giving less focus on triple-bottom-line thinking and giving more value on local problems and aspirations, which cannot be simply categorised as ecological, social, or economic (Gibson 2006a) and require using qualitative indicators as well (Waas et al. 2014). Since assessments are increasingly required to consider both individual and societal dimensions of sustainability (Arushanyan et al. 2017; Dor & Kissinger 2017), and combining different types of knowledge as well as fostering the learning process the SAs are increasingly required to combine the both (Whitmarsh et al. 2009; Waas et al. 2014).

*Qualitative – quantitative* is a common counterpart for most studies. As SA is initially developed from environmental assessments (Gibson 2006a) including both monetary and biospheric aspects (Gasparatos & Scolobig 2012), the quantitative dimension naturally dominates, and several SA tools are purely quantitative such as ecological footprint (Dor & Kissinger 2017; Kostevšek et al. 2015) and Life cycle assessment LCA (Arodudu et al. 2017; Sierra et al. 2017). However, qualitative frameworks or combinations of both are emerging due to the shift towards human well-being, other societal issues (Arushanyan et al. 2017), and valuing SAs as tools for two-way social learning (Whitmarsh et al. 2009).

*Subjective – objective* approach determines the position of the researcher in the study. Subjective SA is influenced by researcher's personal opinions and values (Arushanyan et al. 2017) while in objective assessments the role of the practitioner is minimized (Kostevšek et al. 2015). Subjective tends to go hand in hand with qualitative bottom-up assessments (Arushanyan et al. 2017), whereas, objective is often paired with top-down and quantitative SAs (Dor & Kissinger 2017; Kostevšek et al. 2015).

### 2.2.2 Integrated approaches

In practice, different approaches of sustainability assessment do not fall into one clear category, instead hybrid models are becoming more common. Also, while SAs are conducted in different contexts, the deficiencies are becoming more apparent. Thus, there is an emerging pressure to create combinations to fill in the missing gaps. Some SA models consider different aspect than the others, and thus, two or several models can be used to supplement each other. (van Hardeveld et al. 2017.) Integration of different approaches benefits the studies by allowing more horizontal and vertical comprehensiveness by including more issues into consideration (e.g. monetary and social well-being) and different societal levels (e.g. local to global), and thus, diminishing the risk of suggesting less sus-

tainable options (Larrey-Lasalle et al. 2017). In other cases, the need for integration may rise from requirement to assess inter-generational aspects or variable futures (Arushanyan et al. 2017)

Single models may also face criticism. Top-down methods such as Life Cycle Assessment are argued of being purely decision-maker tools and not considering decision takers. Other models are accused of lacking spatial and temporal depth, or not assessing adequately specific categories such as biodiversity, land use and food security. (Arodudu et al. 2017.) Biodiversity for example, is often understood in assessments as the species and ecosystem diversity and not as genetic diversity, while regarding some pressures influencing diversity (e.g. emissions, land use) and ignoring others (e.g. noise, artificial light) (Winter et al. 2017).

Another reason for integration is the tendency of sustainability assessments to be in most cases site-bound and the geographical location determines both the approach as well as the content of the assessment due to different societal structures and political systems. The societal structure defines the density of dwelling and whether the assessment concerns urban or rural areas. Also, the in different countries there might be different requirements, needs and possibilities for conducting assessments in terms of access to data, comprehensiveness of environmental monitoring and reliability of public information. Regional differences and experiences have an impact of the understanding of the concept as well. Whereas in UK the traditional way to conduct SAs have been on regional scale, in Australia, South Africa and Canada the practice has been more often used for project evaluations. (Hacking & Guthrie 2008.)

Site-bound assessments are specifically focused on urban contexts, which are most often exceeding the natural carrying capacity in terms of consumption and pollution (Dor & Kissinger 2017). Therefore, also researchers have paid more attention to urban sustainability assessments than rural SAs (Adinyira et al. 2007) or they may focus on one sector such as energy only (Kostevšek et al. 2015). The European Union has also encouraged for urban SA by publishing guidelines for several types of assessments such as EU's ideas for sustainable societies planning (Science for Environment Policy 2015), and the Reference framework for sustainable cities (RFSC 2016). Other urban SA guidelines and frameworks include Belgio STAM principles for sustainability assessment and measurement (Pintér et al. 2012), sustainability appraisal (Dalal-Clayton & Sadler 2014) and a computational tool CAMSUD (Ali-Toudert & Ji 2017).

In Finland, the assessments are often regional consisting if both rural and urban environments or focusing on a specific sector only (Laatikainen 2013; Lohilahti 2014; Panula-Ontto-Suuronen 2012; Kuosmanen 2014). However, the most typical assessments are focusing both sectoral issues such as energy or waste as well as the combination of all sectors (e.g. Lohilahti 2014), using qualitative indicators and methodologies such as Rapid Impact Assessment Matrix (e.g. Laatikainen 2013; Lohilahti 2014). There are some attempts of relying on theoretical models and creating an adapted hybrid approach (Panula-Ontto-Suuronen 2012), yet they are rather scarce.

### 2.2.3 Summary of SA approaches

Among all the reviewed articles, the combination of ex ante (e.g. van Hardeveld et al. 2017; Arushanyan et al. 2017), top-down (e.g. Sala 2013; Manzhynski et al. 2015), quantitative (e.g. Dor & Kissinger 2017; Kostevšek et al. 2015), and objective (e.g. Arnell et al. 2016; Ang et al. 2011) were dominating. However, all eight features were represented in one of the 23 peer-reviewed articles investigated mainly between 2010-2017 to achieve the most up-to-date perspective. As a result, two main streams could be identified in the current literature similarly as in Morrison-Saunders et al. (2014); either top-down, ex ante assessments with qualitative indicators, or bottom-up ex-post SAs combining both qualitative and quantitative measures.

Feature	Study/Framework	Combination of counterparts
Ex ante	van Hardeveld et al. 2017; Arushanyan et al. 2017; Sierra et al. 2017; Arnell et al. 2016; Bond et al. 2011; Phillips 2016; Douthwaite et al. 2003; Larrey-Lassalle et al. 2017	Ali-Toudert & Ji 2017
Ex post	Dor & Kissinger 2017; Ang et al. 2011; Iverot & Brandt 2011; Manzhynski et al. 2015; Lamorgese & Geneletti 2013	
Top-down	Sala 2013; Gasparatos & Scolobig 2012; Sierra et al. 2017; Ang et al. 2011; Manzhynski et al. 2015; Lamorgese & Geneletti 2013	Arushanyan et al. 2017; Dor & Kissinger 2017
Bottom-up	Vincent & Morrison-Saunders 2013; Whitmarsh et al. 2009 Douthwaite et al. 2003	
Qualitative	Arushanyan et al. 2017; Whitmarsh et al. 2009; Landerretche et al. 2017; Manzhynski et al. 2015; Larrey-Lassalle et al. 2017	Iverot & Brandt 2011; Phillips 2016; Douthwaite et al. 2003
Quantitative	Dor & Kissinger 2017; Kostevšek et al. 2015; Arodudu et al. 2017; Sierra et al. 2017; Ang et al. 2011	
Subjective	Arushanyan et al. 2017; Phillips 2016; Douthwaite et al. 2003	-
Objective	Kostevšek et al. 2015; Arnell et al. 2016; Ang et al. 2011; Landerretche et al. 2017; Manzhynski et al. 2015	

Table 1: Summary of the SA models and frameworks considered in this paper.

Depending of the theory used, some of the papers indicated directly in which of the counterparts they belonged in and other made indirect implications. Therefore, the division is partially subjective and partially objective – some of the studies could have been labelled differently. Irrespective of the limited number of elaborated papers, the categorisation suggests which features are emphasized in current sustainability assessments. Even if ex ante and quantitative forms are still the most used forms of SA, new experiences are accumulating in qualitative assessments and balancing between top-down and bottom-up approaches. Therefore, similar analysis conducted after five or ten years might imply different results, locating more studies in the middle of the counterparts. Even now, most of the studies represented integrated models either by combining two existing frameworks (van Hardeveld et al. 2017) or using one exiting model and self-defined additional elements (e.g. Luederitz et al. 2017; Ali-Toudert & Ji 2017).

## 2.3 Sustainability assessment for Central Finland

The assessment of the environmental programme of Central Finland is based on three perspectives. Firstly, based on the literature review, four principles are identified for this study; three of them found both in Bellagio STAMP as well as Gibson's (2006a) principles for SA, and the fourth describing the desired features in this study. Secondly, the scope of the study is based on the research questions, and spatial and temporal limitations. The content of the study is created by the structure and objectives named in the environmental programme. Therefore, the approach in this study is similar with Lamorgese and Geneletti (2013), Gibson (2006a), and Luederitz et al. (2017) in terms of adapting and combining sets of criteria for a specific context.

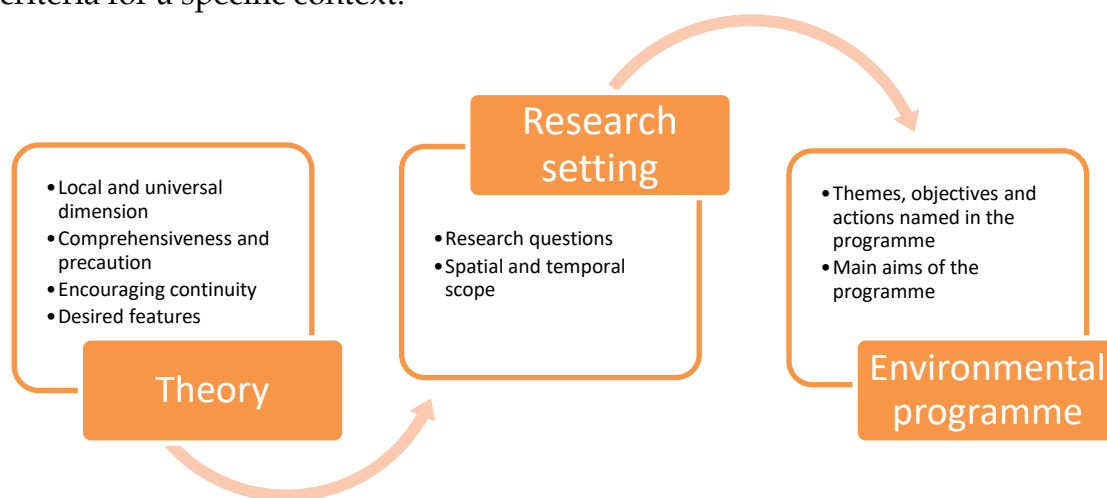


Figure 3: Process of assessing the environmental programme for Central Finland.

### 2.3.1 Theoretical approach and principles

The three common principles in Bellagio STAMP and Gibson's principles for sustainability assessments are the cornerstones of this study. The other principles such as transparency and the recognition of limits and opportunities are not, however, completely ignored, rather, they influence in the background both inspiring and guiding the thinking. Whereas, in both Gibson's and Bellagio STAMP principles the context-dependency is referred as the third or seventh principle (Gibson 2006a; Pintér et al. 2012), in this study it is the first guideline to be followed due to a unique spatial and temporal scope of the assessment. The fourth principle concerns the desired features to determine and describe the approach for conducting assessment for the environmental programme for Central Finland.

#### 1. Local and universal dimension

Even if there are universal aspects in the concept of sustainability, they are always bound to certain time and place, thus, sustainability can be considered in different ways in different locations and time frames (Gibson 2006a). Central Finland is a heterogeneous region consisting of everything between

fast-developing urban areas, small rural municipalities, and wilderness. In cases like this, high level of context-dependency is required and understanding variable forms of sustainability. At the same time, the region is in interaction on national and global level, giving inputs to other regions and being influenced by development in other areas or global trends (Hacking & Guthrie 2008).

## **2. Comprehensiveness and precaution**

Sustainability issues are constantly changing, multi-scalar and unpredictable making the assessments always imperfect (Gibson 2006a). Uncertainty requires transparency, which can be enhanced by describing the methods and the process transparently while discussing the results in the context of uncertainty (Sala 2013; Gasparatos & Scolobig 2012). Comprehensiveness is also aligned with context-dependency – socio-economic and ecological aspects are considered as far as it is relevant for this study (Pintér et al. 2012).

## **3. Encouraging continuity**

Understanding sustainability as an open-ended process means that there is no final stage to be achieved (Gibson 2006a), rather a continuous process and series of improvements (Pintér et al. 2012). The idea of encouragement derives from the notice that in urban planning the steps towards sustainability are often simply mitigation and compensation instead of inciting more sustainable decisions and practices (Lamorgese & Geneletti 2013). Mitigation of negative effects has its limits, but positive steps can be continuous and go beyond the expectations (Gibson 2006a). In this study, the encouragement continuity is interpreted as a justification to conduct the assessment in a flexible and adaptive manner, recognising the fact that Central Finland itself, and the understanding of sustainability in the region is constantly developing. The environmental programme is reflecting the mindsets back in 2009, thus, if there are issues raised, which go beyond the environmental programme, they are also included when appropriate.

## **4. Desired features**

This study has an ex-post or a descriptive and top-down approach. The assessment is conducted afterwards the programme period assessing the interventions made and the impact of the policy document. As in typical top-down assessments, this also is based on international principles (Sala 2013; Arushanyan et al. 2017; Gasparatos & Scolobig 2012) of Bellagio STAMP (Pintér et al. 2012) and Gibson's principles with rather wide scope on social, economic, and environmental issues (Gibson 2006a). Differing from traditional top-down assessments, this study does not rely purely on qualitative criteria and indicators (Waas et al. 2014), rather mixing both qualitative-quantitative methods with both subjective and objective approaches. Subjective in terms of adapting principles and defining research questions and assessing the realization of objectives in the programme, objective in terms of following faithfully the content and structure of the programme.

