



Sveaskogs report on Multi-Dimensional Value Creation

The forest has many values - how can we visualize them?

The forest creates great values. Sveaskog has now begun a work to visualize and quantify values that we were previously not measured, including climate sequestration and water regulation. According to first estimates, such values amount to more than SEK 10 billion annually. This brochure tells you more about the calculations behind these figures.

Sveaskog has worked with the internationally recognized sustainability economist Pavan Sukhdev and his team at GIST Advisory to quantify Sveaskog's value creation. This multi-dimensional value creation is estimated according to a methodology named Integrated Profit and Loss (IP & L). Sveaskog is a pioneer in this field in the forest sector. In the past, like others, we only measured our financial results, but now we are beginning to put figures on previously invisible values that are beyond our income statement but equally important to society and our owner. Examples are Sveaskog's whole GDP contribution, values of recreation and non timber products and carbon sequestration. This means, among other things, that we can better illustrate the value of natural capital than before.

What does this mean for society and the environment? How does the insight from this work affect the use of our forests and

the ability to sell forest products and services today and tomorrow?

Now, we will take the next steps to analyze and complement and build on this foundation. Forest management and use is a cornerstone in the development of a circular bioeconomy. In this context, our aim is to be able to produce and develop more biomass as well as more biodiversity in our future forests.

Read more in this brochure and on www.sveaskog.se/skogensallavarden

Per-Olof Wedin, President and CEO, Sveaskog

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Lena Sammeli-Johansson, Chief Sustainability Officer

About Sveaskog

Sveaskog is Sweden's largest forest owner and sells sawlogs, pulpwood and biofuel to 130 customers, primarily in the pulp and paper and sawmill industries.

Sveaskog also works with land transactions and develops the forest as a venue for hunting, fishing and other nature-based experiences.

Our vision is to be the leading forest company.

Sveaskog has 37 ecoparks and has set aside 20% of its productive forest land for nature conservation

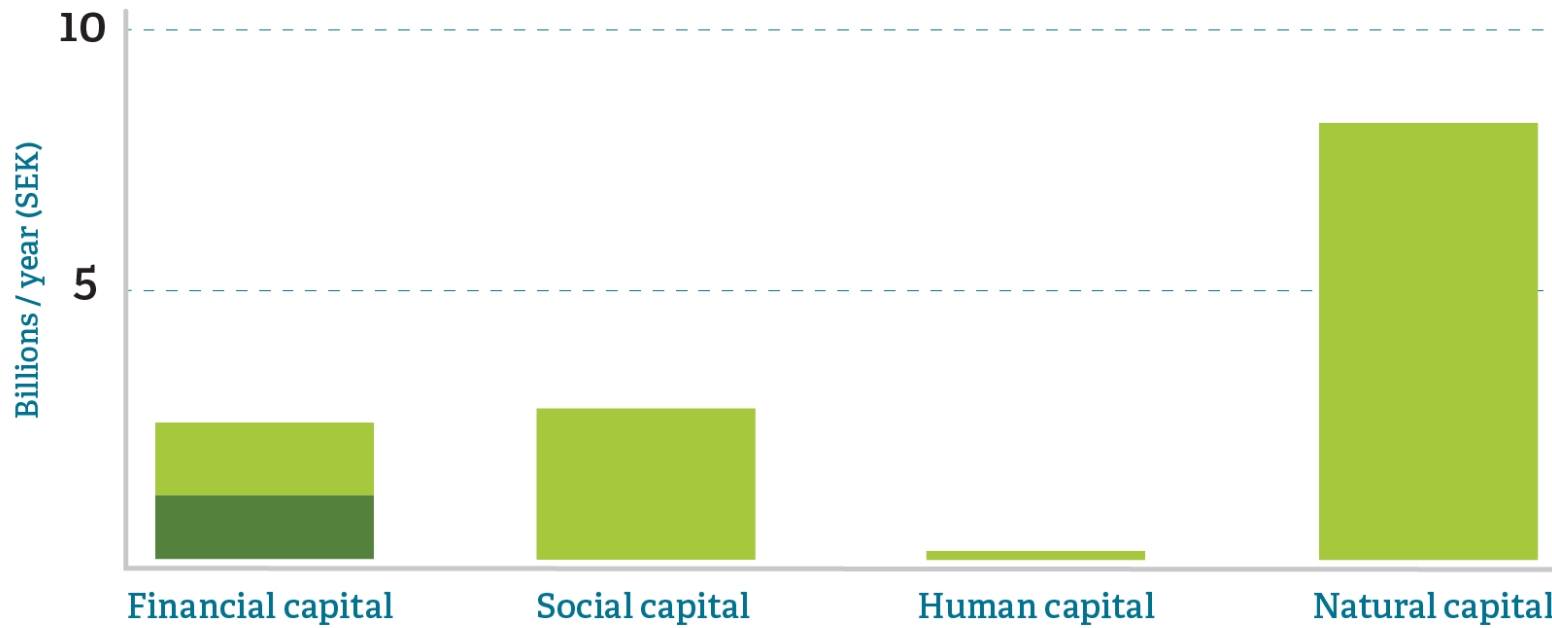
All Sveaskog's forests are FSC® certified, which provides a guarantee that the forest is managed responsibly. All felling is planned based on the requirements in the Swedish FSC® standard which take economic, environmental and social factors into account.