### 2.3.2 Research setting

In accordance with the four principles, the scope of the study is limited by the research questions as well as the spatial and temporal focus. The research questions proceed bottom-up, from deeds to main aims as follows; 1) What concrete actions were conducted during the years 2010-2015 towards sustainability in Central Finland, 2) How has sustainability of Central Finland developed, and 3) Were the objectives of the environmental programme achieved. In addition, the fourth research question is about how to assess the environmental programme for Central Finland, since there were no defined means nor prescribed evaluation plan.

Spatial and temporal scope refers to geographical limitations and specific time determined in the programme. The assessment concerns the region of Central Finland with its 23 municipalities. Even if the number of municipalities and the borders between them have changed from 2009 (Kuntaliitto 2016), geographical outline has remained the same. The temporal scope is from 2009 to 2015, the former being the year of preparing for the environmental programme and the years 2010-2015 being the programme period (ELY 2010).

As a less visible but significant part of the research setting, and methods used, was the aim of providing the local ELY Centre information from other organisations and personal experiences in being part of the preparation of the programme. After all, the ELY Centre monitors the development in the region in various ways, including the themes in the environmental programme. Therefore, this study aimed at gaining opinions and experiences outside the organisation, thus, having very subjective and human-based approach, giving space for individuals' opinions, assumptions, and experiences instead of relying on hard statistical data only.

### 2.3.3 Structure of the programme

The environmental programme has a sectoral approach by naming 16 themes including sub-objectives and actions contributing to sustainability from different perspectives (ELY 2010). The study and the elaborating of findings follows the order of thematic sectors, thus, resembling the work of Kostevšek et al. (2015), in which pre-defined sectors are assessed individually and each consisting of own sets of indicators. Due to the large number of sectors, they are divided into three categories of 1) Regional planning, 2) Natural resources and environmental protection, and 3) Research and awareness. The categorization is subjective and based on the common factors found in the sectors. The first category focuses strongly in zoning, development of societal structure and infrastructure. The second group of themes includes objectives related with biosphere; production, consumption, maintaining natural resources, and climate change, which was also named as one of the most significant environmental issues in Central Finland

(Onkila et al. 2008). The last category is the most anthropocentric, regarding human behaviour, awareness and using the knowledge for changing practices. The division and all 16 themes are listed in table 2 below.

Category	Themes
Regional planning	Development of societal structure Preparing for floods and extreme weather Enhancing energy-efficient construction Transportation Regional planning and biodiversity Cultural heritage
Natural resources and environmental protection	Energy production Waste management and material efficiency Wastewater treatment Fresh water Tourism Biodiversity Maintaining viable forests
Research and awareness	Research and development Environmental management systems Environmental awareness

*Table 2: Themes of the programme defining the structure of the assessment.*

In addition, the programme names six overall aims for the policy document; 1) to be part of regional development, 2) to encourage the whole region from words to deeds, 3) to show the direction towards more sustainable Central Finland, 4) to support the preparation of the regional plan and programme, 5) to name concrete actions, and 6) to gather and supplement other regional programmes, action plans, and strategies (ELY 2010). Based on the thematic outcomes and actions, the study reflects the achievement of the general aims.

## 3 DATA AND METHODS

### 3.1 Data collection

The main sources of data are 11 environmental indicators and 25 supplementary indicators of Central Finland, and 12 expert interviews. In the following, the term environmental indicators, refers to both 11 indicators provided by the local ELY Centre and the supplementary indicators from other sources.

#### 3.1.1 Environmental indicators

Environmental indicators are to get a general overview of the development of sustainability and environmental aspects in Central Finland. The data implicates whether the region is heading towards the direction stated in the environmental programme, how certain numeral objectives such as emission levels are achieved and supporting the discussions during the interviews. 11 of the indicators are based on the information in several databases managed and provided by the ELY centre such as Vahti, Hertta and LIPASTO databases, while the remaining 25 derived from various open access databases or statistics. All indicators were selected based on three aspects; 1) the numeral objectives in the environmental programme, 2) the availability of the information, and 3) the reliability of the data provider. Thus, not all themes or objectives in the programme were covered. The indicators are listed in table 3 indicating the source and whether they were utilized during the interviews.

Indicator	Inter-view Y/N	Source
Emissions from transport (N, particles, CO <sub>2</sub> ) (t/a)	Y	VTT Oy 2017
Average distance from home to work (km)	Y	Hertta 2017a
Average annual car usage (km/car)	Y	Finnish Transport Agency 2017
Acidifying emissions (NH <sub>3</sub> , NH <sub>4</sub> , NO <sub>x</sub> , SO <sub>2</sub> ) (t/a)	Y	Hertta 2017b
Particle emissions (t/a)	Y	Hertta 2017c
Industrial CO <sub>2</sub> emissions (M t/a)	Y	Vahti 2017b
Number of people exposed to noise	N	Finnish Transport Agency 2012
Energy production and consumption (inc. renewable energies and waste-based biogas) (GWh/a, GWh/user)	Y	Finnish Energy 2015a & 2015b; Central Finland Energy Agency 2014
Number of municipal energy efficiency agreements or programmes	N	Motiva 2010; Motiva 2016
The usage of biogas in electricity and heating (GWh/a)	N	Pakarinen 2015
Used wood as a source of energy (m <sup>3</sup> /a)	Y	LUKE 2017a
Production of arable energy (GWh/a)	N	Pakarinen 2015; Central Finland Energy Agency 2014
Export of products, technology and services related with bioenergy	N	Päivänen 2017



Amount of communal waste (t/a)	Y	Vahti 2017a
The amount of communal waste placed to landfills (t/a)	N	Regional Council of Central Finland 2014
Number of new wastewater treatment plants	N	Keski-Suomen vesienhoidon pinta- ja pohjavesien toimenpideohjelmien 2010-2015 toteutus 2015
State of surface and groundwater (Ecological & chemical)	Y	ELY (Keski-Suomen pintavedet pääosin hyvässä tilassa 2014)
Diffuse load (N and P) (kg/ha)	Y	LUKE 2017b
Point source load (N and P) (t/a)	Y	Vahti 2017c
Implementation of the Surface and ground water action plans for 2009-2015	N	Selänne et al. 2016
Adequate wastewater management systems in dispersed settlements (% of households)	N	Manerus 2016
Number of visitors in national parks and nature sites	Y	Metsähallitus 2017
The number of travellers in the region (relative change)	N	Regional Council for Central Finland 2016
Number of harbours with a Rubbish Seal Environmental Programme	N	Keep the Archipelago Tidy Association 2017
Forest area included in METSO forest biodiversity programme (ha)	Y	ELY (Metso-ohjelman pysyvän suojelun toteutus 2017)
The area of conserved forests (ha)	N	LUKE 2016; Metsäkeskus 2016
Number of endangered ecosystems and species	N	FANC 2017
Organic farming (ha)	N	Evira 2011 and 2015
Number of rural biotope sites in maintenance and preservation programme	N	Raatikainen & Raatikainen 2015
Increase of awareness of rural biotopes	N	Härkää sarvista! 2012
Spreading of invasive alien species	N	Vieraslaajat kuriin VIKURI -hanke 2015
The volume of decayed trees in the forests	N	LUKE 2014
Financial state of higher education institutions (m <sup>3</sup> )	N	JAMK 2016; JYU 2011; JYU 2016; Mäntylä 2016
Number of certified EMS in corporations (EMAS, Green Office, Ecostart, ISO 14001 and ISO 9001)	N	SYKE 2016; WWF 2017; Koponen 2015; ISO 2017
Number of schools with OKKA sustainability programme	N	The Finnish Association for Environmental Education (Osallistujat 2017)
Number of schools with 'Green flag' programme	N	ELY (T. Tuulinen, personal communication 18.4.2017)

Table 3: List of environmental and supplementary indicators.

### 3.1.2 Expert interviews

During the mid-term assessment of the environmental programme it was noticed that receiving answers via email was a challenge and there could be only very limited number of questions for each recipient. The final assessment was hoped to be more in-depth and therefore semi-structured expert interviews were considered as the most suitable method. Expert interview refers to a situation, in which a phenomenon or a process is studied, and the interviewee is expected to have knowledge of this. In this sense, the interest is not in the person, rather in

the knowledge that he or she, or the organisation in which he or she is employed by, is assumed to have. Expert interviews are often utilized when the research topic is wide and dispersed and supplemented by other data to diminish the risk of letting individual opinions to dominate the study too much. (Alastalo & Åkerman 2010, 313-315.)

As a semi-structured interview, all interviewees were asked ten similar questions but the order of questions and the way the questions were asked, may have varied depending on the situation. Semi-structured interview also gives the opportunity to ask individual questions and thus it is a flexible method to be used when dealing with experts from different aspects of life (Alastalo & Åkerman 2010, 316; Tuomi & Sarajärvi 2009, 75). Besides sharing their expertise, an interview is also an opportunity for the interviewees to express their opinions (Aaltola & Valli 2010, 27), giving more emphasize on interpretations, different meanings that people give to certain issues and interaction with the interviewer (Hirsjärvi & Hurme 2001, 48) leading to high risk of understanding the questions differently (Tuomi & Sarajärvi 2009, 79). Interviewees also have a double role when studying a societal process such as development of sustainability – while being interviewed as experts of their own topic, the interviewees are also the part of the process giving it their own meanings and interpretations, which may be deceptive, glorified or simply wrongly remembered (Alastalo & Åkerman 2010, 312).

The preparation phase of the programme was highly participatory – four thematic discussion groups were created with 54 members in total representing all the sectors of the society in Central Finland and meeting several times during 2009. Therefore, the interviewees were selected among these participants based on their profession and participation in preparation of the programme and mid-term evaluation (table 4).

<b>Selection criteria</b>	<b>Description (number of interviewees)</b>
1. Persons who are still employed by the same organisation as in 2009 when the discussion groups were in operation, but not working for the local ELY centre.	-working for the same organisation as in 2009 (11) -working for another state institution in similar tasks and the same region (1)
2. Primarily people who participated both in discussion groups and mid-term assessment, secondarily those who only were members of one of the groups.	-as nominated member of a discussion group (11) -as unnominated member but as a preparatory public officer (1)
3. At least one representative from each of the four thematic discussion groups.	-yes (4) -no (8)
4. At least one representative from each of the four thematic discussion groups.	-Industry and primary production (2) -Business, services, waste management & transport (3) -Society and livelihood (5) -Environmental awareness, research, & technology (1)
5. At least one representative from the following sectors: municipality, company, non-profit organisation, state institution and educational sector.	- municipality (3) - company (2) - non-profit organisation (2) - educational sector (1) - state institution (4)

Table 4: Interviewees and the selection criteria.

In total, only 17 were in line with the first two requirements. Finally, eight interviewees were shortlisted for individual interviews and four persons were selected for one group interview conducted in April-June 2017 by meeting each interviewee in person. The interview questions are presented in Annex 2.

## **3.2 Analysis methods**

### **3.2.1 Indicator data analysis**

After the collection of the environmental indicators, they were compared with the objectives of the environmental programme, summarized, and displayed. Some of the data regarding the environmental indicators required small development to be comparable with the objectives in the environmental programme. In practice, this consisted of basic calculations of percentages or summing up in an Excel-sheet and visualization of the statistics. The analysing and interpreting the data was outsourced to the expert interviewees. Thus, the process followed the path of a typical data analysis – data collection, summarizing and displaying of data, analysing data, and interpreting the results (Aaltola & Valli 2010). However, the last two steps of analysing and interpreting received very limited time during the interviews (Annex 2), in most cases only 20-30 min. None of the interviewees were familiar with the statistics before the interview and therefore they could not prepare themselves.

### **3.2.2 Content analysis of interviews**

All the interviews were recorded, transcribed, and analysed by using the content analysis. Each interviewee, including the focus group participants, was given a code between H1-H12 in randomised order. In findings (chapter 4), the codes are used as a reference in individual interviewees.

Content analysis is method with numerous variations, which aims at creating a summary of the research topic and systematically organise the collected material for the conclusions (Grönfors 1982, 161). For instance, Tuomi and Sarajärvi (2009) distinct several categories and counterparts in content analysis discipline; quantitative differentiation and qualitative content analysis, deductive and abductive analysis, as well as theory-bound and theory-guided analysis. Therefore, in each content analysis it is essential to identify the focus between qualitative and quantitative perspective, the relationship with the theory and the way of reasoning and making conclusions. In this study, both qualitative and quantitative content analysis methods are utilized accompanied with inductive reasoning, which is a bottom-up approach moving from specific observations to broader generalizations and theories (Trochim 2006; Tuomi & Sarajärvi 2004, 95-96). Since this is a case study, theory has only a supportive and guiding role.

When transcribing, only those parts which were relevant for the research questions were written down. Therefore, the focus was on content instead of gestures, pauses, tones or repetitions which is common in studies like this. Only clear hesitations were marked, if the interviewee clearly was not sure or assumed, it was marked in the transcription. In addition, all the questions were transcribed to be able to assess the impact of the way of asking questions to the received answers. (Ruusuvuori et al. 2010, 10, 356.) Still, more than 50 pages of transcribed text were collected and details of each interview session such as time, place, if there were other people around, etc. (Kuula & Tiitinen 2010, 380).

For transcription, a free software Express Scribe Transcription was used but for coding and analysis, simple Microsoft Word and Excel sheets were adequate tools. Both literal (Mason 2002; Jolanki & Karhunen 2010, 334) and topic-oriented coding (Kelle 2004, 480) were used during the analysis. Literal coding is based on the literal meanings of the words, such as emission and transportation (Jolanki & Karhunen 2010, 334). Whereas, topic-oriented or sometimes also known as factual coding (Seale 2007) is strongly intertwined with the research questions (Kelle 2004, 480). By selecting these approaches for coding, it helped to filter sometimes very rambling discussions and keep the focus on the research objectives.

Coded text was organised under several themes rising from the material. Often in content analysis, categorising is a popular way of arranging the codes but in this study thematising was more natural choice. Thematising is similar with categorizing, but it has a stronger emphasis on what has been said of each theme (Tuomi & Sarajärvi 2009, 95). Both categorizing and thematising aim at systematically scan the data from the perspective of the research questions and the theoretical context (Ruusuvuori et al. 2010, 14).

After thematising, the frequency of each category was calculated in terms of how many times each occurred and in how many interviewees mentioned it. In every analysis, there is a risk of losing of neutrality due to the subjective decisions made by the researcher, for instance on which issues are considered relevant for the study (Mason 2002, 148). Similarly, the basis of the study and the theoretical background may guide the way how the themes are created and how much emphasis each topic receives (Wolcott 2009). Therefore, the following guiding principles were created to diminish the risk of subjectivity. If at least three interviewees mentioned the topic – basically one fourth – it was considered significant. If some issues were mentioned in one or two interviews only, the level of expertise of the interviewee in this topic was estimated, the level of certainty of the interviewee and the relevance of the answer to the research questions. Thus, the occurrence of different theme did not determine the significance of them, rather supported the quality of the analysis. What had been said about each theme was more crucial. The analysis of the thematised research material consisted of three levels; general observations from the whole text, and the interesting issues and sporadic exceptions rising from the material (Ruusuvuori et al. 2010, 18).

While scrutinizing the transcriptions, the different natures of individual and focus group interviews was considered by analysing the group interview both separately and simultaneously with other interviews. Due to the different circumstances, group and individual interviews cannot be directly compared

with each other nor assumed that they are similar. In focus groups the interviewees' behaviour may be very different from the individual discussions since the answers are influenced by the agreeing, disagreeing and negotiations with other group members. (Pietilä 2010, 179, 182.) Through the interaction, expressing different opinions and comparing differences, people may create new information which would have not been available in an individual interview (Barbour & Kitzinger 1999, 194) and the conversation easily focuses on common factors that unite the whole group (Alasuutari 2012, 152). Thus, the analysis of group interviews need to consider whole discussions instead of singular comments, and the process rather than the outcome of the discussions (Barbour 2007). As a guidance, the 12 questions to assess the interaction during a group interview suggested by Patricia Stevens (1996, as referred by Pietilä 2010, 185) were used during the content analysis. The questions considered topics such as staying in the topic, contradictions, agreeing and disagreeing, dominating personalities and emotions rising during the interview.

### **3.2.3 Realization of actions**

The results of data analysis and content analysis are used for assessing the realization of the actions listed in the environmental programme. For each of the 16 themes, conducted actions are identified and then compared with the ones named in the environmental programme. After comparison, each of the 101 objectives of the environmental programme are labelled as 'achieved', 'partially achieved', not achieved, and not assessed. The first label suggests all planned actions were realized as stated in the programme or in a corresponding way. The alternative way refers to minor differences, e.g. the planned action is to prepare a regional strategy, but it is realized as several municipal-level plans. Partially achieved objectives include implemented actions but some of them are lacking or no information were available to fully assess the realization. Objectives were labelled as not achieved only if there were strong, often quantitative evidence implying so. Objectives falling into 'not assessed' -category faced challenges in finding feasible data or indicators for assessment.

The challenge in labelling was created by the combination of quantitative and qualitative objectives as well as relying on indicator-based statistical data as well as individual interviews. As a result, the assessment of numeric objectives is rather simple, however, more qualitative the objective is, more uncertainty the assessment has. The subjectivity of the interviewee and the interviewer may alter on the labelling outcomes. The realization of all objectives indicating the source of data are summarized in Annex 2.

### 3.3 Data quality

Sustainability assessments as a wide and versatile field of study challenges the researchers in terms of validity and reliability. Validity regards the appropriateness of the data and interpretations, and how well they answer the research questions. Reliability, on the other hand, can be understood both from the quantitative and qualitative perspective. Quantitative reliability is aligned with repeatability, if the study conducted again, would it result in similar answers. Qualitative reliability is more concerned of the analysis and interpretation – whether the limitations, principles, and choices are systematically made, and on what the interpretations are based. (Ruusuvaori et al. 2010, 15.) The diversity of terms related with sustainability assessment casts a shadow on data quality as well. The theoretical background highly dependent on the keywords used and since there is a great variety of them in related with sustainability assessments, some perspectives may be emphasized more than others.

#### 3.3.1 Validity

The combination of statistical data and interviews creates several risks for the validity of data, which have been considered throughout the study as far as possible. The selection of environmental indicators was defined by the objectives stated in the environmental programme, but they do not necessarily describe comprehensively the sustainable development in the region. Also, the data may not be comparable throughout the programme period due to changes in the ways of calculating and collecting them, or the data does not cover the whole programme period.

The interviews and transcription were made in Finnish, whereas the thesis is fully in English. Using different languages causes a validity risk in qualitative research due to the change of meanings when translating and higher level of interpretations (Nikander 2010). After all, Finnish language contains several terms and expressions which do not have counterparts in other languages. As a simple example, *'kevyt liikenne'* often translates as a cycle path in English, even though in Finnish language it is understood as any form of transport without motor vehicles, including also walking, roller skating, riding and such.

In expert interviews it is common to have long, general-level answers from professionals used of giving public speeches and not getting into the detailed level. Also, experts constantly working on strategies, programmes and actions plans may struggle to remember one specific paper among the many. (Alastalo & Åkerman 2010, 317; Koskinen et al. 2005, 118-120.) Semi-structured interviews allowed to modify the questions according to the interviewees, include tailored questions and ask specific questions when needed.

Interviews in general are always a question of appropriateness due to the possibility of subjectivity and the dependence of the interaction between the in-

interviewees and the interviewer. For instance, in individual interviews, it is common to provide answers which are assumed to please the interviewer (Alastalo & Åkerman 2010, 322; Pietilä 2010, 188), whereas group interviews may become just several individual interviews in a group situation, thus losing its purpose (Valtonen 2005). Also in expert interviews, the anonymity may suffer due to the limited social circles – there is a high risk of the interviewees knowing each other and being able to trace the answers to a certain person (Alastalo & Åkerman 2010, 321), influencing possibly in the way of speaking.

### 3.3.2 Reliability

From the perspective of quantitative reliability, the study can be repeated in terms of data collection and methods. However, the interviews are always bound to certain time, place and interaction between the interviewees and the interviewer. In addition, the way how the statistics are formed and visualized as well as the content analysis of the interviews include reflections of the interviewer's assumptions, knowledge and the way of thinking. In expert interviews, also the professional role may have an impact – the experts may have an internal set of guiding rules of what topics to discuss publicly and in which way (Alastalo & Åkerman 2010, 322). In semi-structured interviews the role of the interviewer is more important – the way the questions are asked, and which questions are asked may vary and reflect the interests of the interviewer rather than be relevant for the study. On the other hand, they give the opportunity for the interviewees to share whatever they see most relevant.

Regarding qualitative reliability, the major challenge is to recognize the limitations and assumptions made during the process. For instance, a limited number of interviewees casts a higher risk for personal opinions but during the interviews it may be challenging to discover which statement is based on facts and which on assumptions. Professionals may even deny or supplement the data provided during the interviews, requiring source criticism from the interviewer (Alastalo & Åkerman 2010, 327). Transcribing the interviews makes it even more difficult since the gestures, pauses and other non-verbal communication is left out, possibly influencing the interpretations (Bucholtz 2000, 1461-1462; Ruusu-vuori 2010, 358). Especially when discussing the preparation of the environmental programme back in 2009, the answers were hardly fact-based, rather interpretations of the interviewees' memories at that moment, which is common in interviews regarding historical events. In other words, the interviewees make their own interpretation of what had happened during the interview, possibly influencing the issues raised for discussion or the meanings given for certain issues. (Alastalo & Åkerman 2010, 320.) Especially in group interviews the value of different topics may be created during the discussion and the group members tend to be more critical towards the society for instance, than in individual interviews (Pietilä 2010, 183).

## 4 FINDINGS

### 4.1 General overview

The findings of the study reflect the general development trends both on regional and national level. This means that changes occurring in Central Finland are most likely to be reflected in other regions of Finland as well. Or the other way around, international, and national trends affect inevitably Central Finland. As several of the interviewees indicated, during 2010-2015 environmental issues have become a part of everyday life and spread into all sectors of the society (e.g. H4; H8). Thus, incentives for taking steps towards sustainability may not come just from different levels of the society, but also from various actors from individuals to institutions. From the perspective of sustainability assessments, this brings increasing diversity and complexity for the SA practitioners since the network of causal connections is spreading both horizontally and vertically.

The structure of the findings follows both the structure of the environmental programme as well as the order of the research questions – from grass root to more general level, from actions to aims. Firstly, the realization of the environmental programme is being discussed from the perspective of the two first research questions; what were the concrete actions and how did those aspects develop in Central Finland. The data provided by the environmental indicators and the issues raised through the content analysis of the interviews are reflected and compared with the planned actions and development named in the environmental programme. Chapter 4.2 walks the reader through each of the three main categories and 16 sub-themes, indicating first the general overview of each category by utilizing graphs, and then more detailed level by scrutinizing each theme individually. When utilizing an interview as a source for assessment, the codes H1-H12 given in randomized order, were used as a reference, remembering that each interviewee discussed only themes relevant for their profession and not covering all equally. Based on the experiences of the interviewees, chapter 4.3 describes the role and impact of the programme in realisation of the actions and change in the region. Finally, the main objectives are reflected and whether they were achieved (Figure 4).

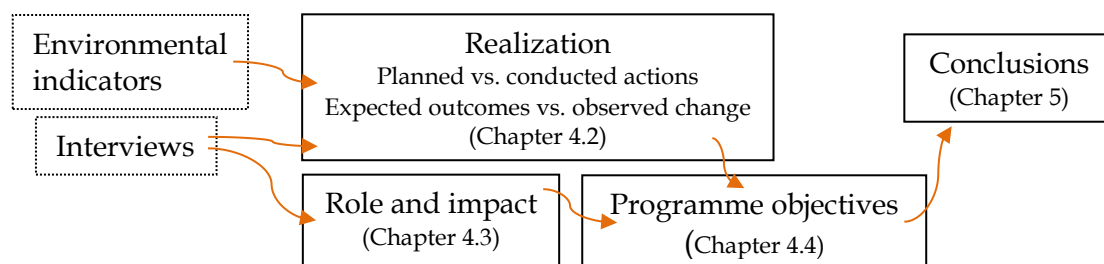


Figure 4: The utilization of methods in assessing the realization of the environmental programme and its role and impact in the region. Based on realization and the identified role of the programme, the achievement of the main objectives is being discussed.



## 4.2 Realization - Actions and development

In this chapter, the 16 themes of the programme are divided into three categories, 1) Regional planning, 2) Natural resources and environmental conservation, and 3) Research and awareness. In each theme, the objectives and planned actions are compared to those introduced by the environmental data, interviews, or other sources. Thus, each objective is marked either as 'achieved', 'partially (achieved)', '(objective) not met' and 'not assessed'. As a result, 52 % of all 101 objectives were achieved and one third partially, meaning that 85 % of the planned actions of the programme progressed, while 4 % were not achieved and the rest were not assessed. A positive trend was observed in each 16 sectors of the programme – half of the objectives were met in each category and all sub-themes included realised actions towards sustainability. An overview of the realization is visualized in chart 1 and summary of all objectives assessment in annex 2.

In general, the interviewees indicated that the general development of the region had been positive, and all the topics covered in the programme had progressed, though some more than the others. The high realization rate of the objectives was assumed to derive from the successful utilization of the expert knowledge and participatory methods used when compiling the programme (H2; H6; H8), while others questioned whether the objectives were set in too modest level (H1; H12).