Sustainable development permeates every aspect of Sveaskog's business.

A tree that is planted today will be harvested in 60–120 years. For every tree harvested by Sveaskog, we plant 3 new. The growing forest and production of wood raw material make a substantial contribution to counteract climate change.

Facts

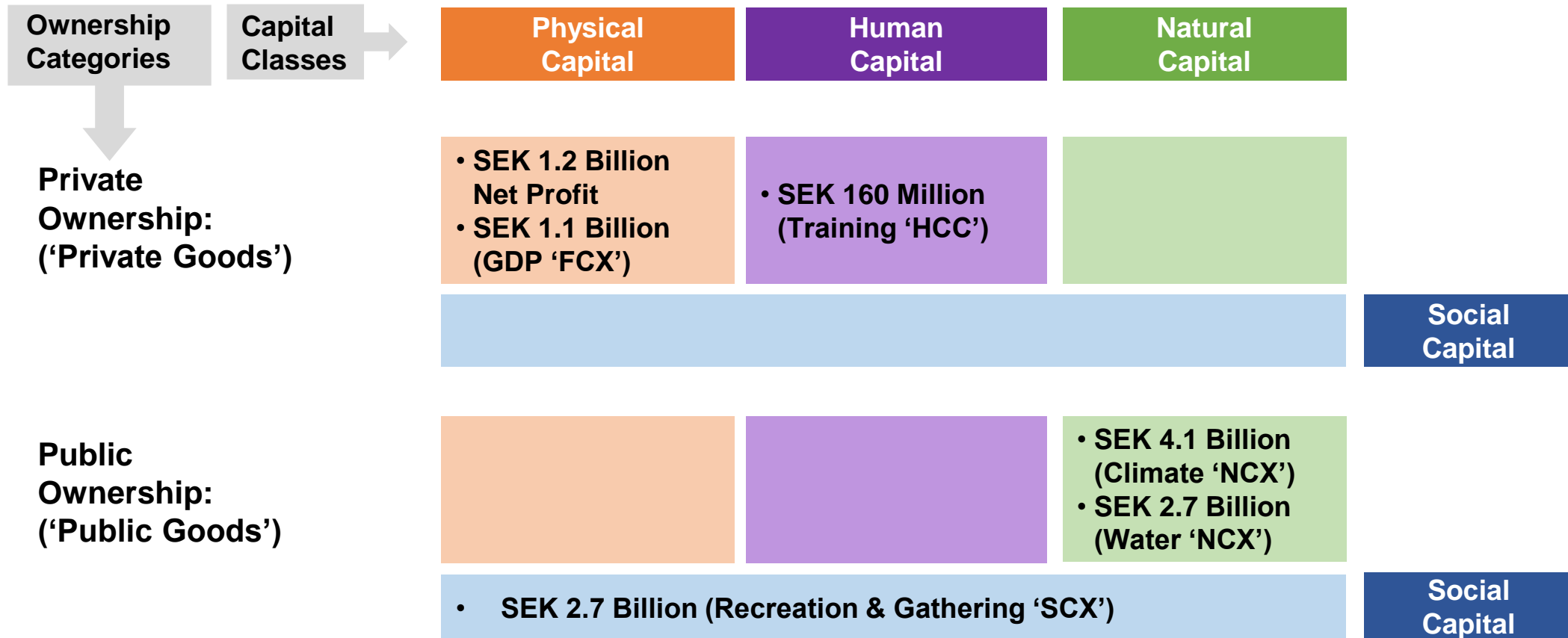
- Sveaskog owns 14% of forest land in Sweden, spread across the entire country.
- Most of the forest land is in the northern part of the country.
- Sveaskog is the Swedish market leader within forest regeneration and seedlings through Svenska Skogsplantor.
- Sveaskog owns land worth SEK 34.5 billion
- Sveaskog sales of SEK 6.206 million in 2017 and in average 846 employees throughout Sweden.
- Sveaskog is owned by the Swedish state.



The dark green in the financial result is Sveaskog measured earlier. The light green in the financial capital is other financial value: value added tax, interest rates and depreciation. Social capital includes recreational benefits, berry collection from Sveaskogs forest, hunting and fishing, and forest roads for better access. Human capital involves employee development, including skills development and well-being. Natural capital includes, in particular, carbon capture and the positive impact of forests on the water cycle.

Read more about the calculations in the coming pages.

<IP&L> gives us the Big Picture ...



Sveaskog's Contribution to GDP was nearly twice its Net Profit...

Total Financial Value Addition SEK 2.3 Billion (2016); SEK 2.5 Billion (2017)