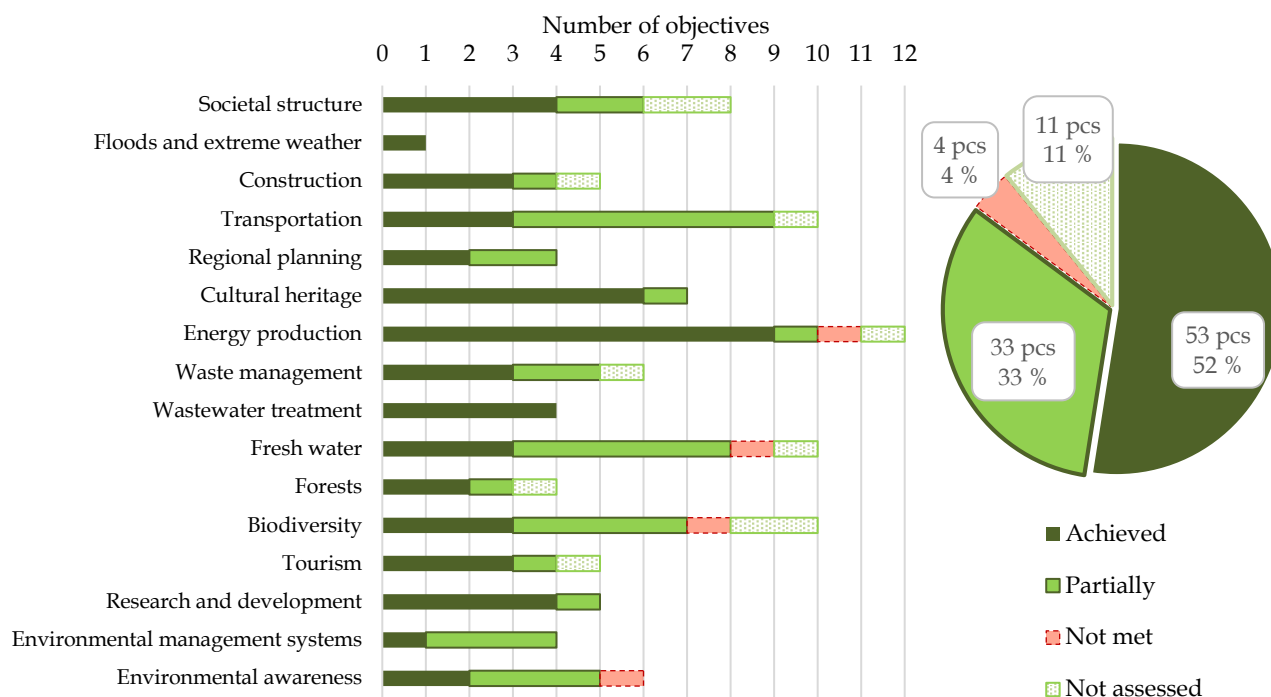


Chart 1: The achievement of the 101 objectives thematically (left graph) as well as absolute numbers and percentages (right graph).

Indicator	Year	Change	Comments
Emissions from transport (N, particles, CO <sup>2</sup> ) (t/a)	2015	+	NO <sub>x</sub> -16%, particles -54%, CO <sup>2</sup> -8%
Average distance from home to work (km)	2014	-	+6% increase
Average annual car usage (km/car)	2014	-	+0,5% increase
Acidifying emissions (NH <sup>3</sup> , NH <sup>4</sup> , NO <sub>x</sub> , SO <sup>2</sup> ) (t/a)	2014	+	NH <sup>3</sup> + NH <sup>4</sup> -6%, NO <sub>x</sub> -11,5%, SO <sup>2</sup> -30,2%
Particle emissions (t/a)	2014	+	-36,24% decrease
Industrial CO <sup>2</sup> emissions (M t/a)	2014	+	-1,26 % decrease
Number of people exposed to noise	2012		Increased between 2010-2012
Energy production and consumption (inc. renewable energies and waste-based biogas) (GWh/a, GWh/user)	2014	+	CO <sup>2</sup> /produced GWh -25,4%, Renewable energy increased, energy consumption -5,5 %
Number of municipal energy efficiency agreements or programmes	2015	+	Growth from 6 municipalities to 9 out of 23
The usage of biogas in electricity and heating (GWh/a)	2014	+	37 GWh in 2014
Used wood as a source of energy (m <sup>3</sup> /a)	2015	+	+25,6 % increase
Production of arable energy (GWh/a)	2014	0	Not feasible source of energy
Export of products, technology and services related with bioenergy	2017	+/-	Major annual fluctuations
Amount of communal waste (t/a)	2014	+/-	Major annual fluctuations
The amount of communal waste placed to landfills (t/a)	2014	+/-	Aim reached in 2016
Number of new wastewater treatment plants	2015	+	2 new plants built
State of surface and groundwater (Ecological & chemical)	2012	+/-	Both improvement & degradation
Diffuse load (N and P) (kg/ha)	2015	+/-	Major annual fluctuations
Point source load (N and P) (t/a)	2015	+	Average N -18,2% and P -19,7%
Implementation of the Surface and ground water action plans for 2009-2015	2015	+/-	Partially implemented
Adequate wastewater management systems in dispersed settlements (% of households)	2015	+/-	81 % still lacking a proper system
Number of visitors in national parks and nature sites	2015	+	+42,8 %, Without Konnevesi +13,7 %
The number of travellers in the region (relative change)	2015	-	-11 % decrease
Number of harbours with a Rubbish Seal Environmental Programme	2017	0	4, no data whether the number have changed between 2010-2015
Forest area included in METSO forest biodiversity programme (ha)	2015	+	+3121% increase, from 450 ha to 4685 ha
The area of conserved forests (ha)	2015	+	Increased from 1,6 % to 3,1 %
Number of endangered ecosystems and species	2017	-	14 % of all species are endangered
Organic farming (ha)	2015	+	increasing continuously
Number of rural biotope sites in maintenance and preservation programme	2015	+	increased, over 300 sites in maintenance
Increase of awareness of rural biotopes	2012	+/-	Guidance provided
Spreading of invasive alien species	2014	-	not able to stop spreading yet
The volume of decayed trees in the forests	2013	0	No change
Financial state of higher education institutions (m <sup>3</sup> )	2015	+	Stable despite the financial cuts
Number of certified EMS in corporations (EMAS, Green Office, Ecostart, ISO 14001 and ISO 9001)	2015-2017	+	Increase in Green offices and ISOs, others stable or decreasing
Number of schools with OKKA sustainability programme	2017	+	+23,1% (increase of 3 schools)
Number of schools with 'Green flag' programme	2017	0	No change

Table 5: List of environmental indicators and their development categorized as positive development (+), both positive and negative development (+/-), no change (0), and negative change (-).

The selection of 36 environmental indicators presented in table 5 provided some suggestions for the general development in the region as well as spurred the conversation during the interviews. Unfortunately, there was not enough data regarding all the environmental indicators – mostly they were lacking data throughout programme period. For this reason, not all indicators were utilized during the interviews, possibly influencing the topics discussed, and some were assessed while acknowledging the imperfections. In total, 18 indicators suggested positive progress, while only six reflected negative development and the remaining were experiencing concurrent improvements and setbacks.

#### 4.2.1 Regional planning

The category of regional planning consists of six sub-themes and 35 objectives; the development of societal structure, preparing for floods and extreme weather, energy-efficient construction, transportation, regional planning and biodiversity, and cultural heritage. More than half of the aims were met (19 objectives), 12 partially, and four were not assessed. In the following, all the six themes are discussed individually.

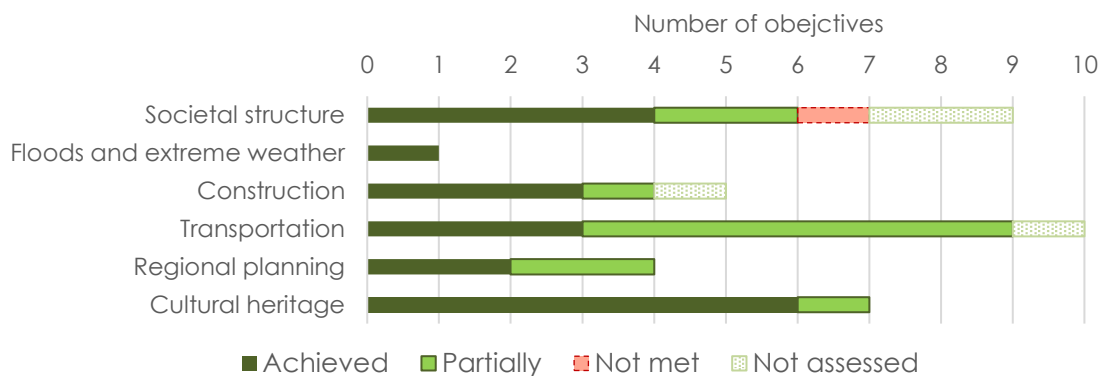


Chart 2: The achievement of the objectives in the category of Regional planning.

##### 4.2.1.1. Development of societal structure

The objectives were all related to mitigating climate change via regional planning practices by intensifying the urban structure, while remembering the needs of dispersed settlement, quality of living and limited noise levels, as well as developing participatory methods and sustainable energy sources in regional planning. Out of eight objectives, four were achieved, two partially and two were not assessed.

The emissions decreased throughout the programme period (Vahti 2017b; VTT Oy 2017; Hertta 2017b; Hertta 2017c), while the transport and usage of private cars increased (Hertta 2017a; Finnish Transport Agency 2017), indicating the development of cleaner technologies in vehicles (H1; H2; H9; H12) and less polluting alternatives for fuels (H3; H8; H12), rather than intensified societal structure. The development of transportation will be discussed with more details in

chapter 4.2.1.3. In heating systems, district and geothermal heating, as well as air source heat pumps had emerged substituting oil (H7, H8).

The challenges already identified in 2009 (ELY 2010, 13), were still reflected in the interviews. Transportation between the municipal centres was still under development and facing challenges in terms of the feasibility of public transport and decrease of private driving. The region consists of both intensive urban areas as well as country side and wilderness, which requires balancing between very different needs arising from the settlements, preserving cultural heritage and natural values. Irrespective of the size of the municipality, the urban areas experienced positive progress and meeting most of the objectives whereas the areas with dispersed settlements were more complicated. (H7, H8, H10.) Five of the interviewees, who participated in regional planning as a part of their job, had clearly more positive image of the development than the rest without similar professional experience.

Objectives related to noise were not assessed, however, in 2012 the number of people exposed to noise were increasing in Central Finland (Finnish Transport Agency 2012) and during the interviews this was briefly referred (H5, H8), suggesting noise is still a current issue in the region.

#### **4.2.1.1. Preparing for floods and extreme weather**

The only objective of the theme was to prepare the region to increasing floods and heavy rain. Even if Central Finland is not the most vulnerable region for flooding, increased rains and storms are becoming more common and examples of those can be found from the years 2010 and 2014 (Keski-Suomen ELY-keskuksen Facebook-kyselytunnit alkavat tulva-aiheella 2015). Five of the interviewees were satisfied with the preparedness for floods and extreme weather (H4; H5; H7; H8; H12) also recognising a shift from floods to more specific and region-bound topics such as urban runoff preparedness for storms (H7; H8; H12). For instance, during the programme period new requirements for managing urban runoffs in zoning were established (H7) and an inter-regional management plan for flooding in Kymi river area was created (Höytämö et al. 2015).

#### **4.2.1.2. Enhancing energy-efficient construction**

Besides construction and planning of buildings, this theme regarded with zoning, regulations, competence of the actors in construction sector and informing the users of the buildings. Three objectives were achieved, one partially and one related with the level of knowledge of the dwellers and how well they considered energy-efficiency issues at home was not assessed in this study. Due to the nature of the objectives, interviews were used as the only data source for the assessment.

The development of construction regulations, the consideration of cultural heritage, and the level of competence of the constructors were in line with the aims of the programme (H4; H8; H12), whereas the quality of planning received contradictive opinions. Two interviewees suggested it was on adequate level (H4;

H12), while three felt it required too many compromises between social and environmental needs or the pace of development was too modest (H5; H7; H8). Fourth of the interviewees experienced that construction sector had developed fast during the past years, mainly due to changed legislation (H4, H8, H12). Also, the requirements for zero-energy buildings became stricter (H8). In zoning, the focus is largely on Äänekoski-Jyväskylä-Jämsä area. However, the financial depression did influence both the municipalities and construction companies during the programme period. Those municipalities utilizing energy audits and energy efficiency agreements found them useful tools for development and expected them to grow more influential in the future (H6, H7, H8). In total, six municipalities in the region had signed the energy efficiency agreement or joined the programme by 2009, and the number was increased by three during the programme period (Motiva 2010; Motiva 2016).

#### 4.2.1.3. Transportation

The section of transportation had a strong focus on climate change and regional planning, thus, consisting both on numeral objectives regarding emissions and transport flows, as well as developing infrastructure and urban structure. The theme played relatively large role in the programme, including 10 objectives in total, out of which three were achieved, six partially and one was not assessed.

As discussed earlier concerning the societal structure, the transport related NO<sub>x</sub> and CO<sub>2</sub> emissions decreased by 16 % (NO<sub>x</sub>) and 8 % (CO<sub>2</sub>), while the amount particles were halved (-54%) from 2009 to 2015 (VTT Oy 2017). However, the average of work-related kilometres increased modestly by 0,8 km, (+0,5%) (Hertta 2017a) and average driving distances by 12 km (+6%) (Finnish Transport Agency 2017). Though the usage of public transport was estimated to become more common (H1; H8) and the attitudes had shifted in a way that owning a car was not considered as compulsory anymore (H7; H8), they were not enough to balance the emerging pressure for both inter-regional and intra-regional transport caused by the needs of the industrial sector (H3; H10), increase in commuting (H2; H4; H6; H7), and recreational driving (H1; H3; H4; H6), which were all seen as general megatrends and being pressured by national and EU politics rather than regional decision-making (H7; H9; H10; H12). During the interviews, the positive development of cycling in urban areas was pointed out and seen as a complementary mode of transport, which does not significantly reduce the usage of individual cars. Also, public transport, even if increased and developed, could still not replace private motoring. (H2; H5; H9.) Regional differences in these aspects were remarkable - Jyväskylä city had put an effort on cycleways and public transport (H4, H8), while in the countryside the public services have services have diminished (H2; H7; H10).