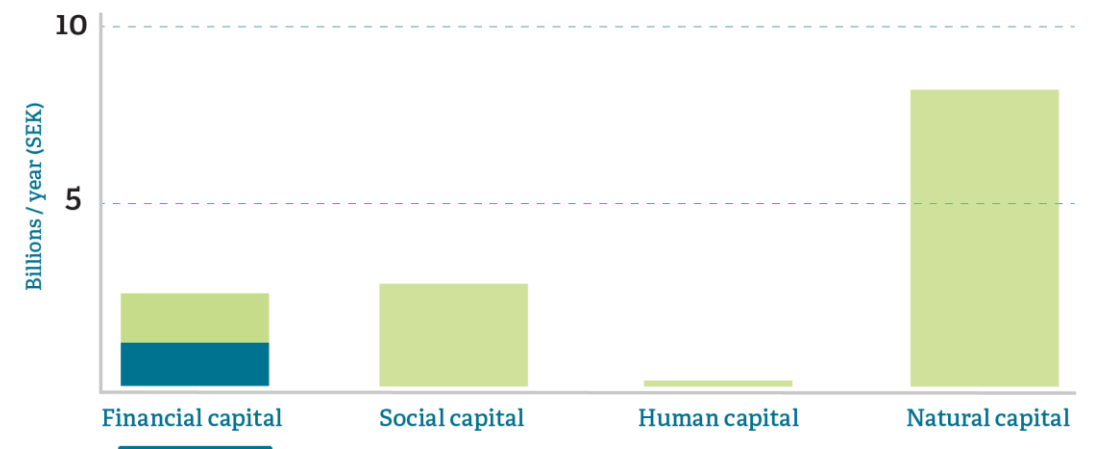
Value addition by the “income method” for GDP

<FCXTM> = Sveaskog's contribution to Sweden's GDP beyond Net Profits

Notes:

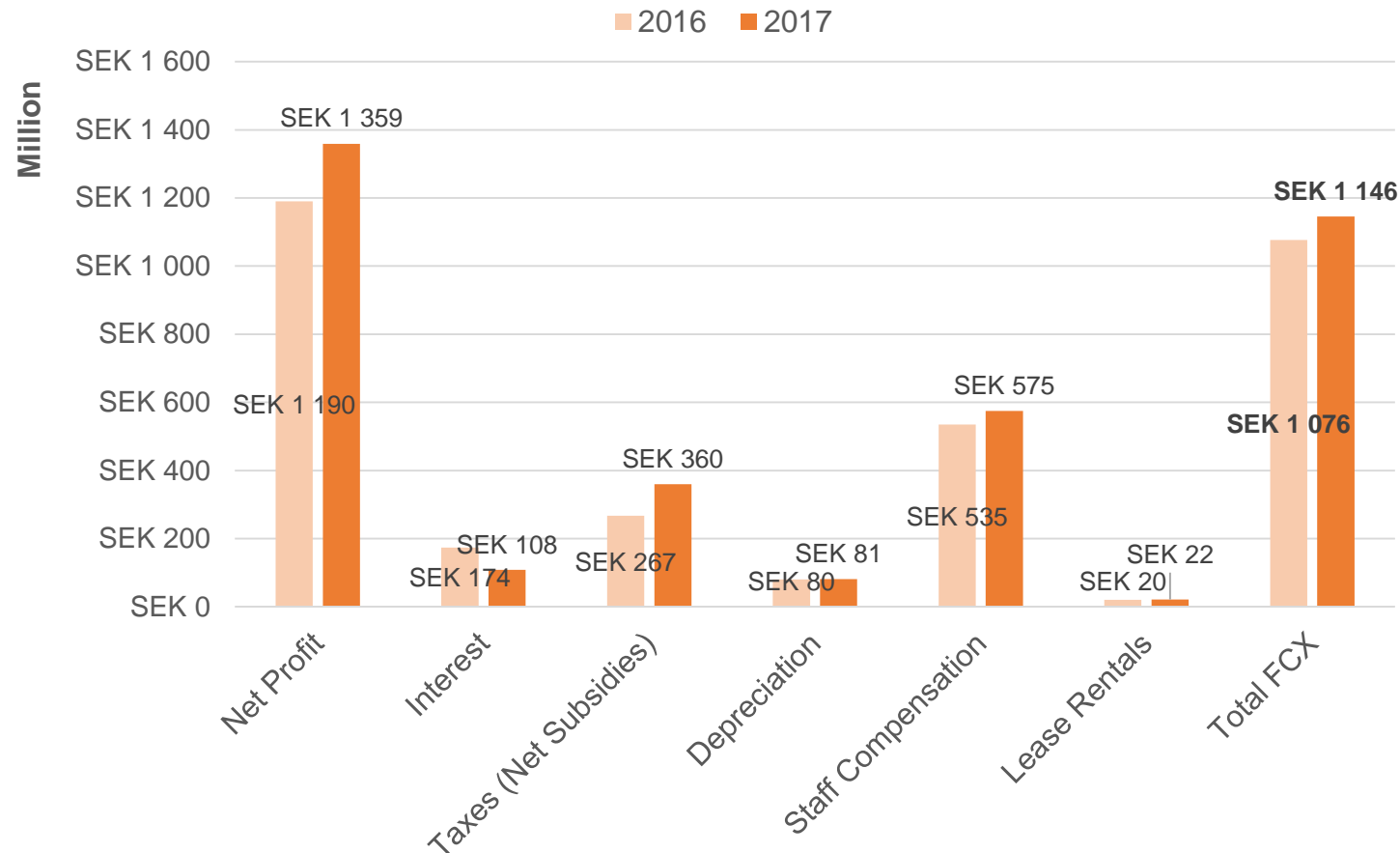
1. FCXTM & GDP do not include large externalities (ESS values, GHG impacts, etc.)
2. “Level-1” <FCXTM> and does not include outsourced / sub-contracted value-added

¹Sweden's GDP in 2016 was US\$ 514.46 Billion ([World Bank, 2018](#))



Sveaskog's Contribution to GDP was nearly twice its Net Profit...

Total Financial Value Addition SEK 2.3 Billion (2016); SEK 2.5 Billion (2017)



Sveaskog Generated Social Benefits of SEK 2.7 Billion...

Recreational Benefits – Travel Cost Method

Individuals average 40 visits per year @ SEK 50 per visit (Fredman et al 2013)

Economically active population (age 15 and above) = 85% (Statistics Sweden 2017)

Swedish forest area owned by Sveaskog = 14% (Sveaskog 2017)

NTPF Benefits – Production Function, WTP & Avoided Cost

Harvest rates in Sveaskog forests = 9% for Lingonberry & 6% for Bilberry (Sveaskog 2017)

75% berries sold in organized markets, rest sold in unorganized markets (Sveaskog 2017)

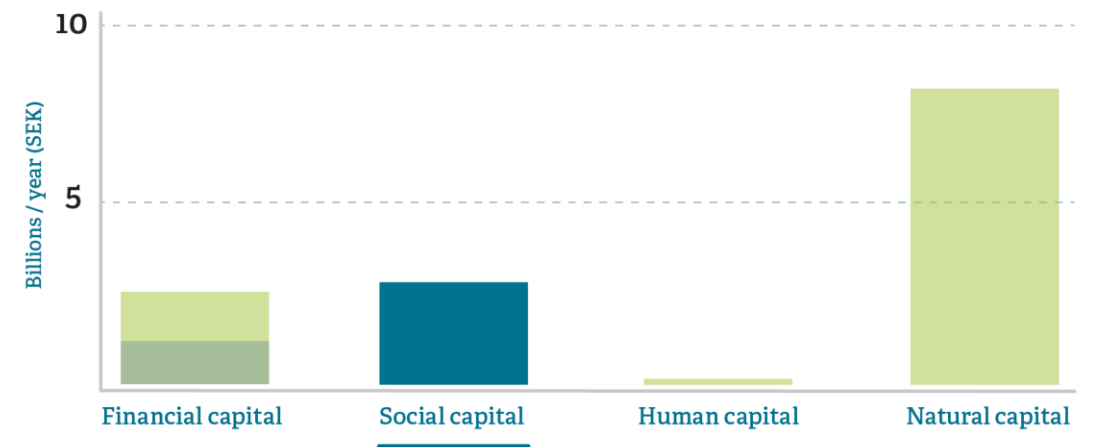
TEV of moose = SEK 3500 / SEK 3700 / SEK 4600 in North / Central / South Sweden (Mattsson et al. 2006)

WTP for hunting of Roe Deer = SEK 470 (Engelman et al. 2016)

Daily cost of feed for reindeer = SEK 5 (Sara Askelund, 2014)

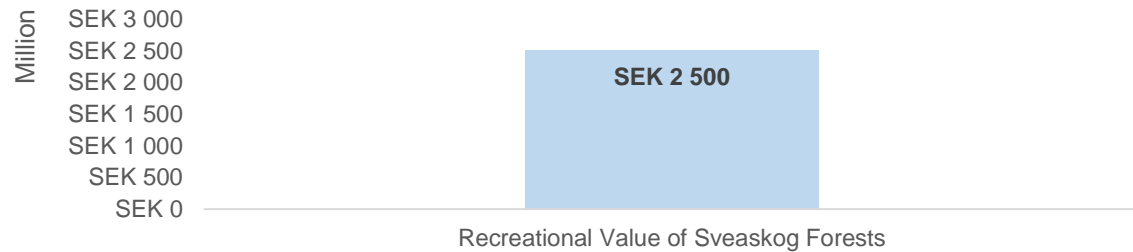
CSR & Business Model Benefits – HCXTM Model

50% of Växtkraft! Program trainees receive full time employment in forestry sector (Sveaskog 2017)

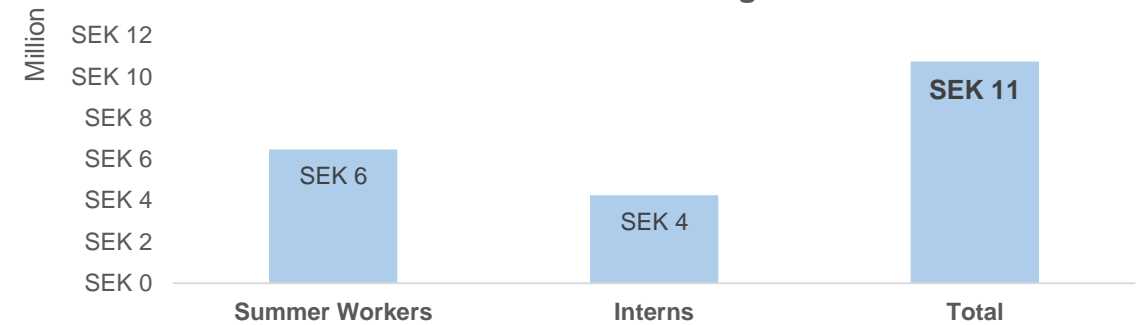


Sveaskog Generated Social Benefits of SEK 2.7 Billion...