New development trends not predicted in the environmental programme were the rise of commuting and transportation flows caused by the online shopping and waste management. Commuting may have increased due to the regres-

sion and a need for searching employment further, but clearly there was an increased interest of not living and working in the same municipality (H1, H6, H7, H12). Waste flows had radically changed due to legislative development which resulted in delivering the waste to other regions for incineration (H10, H12). The widespread impacts of transportation were reflected in other themes as well. For instance, the increased interest in nature sites such as national parks required using own car. Similarly, construction to dispersed settlement areas influenced negatively on the emissions. Thus, transportation was often seen as the counterpart or having an inverse correlation with other themes of the programme.

#### **4.2.1.4. Regional planning and biodiversity**

All four objectives indicated positive development in this theme, half of them were fully achieved and the other half partially according to the interviews. The quality of information and reports, data availability and up-to-datedness were on good level (H1; H2; H7; H12), in addition the role of the third sector and citizens as source of data had become more significant (H1; H2; H8). Two interviewees questioned whether the means and level of conservation was adequate, for instance, in terms of number of protected areas and ecological ways raised concerns (H4; H5). Again, those with professional experience in regional planning showed more positive attitudes and referred to the challenges in balancing between different socio-economic interests, which did not always allow them to act with purely environmental motives (H6; H7; H8; H12).

#### **4.2.1.5. Cultural heritage**

Objectives related with maintaining cultural heritage sites were based on Cultural Heritage Programme of Central Finland for 2005-2015 (ELY 2010, 51), which were again updated in 2011 (Horppila-Jämsä et al. 2011). Thus, the aims were not similarly the result of preparatory discussion groups as in the other themes. In total, six out of seven objectives were achieved and one partially.

In general, the state of cultural heritage sites and the level of knowledge in preserving them were considered adequate or even higher than in other regions of Finland (H2; H4; H5; H12), when considering the limited resources that the municipalities have for their maintenance (H5, H6, H7). The private owned sites faced challenges due to lack of knowledge, interest, and resources of the private landowners for preservation, and on the other hand, the inability of public sector to support the landowners. The situation seemed unfair since the landowners experienced societal pressure for better maintenance, but could not do so without sufficient help from the society. (H6; H7.) Irrespective of some challenges, positive aspects were raised up more often. For instance, during the programme period, KYNÄ project increase the accessibility and visibility of cultural heritage sites by mapping out the sites of the region and free access database (Kulttuuriympäristö näkyväksi KYNÄ -hanke 2017).

## 4.2.2 Natural resources and environmental protection

This category included seven themes and 51 objectives in relation with energy production, waste management and material efficiency, wastewater treatment, fresh water, tourism, biodiversity, and viable forests. Over half of the aims were met (27 objectives), 14 partially, three not achieved and seven were not assessed. All the seven themes considered in one way or the other emissions to the air or water, biodiversity, and human impact to the nature. Especially energy production, water-related issues, and biodiversity played a major role by covering more than two thirds of the objectives.

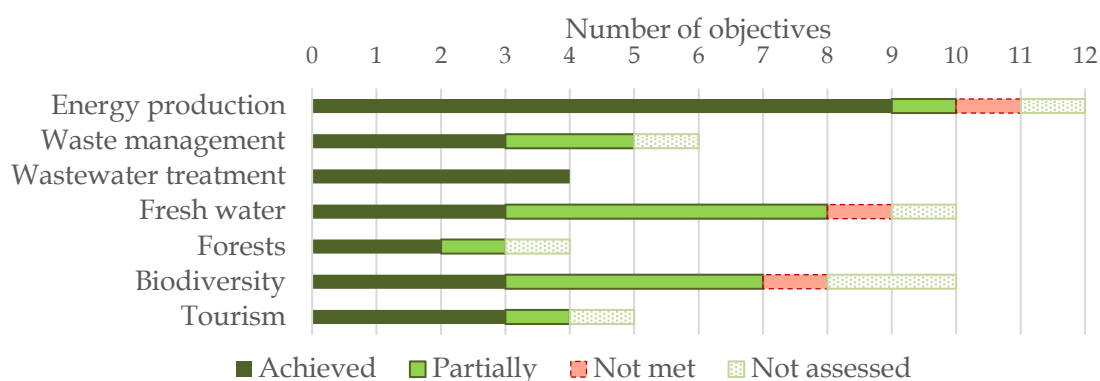


Chart 3: The achievement of the objectives in the category of Natural resources and environmental protection.

### 4.2.2.1. Energy production

Besides emissions deriving from the energy production, the objectives related with renewable energies, energy efficiency and businesses. Altogether there were 12 objectives listed – more than in any other theme. As one of the interviewees indicated, five years in energy sector is extremely short time frame keeping in mind the long-life span of the power plants and large investments usually required. However, in 2010 a new power plant was opened nearby Jyväskylä making a leap forward in renewable energy sector and ensuring that several of the ambitious objectives in the programme were realized. (H3; H5; H8.) Besides this one powerplant, the development of energy sector in the region was suggested to be both fast (H1; H2; H8) and rather slow (H3; H5). Out of 12 aims, nine were achieved, one partially, one not achieved, and one not assessed.

From 2009 to 2014, the emissions of SO<sub>2</sub> decreased by 30,2 %, NO<sub>x</sub> by 11,5 %, and particles by 36,2 % (Hertta 2017b; Hertta 2017c). The emissions per produced GWh of energy decreased by 25,4 % (Finnish Energy 2015a; Vahti 2017b), though the production of energy increased by 32,4 % (Finnish Energy 2015b), suggesting the influence of the technological development and stricter environmental permits (H6; H7; H8). Already by 2014, the renewable energy sources exceeded the national goal of 38 % of consumption (Central Finland Energy Agency 2014), and in 2015 the usage of wind power increased from six to 60 GWh (Finnish Energy 2015b) and solar power had become more popular as well (H1, H6, H8). Besides

solar and wind power, air source heat pumps and geothermal heating had emerged after 2010. In some areas, geothermal heating had even become the second choice in heating systems after district heating, partially due to development in the municipal plan regulations. (H7, H8.) The usage of biogas in electricity and heating exceeded the aim of 25 GWh in the environmental programme, by 2014 the number was already 37 GWh (Pakarinen 2015). Also, the waste-based biogas production and consumption increased (Central Finland Energy Agency 2014).

In all the interviews, wood-based energy was somehow discussed, mostly connected to controversial opinions related with the recently started bioproduct mill at Äänekoski (Metsä Group 2017) and usage of peat moss. Bioenergy dominated energy related conversations more than back in 2009 (H1; H2; H3; H8). The usage of wood as energy source increased by 25,6 % between 2009-2015 (LUKE 2017a) replacing oil and peat in energy production (H1; H3; H5; H6). However, due to competitive market prices the consumption of coal again emerged during the years 2013-2014 (H3, H5). In any case, Central Finland had strengthened its position as the forerunner in bioenergy issues (H2; H3).

Production of arable energy was proved to be unfeasible (H5; Pakarinen 2015; Central Finland Energy Agency 2014), and thus, the objective of increasing it was not met. Export of products, technology and services related with bioenergy was not assessed, however, the exports in the region in general decreased throughout the programme period and in forest and technology sector was turbulent due to economic regression (Päivänen 2017, 11-12).

#### **4.2.2.2. Waste management and material efficiency**

Between 2011-2016, the waste legislation in Finland changed, and for instance organic waste could not be placed in landfill sites after 2016. This created emerge in the level of waste utilization especially for energy and a collapse in the masses ending up in landfill sites. (Pokka 2016.) From the point of view of this study, the radical changes in waste sector causes challenges, since the regional waste statistics are hard to collect, and they are often published with a long delay. Thus, they might not be comparable throughout the programme period and the most recent estimation on regional waste amount is from the year 2014 (Vahti 2017a). Also, the last major legislative changes occurred in 2016 dominated and shadowed the discussion during the interviews, making it difficult to go to the environmental programme period. Besides the legislation, Central Finland had a regional waste plan for the years 2010-2016 and the objectives presented in the environmental report are in accordance with the waste plan (ELY 2010, 29; Yli-Kaupilla et al. 2009). In total, half of the three objectives were achieved, two partially and one was not assessed.

Improvement in material efficiency were estimated to occur in several sectors due to construction regulations and increased awareness (H4; H8; H9; H12), increased pressure and interest as well as a challenging economic situation in industrial sector to find recycling opportunities and increase of environmental management systems in businesses. Waste management services had proceeded



in minor steps, though there were still improvement possibilities. (H3; H9.) There was progress in waste management techniques and circular economy thinking, valuing waste as material and increasing local renewable energy sources, but little in decreasing the absolute amount of waste (e.g. H2, H3, H5, H10).

The aims related with communal waste were partially achieved since the amount of communal waste fluctuated largely between the programme period and the trend was not decreasing as expected (Vahti 2017a). The aim of placing less than 20 % of the communal waste in landfills was achieved in 2016 after the legislative change (H9), while in 2014, the percentage was still 50 % (Regional Council of Central Finland 2014, 11). In general, the slow political decision-making process was considered as one of the major factors hindering the positive change, since some of the processes could not be initiated before receiving the municipal licence to act (H6, H9).

#### **4.2.2.3. Wastewater treatment**

Simultaneously with the environmental programme, a regional development plan for wastewater treatment was published for the years 2009-2020 (ELY 2010, 33; Viitaniemi 2010). All four objectives in the programme were assessed achieved during the programme period. Wastewater treatment alongside regional planning had taken major steps forward (H12). Two new wastewater treatment plants were built and sewerage and been supplemented especially in dispersed settlement areas (Keski-Suomen vesienhoidon pinta- ja pohjavesien toimenpideohjelmien 2010-2015 toteutus 2015, 5; H6). During the programme period special focus had been given for managing urban runoffs and combining wastewater treatment into regional planning. Due to these successes the situation in urban areas were generally considered as satisfactory. (H3, H6, H12.)

Dispersed settlements, however, were considered a challenge and need for improvements. In 2011, regulations concerning dispersed settlement's wastewater treatment were added in the Finnish Environmental Protection Act (MoE 2011) causing interpretation challenges and debates on how to implement the regulations (H2, H3). Finally, in 2017 the regulations were clarified and relaxed (MoE 2017). Besides legislative changes, some were concerned of the water co-operatives, since they were often based on few active members and the sustainability of some of the co-operatives was unsecure (H3, H6, H7).

#### **4.2.2.4. Fresh water**

The objectives were based on Fresh water action plan (2009, as referred by ELY 2010, 35) and Surface and ground water action plans for 2009-2015 (Keski-Suomen vesienhoidon pinta- ja pohjavesien toimenpideohjelmien 2010-2015 toteutus 2015). Out of ten objectives three were achieved, five partially, one not achieved, and one not assessed. There was no consensus of whether overall development had proceeded into positive (H4; H6; H8) or negative direction (H1;

H3; H5), also, questioning whether water issues were equally considered with, or shadowed by other themes such as tourism and biodiversity (H1; H8; H12).

Diffuse load of nitrogen (N) and phosphorus (P) is mainly originated from agricultural activities, but also forestry, dispersed settlements, and bog lands (Selänne et al. 2016, 39) and the annual fluctuation was too large to make conclusions (LUKE 2017b). Agricultural practices showed a modest development, though some of the interviewees indicated poor atmosphere for open discussion. Farmers and people living in countryside were seen easily as scapegoats in environmental issues, increasing resistance rather than willingness for sustainability acts. (H3; H6.) When it comes to dispersed settlement the changing regulations concerning dispersed settlement's wastewater treatment caused delays in implementing action plans as expected (Selänne et al. 2016, 9), thus, making it still a significant source of loading (Hajakuormitus suurin vesistökuormittaja 2017; Selänne et al. 2016, 39). In 2016, 81 % of investigated houses with permanent settlement were still lacking appropriate wastewater management system irrespective of the increased guidance for the individual households (Manerus 2016, 15).

Point source load of nitrogen, however, decreased in all sectors; urban areas 22,4 %, fisheries 10,7 %, industry 6 %, and peat lands 24,8 %. For phosphorus the decrease was for urban areas 25 %, fisheries 23 %, industry 12 %, and peat lands 42 %. Apart from nitrogen from urban areas, all others achieved or even exceeded the aims stated in the programme. (Vahti 2017c.) Despite of the decrease in loading, the state of surface and groundwater did not show similar development, rather concurrent improvements, and degradations, depending on the area (Keski-Suomen pintavedet pääosin hyvässä tilassa 2014), but not as prompt development as required by the Water Framework for community action directive (Council Directive 2000/60/EC).

#### 4.2.2.5. Tourism

Three out of five objectives concerning tourism were achieved, one partially and one not assessed. During the programme period a new national park, Etelä-Konnevesi, was established causing an increment of 42,8 % in the visitor amounts. Even without the new national park, the visitor numbers increased by 13,7 %. (Metsähallitus 2017.) Also, the interviewees recognized emerging interest in tourism based on nature and cultural heritage sites, waterways, and forests (H5; H11; H12), requiring the services in these sites to improve (H11), while possibly causing environmental harm by increasing the need for using private cars (H1; H11). All the potential of nature-based tourism was not yet discovered, and it was still seen as marginal in the region with minor economic impact (H1; H11; H7)

Urban tourism especially in Jyväskylä city area was considered well organised and the public transport could meet the needs adequately (H11), however, the number of travellers had dropped by 11 % from 2009 (Regional Council for Central Finland 2016). In 2017, four of the harbours in the region had a Rubbish Seal Environmental Programme (*Roope-satama*), (Keep the Archipelago Tidy Association 2017). Already before 2010, regional tourist companies compiled plan

of actions with sustainability issues included, but the realization of the plans was not investigated yet, leaving one of the objectives of the environmental programme unassessed as well. However, the businesses were estimated to be increasingly interested in sustainability (H5, H11).