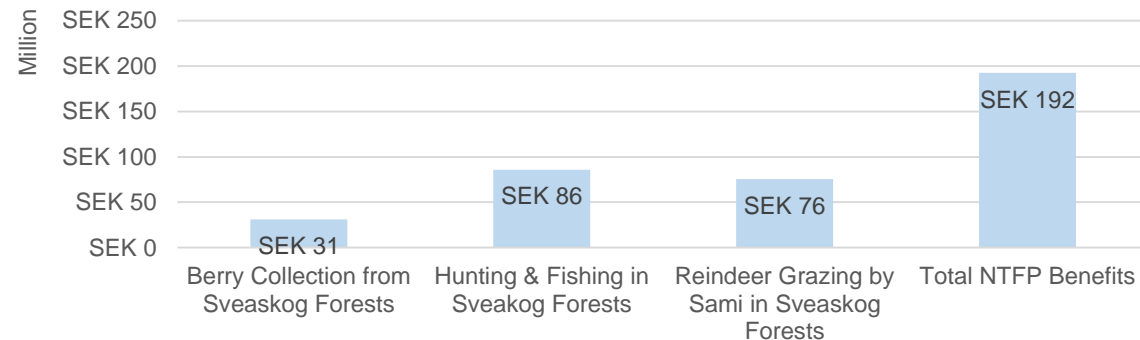
Recreational Benefits from Sveaskog Forests in 2016



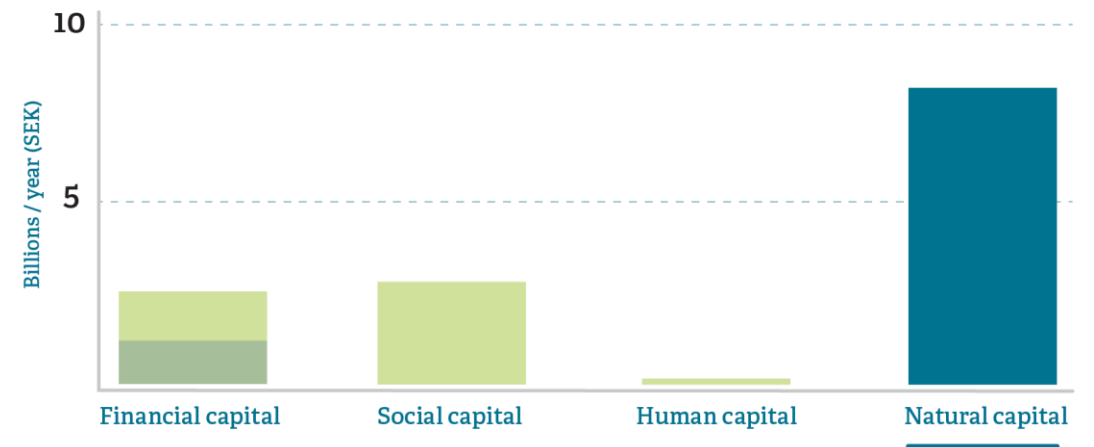
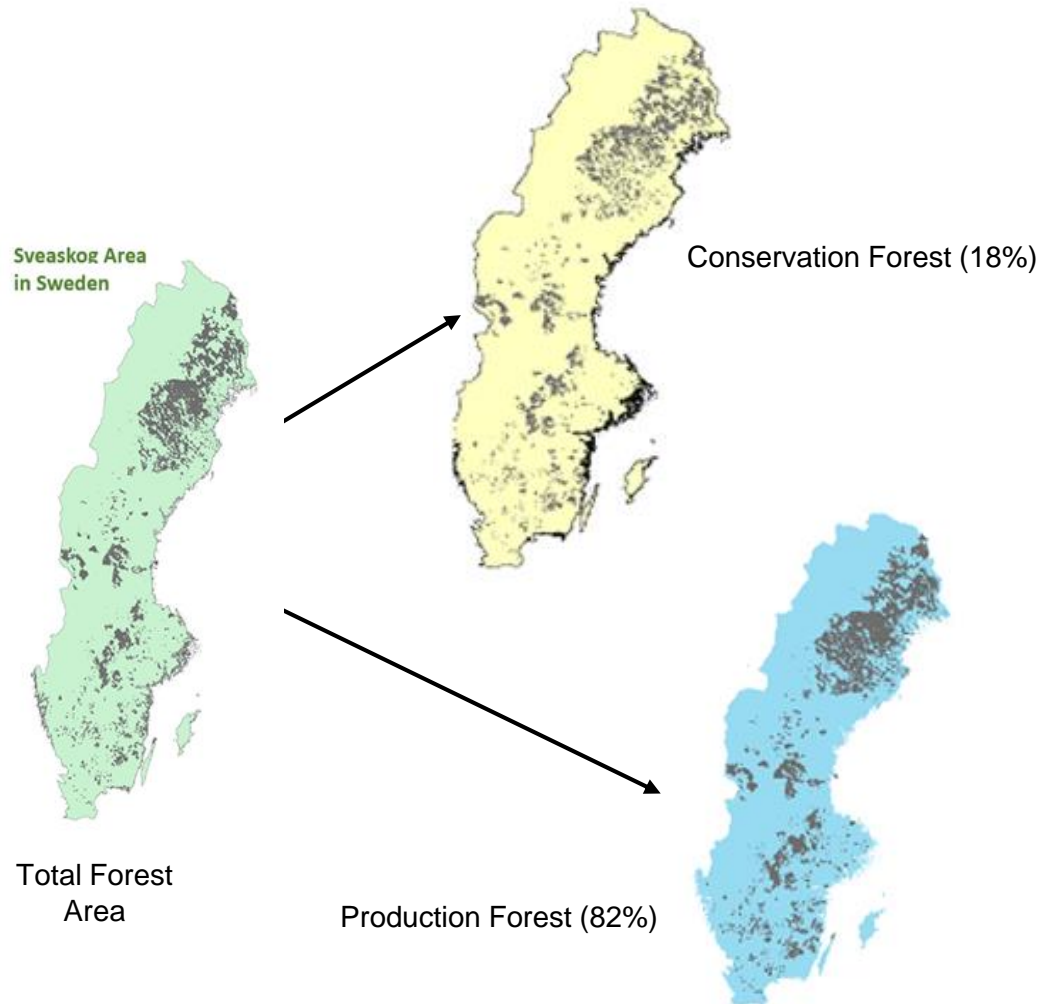
Total Benefits from Växtkraft! Program in 2016