#### 4.2.2.6. Biodiversity

Biodiversity as a topic raised most concerns among the interviewees, while being the most challenging theme to find quantitative information, though many of the objectives were numeral. Therefore, the assessment is highly dependent on the interviewees' personal understanding and information they had from other sources. Out of ten aims, three were achieved, four partially, one not achieved and two not assessed.

The network of protected areas was supplemented during the programme period by a new national park (Metsähallitus 2017) as well as through METSO voluntary conservation programme on private lands (Metso-ohjelman pysyvän suojelun toteutus 2017). In 2009, the area of conserved forests was 1,6 % of all forest area in the region (Metsähallitus n.d.), and by the end of 2015 it grew up to 3,1 % (LUKE 2016; Metsäkeskus 2016). Areas included in the METSO programme increased almost by ten times, from 450 ha to 4685 hectares (Metso-ohjelman pysyvän suojelun toteutus 2017), irrespective of the cuts in the funding of the programme (H2; H3; H8). Among the interviewees, METSO received positive feedback by introducing a new voluntary approach towards conservation using encouragement instead of compelling as the main tool and by compensating financially the private landowners for protecting their forests (H2; H3; H8). Also, the quality and availability of information improved due to technological development and increased collaboration between different actors (H1; H3; H8).

Irrespective of the positive changes, the endangered ecosystems and species were still under threat or even worsened (H1; H2; H3; H5; H7). Local NGO estimated that from 2010, 14 % of all species, 17 in total, had become endangered in the region (FANC 2017). Arable lands in organic farming increased during the programme period (Evira 2011 & 2015) while farming in general decreased threatening the traditional cultural landscapes and rural biotopes highly dependent on agricultural activities (H2; H3; H7). The maintenance and preservation activities in government-owned areas increased throughout the programme period covering over 300 sites in the region (Raatikainen & Raatikainen 2015, 57-58) and an inter-regional project, *Härkää sarvista*, focused on reaching private landowners and increase knowledge of rural biotopes (Härkää sarvista! 2012). Concurrently, the prevention of the invasive alien species proceeded through a project between 2010-2014 (Vieraslajit kuriin VIKURI -hanke 2015), but afterwards there were no systematic monitoring or actions in that area. Therefore, objectives related to invasive species such as hogweed were considered partially or not achieved.

#### 4.2.2.7. Maintaining viable forests

The last topic in this category, forests, was always discussed alongside another theme such as energy, transport, biodiversity, or tourism, mainly due to forests' dominant role in the region's economy and covering over 70 % of the geographical area of Central Finland (LUKE 2016; Metsäkeskus 2016). Out of four objectives two were achieved, one partially and one not accessed. Even if a need for improvements was recognised, a clear progress in environmental awareness of forest owners and the practices used in forestry aiming at maintaining biodiversity and adapt to the impacts of climate change, was described (H2; H3; H7), partially explaining the increase in METSO programme areas (Metso-ohjelman pysyvän suojelun toteutus 2017). Nevertheless, enhanced methodology and awareness have not stopped the ongoing process of habitat loss and degradation of ecosystems – at least not as promptly as hoped for (H1; H3; H5). Also, the volume of decayed trees in the forests remained stable during 2009-2013 (LUKE 2014, 92).

New development trends during the programme period were finding versatile ways to use forests, especially recreational usage (H11; H12), and the change in ownership structure of forests. Increasing number of forest owners lived in urban areas and did not necessarily have financial expectations for their lands, thus, they may relate to conservation differently compared with traditional forest owners (H3; H7).

#### 4.2.3 Research and awareness

Research and development (R&D), environmental management systems (EMS) and environmental awareness are the three remaining themes in the third category containing 15 objectives in total. Seven of the objectives were met, seven partially and one not achieved. Being the most challenging category of the programme to assess, in this only a very subjective and approximate estimation can be given. Partially this was due to lack of sufficient data regarding the environmental management systems and partially the nature of objectives in this section – most of them were very qualitative and concerning all the actors in the society. Based on the methods used, generalizations of the level of environmental awareness cannot be made, only suggestions of the general trends based on the understanding of the interviewees.

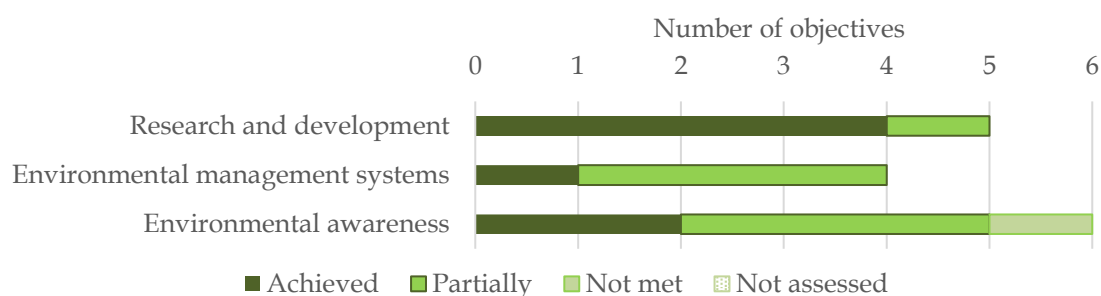


Chart 4: The achievement of the objectives in the category of Research and awareness.

#### 4.2.3.1. Research and development

In 2012 and 2016 the state funding for higher education institutions were cut, shadowing the interviews, and seeing poor development in high education institutions and research in terms of quality and volume (H3; H4; H5). However, the universities in Central Finland reported stable and profitable financial outcomes throughout 2010-2015. Even though both higher education institutions operating in the region lost state funding, they could compensate it with savings or other sources. (JAMK 2016; JYU 2011, 7; JYU 2016; Mäntylä 2016.)

The objectives regarding the co-operation between different disciplines, educational institutions and the society, balance between academic and applied studies, innovative research, and development of the region through R&D were realized (H1; H3; H4; H5). Only the interaction between educational sector and other society was suggested to decrease during the programme period due to general financial situation, which affected for instance corporations' willingness for collaboration (H3, H4).

The interviewees with connections or work experience in education sector emphasized the high quality of education and research as the pride of the region (H1; H3; H4; H5; H12), while the rest did not mention the whole topic or did not know the development of the sector. The environmental programme mainly discussed the higher education institutions and scientific research, whereas the interviewees recognised a completely new actor in R&D sector – individuals and non-governmental organisations emerged as reliable providers of empirical information. Innovations did not necessarily occur among the academic circles, rather anyone could do research and be innovative. Also, participatory methodology had become more common in scientific research. (H1, H8, H12.)

#### 4.2.3.2. Environmental management systems

The environmental management systems (EMS) were expected to increase in public and private sectors, state institutions and procurement practices (H4, H5; H9). Unfortunately, there are no quantitative data related with any of these objectives, for instance, how many companies in Central Finland has an EMS or how many municipality follows a guideline for sustainable procurement. EU-regulated EMAS system can be found in one location at UPM-Kymmene Corporation's mills (SYKE 2016), World Wildlife Foundation's Green office certificates increased from two to six offices from 2009 (WWF 2017), Ecostart programme managed by the ELY Centre was finished by 2013 (Koponen 2015). On national level, the certification of ISO 14 001 environmental management systems has increased 32 % and ISO 9001 quality management systems 15,7 %, even if the number of certificated sites dropped to one fourth (ISO 2017).

With these scattered pieces of information only one of the objectives was considered as achieved whereas the other three partially. Procurement guidelines exists public and private sectors in the region, but no absolute numbers were

available. The number of municipalities signed the Energy Efficiency Agreements increased from six to nine between 2010-2015 (Motiva 2010; Motiva 2016) and they were considered as helpful tools (H4; H7; H8). State institutions had launched personal EMSs already before 2010, but the practices varied from organisation to organisation and statistics throughout the programme period were missing (Turtiainen et al. 2010).

#### 4.2.3.3. Environmental awareness

Even if the interviewees felt that general level of awareness had developed into positive direction (e.g. H2; H3; H4; H8), the theme also had dispersion when it comes to the objectives. Two of the aims were achieved, three partially and one not achieved. Development of environmental education and considering environmental issues from different perspectives had made the expected steps forward (H4; H8; H12). However, two interviewees did not consider the region as the forerunner in environmental education and sharing of good practices was hoped to be more common (H1; H12), whereas, one interviewee was proud of the work done in Central Finland in this theme (H4). Altogether, 15 % of schools were anticipated to have a sustainability certificate but finally 9,4 % had it in 2015; nine schools with 'Green flag' (T. Tuulinen, personal communication 18.4.2017), and seven with OKKA sustainability certificate, which had increased by three school between 2010-2015. (OKKA 2017.)

The interviewees recognised three major changes in attitudes during the programme period. Firstly, the existence of climate change was not arguable anymore, rather a fact taken seriously (H2; H4; H8). Secondly, the circular economy thinking especially concerning waste had arrived at Central Finland. Waste was not necessarily considered as something to be thrown away as before, instead, as a product or material for something else. Also, thinking locality and internal material flows was a trait of new circular economy mindset. (H2; H8; H9.) Thirdly, both individuals as organisations were more willing to experiment new practices and products even with the risk of failing (H3; H8). Also, there were three new features, which were not considered in the environmental programme and only developed during the programme period spontaneously. Firstly, the role of individual citizens or non-governmental organisations in producing and spreading information and thus, create attitude changes, had become significant (H1; H4; H5; H8; H12). As a side-effect popularised environmental information was a slightly negative aspect if it was used for political purposes (e.g. gaining votes in elections) or otherwise twisted and delusive (H3, H5). Secondly, trends such as increased interest towards vegetarian food, utilization of food waste, special bikes and local food production were in line with the objectives of the environmental programme, though they were not yet recognized back in 2009. (H4; H8.)

### 4.3 The impact and the role of the environmental programme

The interviewees indicated several ways, in which the environmental programme influenced or was estimated to influence during the years 2009-2015. In this chapter, the role and impacts of the programme are presented in three levels identified during the content analysis; micro-, meso-, and macro-levels. In other words, discussing first the individual experiences of the interviewees, secondly regional linkages, and finally, looking at national and international perspective.

#### 4.3.1 Individual level

The participation in preparatory discussion groups in 2009 left its mark on those who were involved – to some more than the others. A majority raised up firstly the participatory planning method and good aspects related with it (H2; H3; H4; H6; H8; H9; H12). There was a clear division between those, who operated on the grassroot level with little collaboration with other fields or organizations (H4; H5; H6; H8), those whose occupation included strategy and policy making (H1; H2; H7; H10), and those somewhere in the between (H3; H9; H11; H12). The former group had gained new knowledge (H3; H4), created new contacts (H5; H6; H8) and received a positive new experience working in such a method (H5; H8). For others, the whole planning phase was more ordinary, among many other meetings and policies (H1; H3; H10), demanding several working hours (H2; H12), and being easily forgotten afterwards (H1; H7; H10). Meeting of other experts and information sharing resulted in increased understanding of environmental issues (H2; H4; H6) and minor attitude changes (H3; H6). However, eight years is a long time and thus, many of the interviewees could not recall any personal learning outcomes nor gains of being a member of the thematic groups (H1; H7; H9; H10; H11).

#### 4.3.2 Regional and organizational influence

When asking what was the role of the environmental programme in Central Finland during these years, there were no similar answers. One participant received afterwards invitations to other regional working groups (H5). Another felt that the field in which the interviewee was working on is specialized and not necessarily well understood in other organisations, thus, receiving opportunities to bring new insights for policy-makers is always valuable (H9). The third described how the process allowed to update interviewee's professional knowledge by seeing what are the current trends and what kind of practices existed in other organisations (H6), and what new aspect could possibly be included in interviewee's field of work (H11). The fourth indicated that the regional network of actors had strengthened when people created personal contacts across different organisations and that cooperation had continued afterwards (H2).

In accordance with other SA studies (e.g. Whitmarsh et al. 2009; Waas et al. 2014), the two-way learning process through the exchange of information across different experts, organisations, and fields of business, was seen valuable (H2; H3; H4; H6; H8; H9; H12) This allowed the consideration of different perspectives in the programme, which preparatory public officer may not necessarily have (H3; H8) and more realistic and feasible setting of the objectives (H8; H12). In addition, the preparation work demonstrated in a concrete way how sustainability is a cross-sectoral issue regarding all sectors and actors of the society, instead of an isolated island (H2; H8). Participatory preparation of the programme was assumed to enhance the commitment to the aims of the programme both on individual and organisational level (H3, H6). Still, none of the interviewees had utilized the programme or even opened the published document afterwards, and only two did promote the ideas in the programme in their work places (H4; H8). Instead, the participants referred to some intangible idea, common understanding of the vision and required steps to be taken during the next six years, which they have gained and indirectly influenced their work (H4; H8; H12).

When comparing with other policy documents, the role of the environmental programme was described as minor and invisible (H1; H3; H6; H7; H8; H9), either by becoming shadowed by other strategies (H1; H8; H12) or busy working days which do not always allow long-term considerations (H6; H9). Sceptical interviewees questioned whether the programme had an impact at all and the objectives would have been met in any case (H1; H6; H12), whereas, others appreciated the wide participation enabled the establishment of feasible and progressive objectives which were able to respond to global trends (H2; H8). The environmental programme was assumed having an influence being in accordance with other policies (H2; H5; H8), laying the basis for the preparation of regional plan and strategy of Central Finland (H1; H2; H12), enabling the realization of actions with higher quality and facing less resistance and challenges (H6; H9). Besides contributing to the preparation of the regional plan, the discussions during 2009 were assumed to operate as a basis for large EU-funded projects, which focused on specific theme under the environmental programme (H2; H3; H9).

Still, more continuous visibility of the programme was suggested to have enabled corrective actions, a possibility to update the objectives (H8), increase the utilization of the programme (H6), and maintain the discussion between different stakeholder groups (H3).

### **4.3.3 Macrolevel approach**

The themes of the programme were gathered based on the knowledge and anticipations prevailing in 2009 and some of the topics such as climate change mitigation and adaptation are still under progress currently (H2; H6; H8). While discussing the drivers for change, often legislation or increased other regulations from EU or national level were mentioned, for instance in construction (H6; H8; H9), waste management (H1; H3; H9), fresh water (H1; H3; H12), and forests (H2; H3; H5). Another major influencer occurring during the programme period was



the global economic regression, which was estimated to slow down the pace of development i.e. in waste management, conservation, and culture heritage issues (H5; H6; H8), but also to decrease the emissions and loading derived from industrial sector (H1; H2; H3). However, not all the trends were predicted at the preparatory phase, such as increase in active citizenship (H2; H5), sustainability issues becoming everyone's business (H4; H) and rise of wellness thinking (H8; H11; H12). Thus, while environmental issues have become a common part of life, the point of view towards sustainability have shifted from eco-centric to more anthropocentric perspective, aiming at finding solutions which cater both human and environmental well-being.

#### **4.4 Main objectives of the programme**

There were six overall objectives listed in the environmental programme (ELY 2010), and in the following, each aim is discussed based on the learnings from the realization and the experienced role of the programme.

##### **1. Being part of regional development**

The interaction and influence in other policy tools during the programme period are discussed in sixth objective; Gathering and supplementing other regional programmes. The role of the environmental programme was challenging to identify, since more emphasis was given to the preparatory discussion groups than the policy document. The negotiations, discussions and debates during the planning phase were seen to contribute to the following strategy preparations (H1; H2; H5; H12) and large-scale development projects (H2; H3; H9), as well as creating a common vision of the direction in which the region should forward (H4; H8; H12). From this perspective, the environmental programme laid the basis and initiated some processes, but did not have an active role in regional development throughout the programme period.

##### **2. Encouraging from words to deeds**

Each if the 16 themes of the environmental programme, positive development towards sustainability could be identified and 85 % of the planned actions were implemented fully or partially. Though not all are due to the existence of the programme, it was estimated to play a role by setting the objectives in feasible level (H8; H12), breaking down some resistance and barriers and smoothing the realization phase (H6; H9). Thus, besides just listing concrete actions to be taken, the preparation phase enhanced the general atmosphere to try new practices and processes.

##### **3. Showing the direction towards sustainability**

While creating the environmental programme, the discussion groups painted a common vision of how would the path for the next six years look like and

what kind of steps it would require (H4; H8; H12). The participatory methods also demonstrated in a practical manner, how sustainability issues influence all actors and sectors of the society requiring all stakeholders to act – an understanding that developed and spread during the programme period further (H2; H4; H8).

#### **4. Supporting the preparation of the regional plan**

Those involved both in the preparation of the environmental programme and the regional plan (Regional Council of Central Finland 2014), could identify linkages between the two policy tools in terms of similar objectives and the general direction of desired development. The discussions back in 2009 were described as a preparatory work for the following larger and more detailed documents. (H1; H2; H5; H12.)

#### **5. Naming concrete actions**

The actions made were based on the expertise and anticipations of the professionals in the region. Thus, the action plans became rather realistic and feasible. (H8; H12.) However, the actions were not delivered with the stakeholders to their own organisations (H1; H3; H6; H7; H8; H9) and the main responsibility of the realization considered mainly municipal and state officers (H6; H7; H8; H12).

#### **6. Gathering and supplementing other regional programmes**

Among other policy documents, the role of the environmental programme remained minor and supplementary (H1; H3; H6; H7; H8; H9). Instead of becoming the uniting factor, the programme was one among the others, and in some cases even replaced by other policy tools (H1; H8; H12). Still, the interviewees recognised the connection and interaction between the environmental programme and other policy documents, especially the regional strategy and climate strategy (Regional Council of Central Finland 2011 and 2014). For instance, part of the objectives was transferred from the programme to the strategies. (H1; H2; H5; H12.)

In total nine of those strategies, programmes and action plans named in the environmental programme as of the planned actions, were realized including flood risk management plans, development plan for public transport, development of cycle paths, climate strategy, wind power investigation, fresh water management plan, surface and ground water action plans, tourism strategy, action plan for environmental education. Seven were partially realized; sustainability programmes for each municipality, regional biodiversity action plan, management plans for Natura and UNESCO sites, action plan for energy-savings, work-related transport report, planning principles for cycle paths, strategic land use plan for each municipality. At the same time, references to environmental programme were found only in the Regional plan and Strategy, and the Climate strategy of Jyväskylä city (Regional Council of Central Finland 2001 and 2014; Jyväskylä city 2011), demonstrating the invisible role of the environmental programme for other policies.

## 5 CONCLUSIONS

In this study, in total 23 academic articles related with the concept, approaches and models of sustainability assessment (SA), were reviewed to design a framework for assessing the realization of environmental programme of Central Finland 2010-2015. The framework consisted of three components; theoretical principles derived from the literature review, the research setting, and the structure of the programme. Thus, the paper shares similarities with Luederitz et al. (2017) and Ali-Toudert and Ji (2017) in terms of adapting and combining sets of criteria for a specific spatial and temporal context, and Vincent & Morrison-Saunders (2013) by combining Gibson's (2006a) principles with another SA criterion. Also, the study attempted to bridge the emerging gap between the theory and practice prevailing in SA studies due to strong focus on theoretical conceptualizations (Adinyira et al 2007; Noble et al. 2012).

### 5.1 Applicability and feasibility of the framework

The principles adapted from Bellagio STAMP (Pintér et al. 2012) and Gibson's (2006a) guidelines for sustainability assessments regarded the local and universal dimension for SAs, comprehensiveness and precaution, and encouraging continuity. The dimension of local-global was mainly reflected on the levels of regional, national, and European, reaching to municipal level only through individual examples. Therefore, the assessment implies general development trends regarding the whole region instead each 23 municipalities in Central Finland individually – a typical approach for a study with a geographically wide area (Ang et al. 2011). The linkages to national and international levels were naturally evolved through the cross-sectoral themes common in environmental programmes (e.g. Jalonen 2002; Ilvessalo-Lax 2015) and SA studies (Ali-Toudert & Ji 2017) such as regional planning, the mitigation and adaptation of climate change.

The assessment covered extensively all thematic focus areas of the programme, but was unable to reach geographical and temporal comprehensiveness. Spatial limits refer to not conducting the assessment on municipal level, and temporal imperfections were mainly caused by lagging of data. For instance, the state of the waterways or noise levels are studied in every 5-10 years (Keski-Suomen pintavedet pääosin hyvässä tilassa 2014; Finnish Transport Agency 2012) causing a situation in which data is not necessarily available throughout the programme period. Also, some statistics were not available on regional or not comparable throughout the study period. Therefore, the availability of the data influenced the assessment by leaving some aspects out while including others in – demonstrating the value of aligning the policy document in the general monitoring cycles already in the preparation phase (Iverot & Brandt 2011; OECD 2010).

Encouragement of continuity aimed at focusing on both positive steps as well as mitigation of negative aspects, thus, leaving space for innovativeness and adaptability in dynamic circumstances (Gibson 2006a) and supporting the principle of comprehensiveness. Though the programme reflected the attitudes prevailing in 2009 and most of the anticipated development occurred as expected, still, new trends evolved during the programme period such as the well-being perspective and the expansion of the information network. The semi-structured interviews in this aspect were an appropriate methodological choice, since they allowed the interviewees to bring future considerations and new sustainability trends into their answers, even if they were not part of the environmental programme. When assessing interventions, often the impacts are challenging to define whereas the evaluation of the process is easier (Temmes 2004), thus, in this study an inclusive perspective was seen appropriate.

As the fourth principle, a set of desired features were identified determining the approach in this study as ex-post and top-down assessment, while combining both qualitative and quantitative methods with subjective and objective perspectives. Top-down assessment in this case is ambiguous and based on relying on principles (e.g. Sala 2013), qualitative indicators (Waas et al. 2014) and expert interviews (Sierra et al. 2017) – it could be also argued that interviews involved stakeholders, and thus, having a bottom-up approach. The main difference to typical ex-post SAs was conducting the study two years after the programme period had finished. The gap hindered addressing the direct outcomes of the programme period since the interviewees were not always sure of exact years when changes occurred, and simultaneously two years was too short time to indicate the long-term impacts of the policy document. (Douthwaite et al. 2003; Dor & Kissinger 2017.) The features were based on the knowledge and trends dominating at the time of the study. The dimensions of top-down – bottom-up, qualitative – quantitative, and subjective – objective, are diffusing (e.g. Arushanyan et al. 2017; Waas et al. 2014), therefore, a similar study conducted five years later might have different emphasises and selection of features. When the network of information and actors keep on spreading both horizontally and vertically (H8; H12), categorizing SA models in this way may even become outdated.

Even if the principles were rather general and possibly raised the level of subjectivity in this study due to increased risk of personal interpretations, they clarified the approach and the understanding of SA in this case. Due to the nuanced nature of SAs (Pope et al. 2017), commonalities derived from the literature review with most recent knowledge available were utilized to create a strong and objective basis for the assessment. Also, the utilization of Bellagio STAMP and Gibson's work brought two different perspectives to SA thinking while pointing out the crucial common factors. Traits of both principle sets can be found also in OECD's (2010) and EU's publications (e.g. EC 2009). The principles combined with the research setting and the structural features of the programme gave the framework depth, reaching from philosophical level of sustainability concept to more practical level. The study, however, carries the risk of a traditional sectoral SA, which often have overlapping criteria, causing situations in which some criteria are found in several categories influencing the balance between the sectors,

while the interrelations between different sectors have not been considered (Ali-Toudert & Ji 2017), especially between socio-economic and environmental aspects (Adinyira et al. 2007). Since the aim was to gain the overall picture of the sustainable development in the region, SA as the theoretical concept was feasible. To analyse the interrelations of different themes more thoroughly, another concept such as sustainable value creation or resource-efficiency (Ang et al. 2011; Manzhynski et al. 2015) could have offered more insights to the study.

## 5.2 Empirical study – limitations and implications

The results indicated that a majority of 85 % the objectives and aims named in the environmental programme were achieved fully or partially, covering all the 16 sub-themes (Annex 2). Regional planning in terms of development of practices and regulations, preparedness for floods and extreme weather, regarding culture heritage and climate change issues, especially energy savings and energy-efficiency, leaped forward during the programme period. However, the increasing demand for transportation hindered the intentions to minimize the emissions while the degradation of biodiversity continued. The amount of waste and the condition of waterways caused challenges, while the objectives in relation with energy production, wastewater treatment and forests were mainly achieved. The development research and awareness had proceeded into several new and unexpected directions such as accepting climate change as a fact rather than an arguable issue, circular economy thinking, a willingness to experiments, and spreading of the network of data producers and deliverers into the third and fourth sectors. While the quality of R&D was considered high and the state of the higher educational institutions were, the number of environmental management systems experienced moderate increase, and the general awareness increased in all societal levels. Finally, the programme's role in the region and its main goals as a policy tool were partially achieved. The preparation phase with wide stakeholder participation did contribute to all the six goals by increasing the awareness and collaboration across different sectors. However, the policy document remained invisible during the programme period and had only a minor impact in the region.

The approach resembled the assessments of other region's environmental programmes in Finland by scrutinizing the actions and objectives named in the programme, their realization with qualitative and quantitative methods and involving stakeholders who participated the preparation phase as well (e.g. Panula-Ontto-Suuronen et al. 2008; Regional Council of South Karelia 2017). In these studies, the number of participants of the assessment were not limited, instead, all stakeholder groups were included if possible, gaining a more comprehensive and objective results than was perhaps possible in this study. Therefore, the utilization of several focus group interviews instead of individual interviews presents a tempting alternative option on how the assessment could have been conducted in a different way. On the other hand, focus groups often provide the

opinion of the group and not necessarily personal insights (Aaltola & Valli 2010, 27; Alastalo & Åkerman 2010, 313), especially if personal differences and the way of expressing opinions vary among the group members, giving some interest groups more emphasis than the others (EC 2009).

As the research setting and the semi-structured interview questions were on rather general level, it required adaptability from the interviewer and ability to find the right questions for each interviewee. Irrespective of the interviewees status as experts, the answers reflected also personal values typically found in SA studies (Bond et al. 2011; Podger et al. 2016). When remembering the great variety among the interviewees, flexibility of the framework is a strength. However, simultaneously it increased the level of subjectivity of the study by leaving more space for personal interpretations. Besides the interviewer, the usage of the environmental indicators during the interviews made the situation unique. The data visualized in 15 diagrams compelled the interviewees to answer spontaneously without giving them much time for deep analysis. For this reason, in different circumstances with a different interviewer, the answers may also be completely different.