NTPF Benefits from Sveaskog Forests in 2016



Net Benefits from Ecosystem Services were SEK 7 Billion ...



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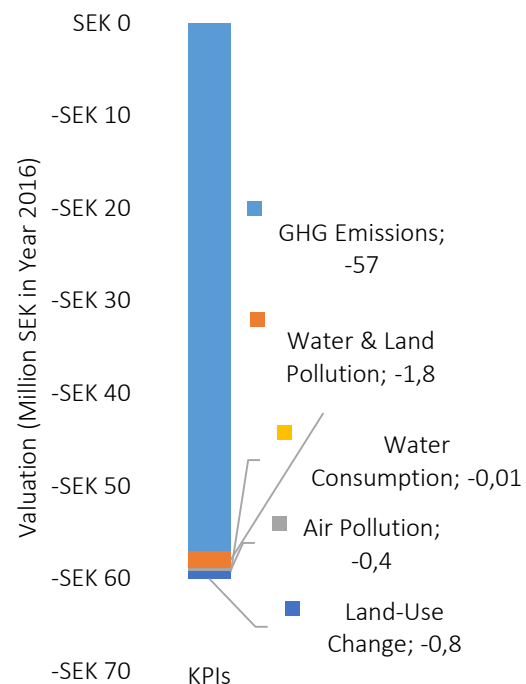
2016: net negative externalities **SEK 59 Million**, of which GHG was largest contributor

(96% of total net impacts) followed by Water & Land Pollutants (3% of total net Impacts)

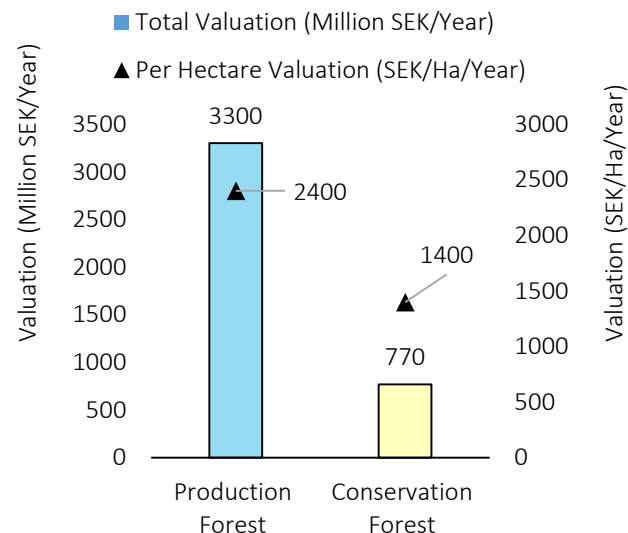
2016: Carbon Sequestration contributed positive externalities of **SEK 4.1 Billion** followed by Water Conservation with **SEK 2.7 Billion**.

Total Value from Soil Erosion Prevention was SEK 0.8 Million, based on 1% land use change scenario. Per Hectare Value – SEK 31 and 26 /Ha/yr. for Conservation and Production forest respectively

Natural Capital Externalities

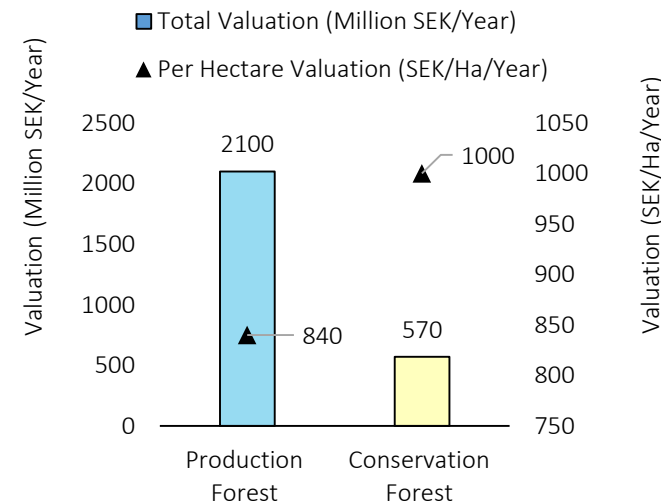


Carbon Sequestration



- Coefficients based on **IPCC, 2006**
- **Valuation based on Social Cost of Carbon at 3% Discounting rate (Interagency working group on Social cost of GHG, U.S. 2016)**

Water Conservation



- Methodology based on **Zhang Biao 2010**
- Valuation based on operational cost (**Eurostat 2017**) from electricity consumption (**Olsson 2012**) in Conventional Water Supply

Managing & Reducing Sveaskog's Negative Externalities

Sveaskog's Initiatives in 2017

38% of diesel used in Sveaskog owned vehicles (for Harvesting activities) sourced from renewable sources

No direct pesticide application in field

Waste recycling avoids SEK 0.6 Million

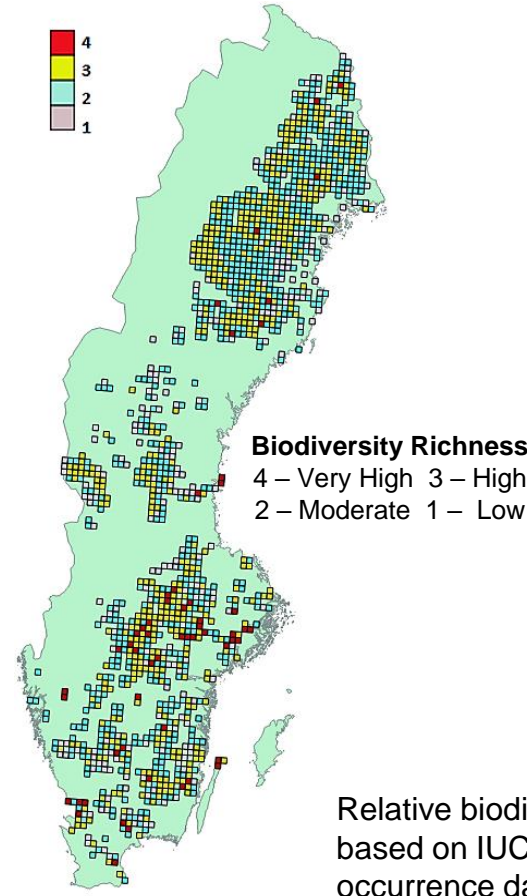
+ve <NCX> far exceeds -ve <NCX>

2018 Recommendations

Application of Biodiversity maps to identify hot spots for planning of production and conservation activities

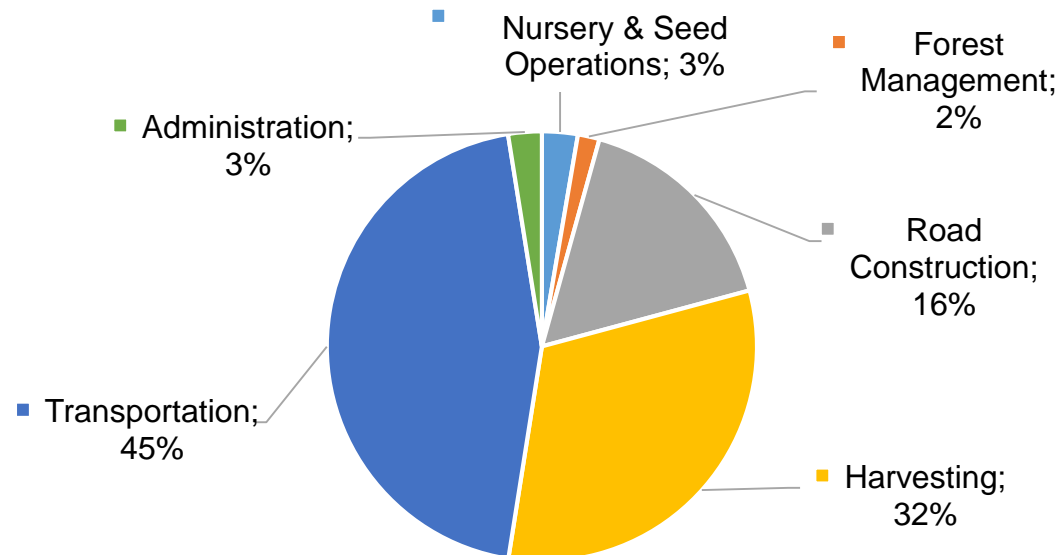
Promoting Supply chain engagement programs aimed to reduce transportation impacts