The coverage of the different themes varied during the interviews – one interviewee commented 3-15 themes out of 16, thus, most vocal interviewees influenced the results more than those focusing on specific topics. In the selection of the interviewees the organisation the interviewees worked for and the assumed expertise they had were crucial in determining which of them were finally interviewed. The aim was to cover, if not all, at least most of the sectors of the environmental programme through the expertise the interviewees were expected to have. Even if the main assumptions proved to be right, some of the interviewees had a wider knowledge or willingness to comment sectors outside their field of profession creating a possibility of emphasising some of the sectors more than the others. For instance, transportation and biodiversity were common topics whereas environmental management systems (EMS) were more unfamiliar, resulting in the risk of making more assumptions related with EMS's due to lack of data. Especially high the risk was in themes not familiar to the analyser, such as regional planning or culture heritage, in which the interviewees could be misinterpreted, or their comments become misleadingly translated from Finnish into English language. In terms of validity of the study, the fact that some of the indicators proved to be inadequate for the assessment during the study created imbalance when some of the sectors in the environmental programme were covered with more information than the others. Furthermore, not all objectives could be covered due to lack of data or measurability, thus, this work only indicated the realisation and impact of the environmental programme partially.

Similar results can be found in other environmental programme assessments and national statistics (e.g. Finnish Transport Agency 2017; Metsähallitus 2017). The participatory preparation increases the learning and understanding of environmental matters and collaboration between different actors, but as a policy document the environmental programmes are weak receiving little commitment from the participants (MoE 2009; Jalonen 2002, 20).

### 5.3 Future considerations

This study provides a description of the current development trends in the region and on national level, as well as feedback on the process of creating the environmental programme. The results are hoped to fuel the discussion on how to proceed in the future and if a new environmental programme shall be created, in which way and with which focus areas. In a broader sense, the study operates as an example of implementing SA frameworks for a case study in Finland and the findings indicate the efficiency and influence of regional environmental programme as a policy tool.

Regarding the possibilities for future environmental programmes, participatory methods were highly recommended by the interviewees (H2; H3; H4; H6; H8; H9; H12). However, a separate policy document as such was considered as an unpractical and arduous tool especially since the sustainability issues currently part of all dimensions of the society. Rather, including the sustainability aspects in an existing strategic policy tool, such as a regional plan (H1; H2; H3; H12) or making it in a more applicable format that can easily be utilized in busy everyday work environment (H6; H7). Irrespective of the participatory approach, the environmental programme for 2010-2015 was largely driven by the public sector (H4; H8; H12), but perhaps in future, decision-makers (politicians) and decision takers (inhabitants) (Arodudu et al. 2017) could be more involved throughout the programme period (H8).

The main issue this assessment demonstrated was that sustainable development is a dynamic process and leaping forward in various sectors simultaneously. Thus, also the guidance and monitoring of the process may need continuous and regular attention (H3; H4; H8) with reflective approach, since the concept and understanding of sustainability as well as the SA practices are in constantly developing further (Pope et al. 2017). Also, out of 54 participants of the preparation discussion groups, after seven years only 17 were employed by the same organisation creating a challenge in terms of continuity.

The roadmap to 2050 for Jyväskylä city (Tiekartta n.d.) and the implementation of UN Agenda 2030 goals for sustainable development (Prime Minister's Office 2016) are rather ambitious, suggesting that sustainable development will play a vital role in the region of Central Finland in the future and introduce increasing pressure for drastic transformational changes concerning on priorities, practices, and infrastructures (Luederitz et al. 2017), thus, requiring the usage of both 'hard' assessments methods as well as softer approaches focusing on social issues (Douthwaite et al. 2003; OECD 2010). Simultaneously, more complex themes, often featured by uncertainties and immeasurability, are emerging into environmental policies (Niles & Lubell 2012; Podger et al. 2016). Even if the field of sustainability assessment is wide-spread, experimental and emerging, not all the possibilities of sustainability assessments are explored yet. Thus, this study provided a new approach for a SA in a specific context, and the framework can be adapted and developed further in other circumstances in the future.

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## ANNEX 1 - INTERVIEW QUESTIONS

1. Kerro lyhyesti taustastasi (ammatti, erikoistuminen, koulutus). / *Please tell briefly about your background and profession (the area of expertise, educational background).*
2. Millainen on ollut yleinen ympäristön ja kestävän kehityksen suunta Keski-Suomessa vuodesta 2010 eteenpäin? / *How would you describe the general development in Central Finland in sustainability/environmental issues (from 2010 onwards)?*

Haastateltavalle näytetään koonti ympäristöohjelman teemoista. / *Showing the themes of the environmental programme.*

3. Miettien oman organisaatiosi tai erityisosaamisesi kannalta, millainen kehitys on ollut seuraavissa ympäristöohjelman teemoissa? / *When considering your own area of expertise and/or the organisation you work for, how the following themes in the environmental programme have developed?*
4. Haastateltavalle näytetään koonti ympäristöohjelman numeerisista tavoitteista sekä niiden toteuma ympäristön tilan indikaattorien kautta. / *Next, the interviewee(s) are given a summary of selected quantitative objectives and environmental indicators and asked the following questions:*
5. Millaisia ajatuksia näistä herää? / *When reading this information, what are your first impressions?*
6. Miten selittäisit muutosta? / *How would you explain/comment on the change (if any)?*
7. Nimeä tekijöitä/ajureita, jotka ovat muutosten takana? / *Can you name the actors or drivers behind these changes?*
8. Mitä hyötyä tai vaikutusta ympäristöohjelman laatimisesta tai ympäristöohjelmalla itsellään oli? / *What do you see as the benefits of the creation environmental programme?*
9. Miten ympäristöohjelma on vaikuttanut Keski-Suomen kehitykseen? / *How the environmental programme has influenced in the sustainable development of Central Finland?*
10. Miten ympäristöohjelman valmisteluun osallistuminen on heijastunut omassa työssäsi tai työympäristössäsi? / *How the environmental programme or participation in the planning phase has influenced your work / working environment?*

Näytetään uudelleen koontia ympäristöohjelman teemoista. / *Showing again the themes of the environmental programme.*

11. Nimeä käytännön esimerkkejä tai tekoja liittyen ympäristöohjelman eri teemoihin, joilla kestävä kehitys on edistetty Keski-Suomessa. / *Please give some examples of concrete actions related to any of the themes in the environmental programme which have enhanced sustainable development in Central Finland?*
12. Mikäli aiemmin ei tule esille, 1-3 räätälöityä kysymystä jokaiselle haastateltavalle hänen erityisosaamiseensa liittyen. / *Possibly 1-3 tailored questions for each concerning the area of expertise (if not discussed already earlier).*

## ANNEX 2 - REALIZATION OF THE OBJECTIVES

Achieved
  Partially achieved
  Not achieved
  Not assessed
  No data

Theme	Objectives		Realization		
			Ind	Interv	Other
Development of societal structure	1	Regional planning aims at climate change mitigation and adaptation			
	2	Societal structure is the basis for low-carbon transportation			
	3	Inhabitants have a comfortable living environment			
	4	Residential areas are planned to be noiseless			
	5	People living in noise areas decreases 20% by 2020			
	6	Developing participatory methods in zoning			
	7	Regional planning enhances energy savings and usage of renewable energies			
	8	Increasing renewable energies in new and renovated buildings			
Floods & extreme weather	1	Preparing for increasing floods and heavy rains			
Enhancing energy-efficient construction	1	Energy-efficient building regulations are included in zoning			
	2	Planning of buildings is with high quality			
	3	Buildings valuable for cultural heritage are recognised and considered			
	4	Those responsible for construction are qualified and cooperative			
	5	Residents' awareness on energy-efficiency issues increases			
Transportation	1	The need for private cars is minimized			
	2	Public transport becomes an alternative for transportation			
	3	The public transport services are maintained in dispersed settlement areas			
	4	Use of private car decreases, while cycling and going on foot increases			
	5	Paths for cyclists and pedestrians are with high quality, well connected, and safe to use around the year			
	6	Of all travels in Jyväskylä, 20% are by bicycle			
	7	Central Finland is the forerunner in reinforcing the status of public transport and cycling as the mean for work-related travels			
	8	Transportation on rails increases			
	9	Emissions from vehicles decrease continuously			
	10	Roads are in good condition, safe and clean			
Regional planning & biodiversity	1	Biodiversity is maintained in urban and rural environments through zoning			
	2	The value of substitutional habitats is recognized and secured			
	3	Regional planning is based on up-to-date high-quality environmental information			
	4	The quality and interpretation of nature or cultural heritage investigations are improved			
Cultural heritage	1	Knowledge on cultural heritage is continuously collected			
	2	The data is available in GIS for anyone			
	3	Central Finland has adequate knowledge on its cultural heritage			
	4	Land use and construction planning is based on knowledge on cultural heritage			
	5	With good planning, cultural heritage is secured and maintained			
	6	Cultural assessments are in equal position with other impact assessments			
	7	Cultural heritage around waterways is maintained with interregional cooperation			
Energy production	1	Energy-savings and -efficiency are the basis in the region			
	2	Emissions per produced energy unit are small			
	3	Consumption of renewable energy exceeds the national aim of 38 %			
	4	Energy production is competitive and secured			
	5	Usage of wood as energy source increases			
	6	Harvesting of wood for energy production is sustainable and knowledge of sustainable practices increases			
	7	Utilisation of waste for energy and waste-based biogas production and consumption increase			
	8	The usage of biogas for electricity and heat production increases to 25 GWh			
	9	Production of arable energy increases significantly			
	10	Emissions of SO <sub>2</sub> , NO <sub>x</sub> , particles, VOC and NH <sub>3</sub> from industry and energy production are decreased, maximum level is based on BAT and legislation			
	11	Export of technology companies with renewable energy-based products and services increases			
	12	Central Finland is the forerunner in social and ecological sustainability of bioenergy production			

Waste & material efficiency	1	Energy-efficiency of production, consumption and construction improve			
	2	Waste derived from industry sector decreases			
	3	The amount of communal waste standardizes to the level of 2000 and begins to decrease			
	4	Maximum of 20 % of communal waste is placed to the landfills			
	5	Waste management services in dispersed settlement areas are equally secured			
	6	Cost-efficiency of waste management improves, and waste fees influence on waste production			
Wastewater treatment	1	The combination of land use planning and wastewater treatment has become standardized			
	2	Wastewater treatment plants are appropriate for the regional needs			
	3	Access to fresh water has been secured and water plants are categorized based on their capacity			
	4	Wastewater treatment plants are in good condition and their capacity is adequate			
Fresh water	1	Reaching good ecological and chemical state of surface waters and good chemical state of ground water			
	2	Phosphorus loading from dispersed settlements decreased by 50 % (approx.) nitrogen by 1/3			
	3	Phosphorus loading from wastewater treatment plants decrease 10 % and nitrogen 30 %			
	4	N and P loading from industry decreases at least by 5 %			
	5	Loading from peat lands decrease about 10-15 %			
	6	Loading from fisheries decreases about 10 % (P) and 5 % (N)			
	7	Loading from agriculture decreases 15 %			
	8	Loading from forestry decreases 10 %			
	9	Realizing the actions named in the Surface water action plan for 2009-2015			
	10	Realizing the actions named in the Ground water action plan for 2009-2015			
Tourism	1	Tourism-based transportation causes as little environmental harm as possible			
	2	Tourism-related businesses operate in a sustainable manner			
	3	Tourism related with nature and culture heritage increases especially in national parks and around lake Päijänne			
	4	Utilization of waterways and forests in tourism increases with a respect to the environment			
	5	Services in nature sites are adequate and appropriate			
Biodiversity	1	Endangered ecosystems and biotopes are secured			
	2	The network of conserved areas is supplemented. 3 % of forest are is protected			
	3	The quality of conserved sites improves through maintenance and restoration			
	4	75 % of the invented traditional biotopes are regularly maintained			
	5	The continuous high-quality maintenance of traditional biotopes is secured			
	6	There is an adviser of rural environment and landscapes in Central Finland			
	7	The spreading of invasive alien species is slowed down			
	8	The spreading of hogweed stops			
	9	GIS regarding nature values is comprehensive, with high-quality and reliable			
	10	The accessibility of information concerning nature values increases			
Maintaining viable forests	1	Forests remain viable in changing climate			
	2	The biodiversity on commercial forests increases			
	3	Amount of decayed wood increases in commercial forests			
	4	The awareness of forest owners increases in general and on the opportunities for their usage			
Research & development	1	In research, multidisciplinary cooperation is emphasized			
	2	Alongside academic research, the applied research and R&D are strengthened			
	3	Dialogue between research and other society is reinforced			
	4	In the region, progressive and innovative research opening new employment and growth opportunities is conducted			
	5	Environmental research and development support the development of the region			
Environmental management systems	1	Public sector, companies and citizens prefer sustainably produced, energy-efficient products with a long life-span			
	2	Environmental and quality management systems of companies increase			
	3	Environmental programmes in municipalities increase			
	4	State offices are the forerunners in implementing sustainability programmes			
Environmental awareness	1	Key persons have a strong role in improving environmental awareness			
	2	Every nursery, school and educational institute creates a sustainability programme and 15 % of them are certified			
	3	Good practices are publicly visible			
	4	Development of environmental education is continuous and productive			
	5	The region is profiled as the forerunner in environmental education			
	6	Different aspects of the environment are visible in increasing awareness			