Promoting rail transport to reduce impacts



Managing & Reducing Sveaskog's Negative Externalities

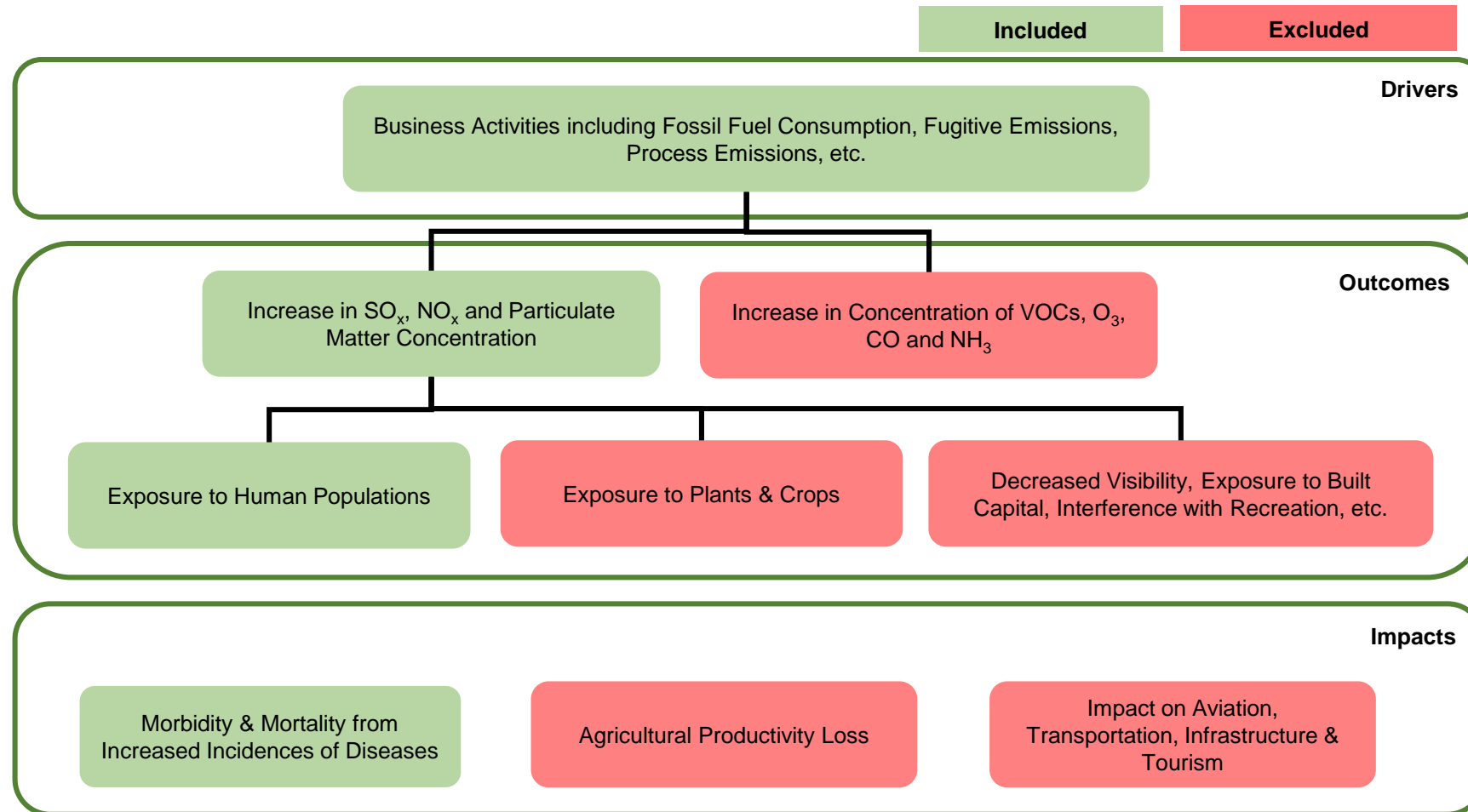
**GHG Impacts : Activity Breakdown
(SEK 57 Million)**



Major Contributors to other KPIs:

- SEK 1.8 Million - Water & Land Pollution is 93% from Forest Management
- SEK 0.4 Million - Air Pollution is 87% from Transportation
- SEK 0.01 Million – Water Consumption is 96% from Nursery & Seed Operations
- SEK 0.8 Million – Land Use Change is 100% from Road Construction

Methodology Example (1): Estimating Impacts of Air Pollution



Methodology Example (1): Estimating Impacts of Air Pollution

Drivers

Emissions Quantification

- Air pollutant emissions at source from fuel and electricity consumption
- Based on the activity and source, Pollutant emission rates are calculated
- Mapping sources geographically such as Northern, Middle and Southern Sweden to calculate the impact

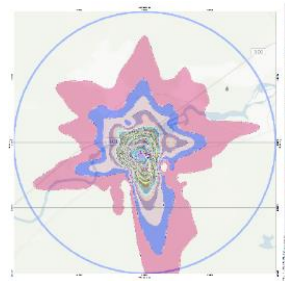
Impacts

Inputs

- Relative Risk assessments for mortality and morbidity based on epidemiological studies

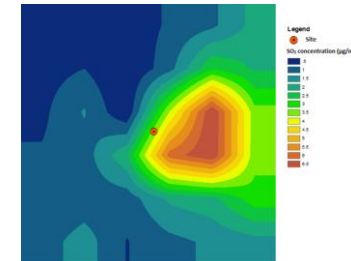
Impacts

- “All Cause” mortality
- Morbidity including hospital admissions related to respiratory, COPD and cardiovascular illnesses
- Total Health Cost



Dispersion

Outcomes



Concentration

Developing regionalized models for Northern, Middle and Southern Sweden

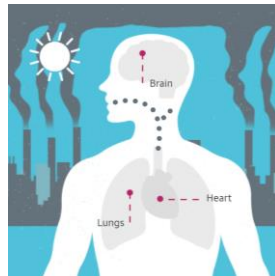
Model

Air dispersion Model – Area & Line

Inputs

Emissions, MET data, Receptor type

Human Health Impacts



Source: The Guardian

Model Output

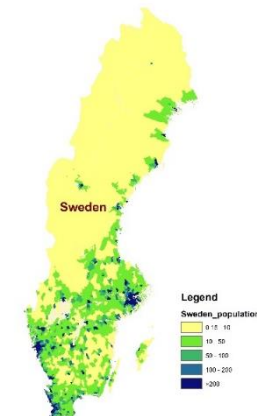
Concentrations of pollutants at receptors



Population

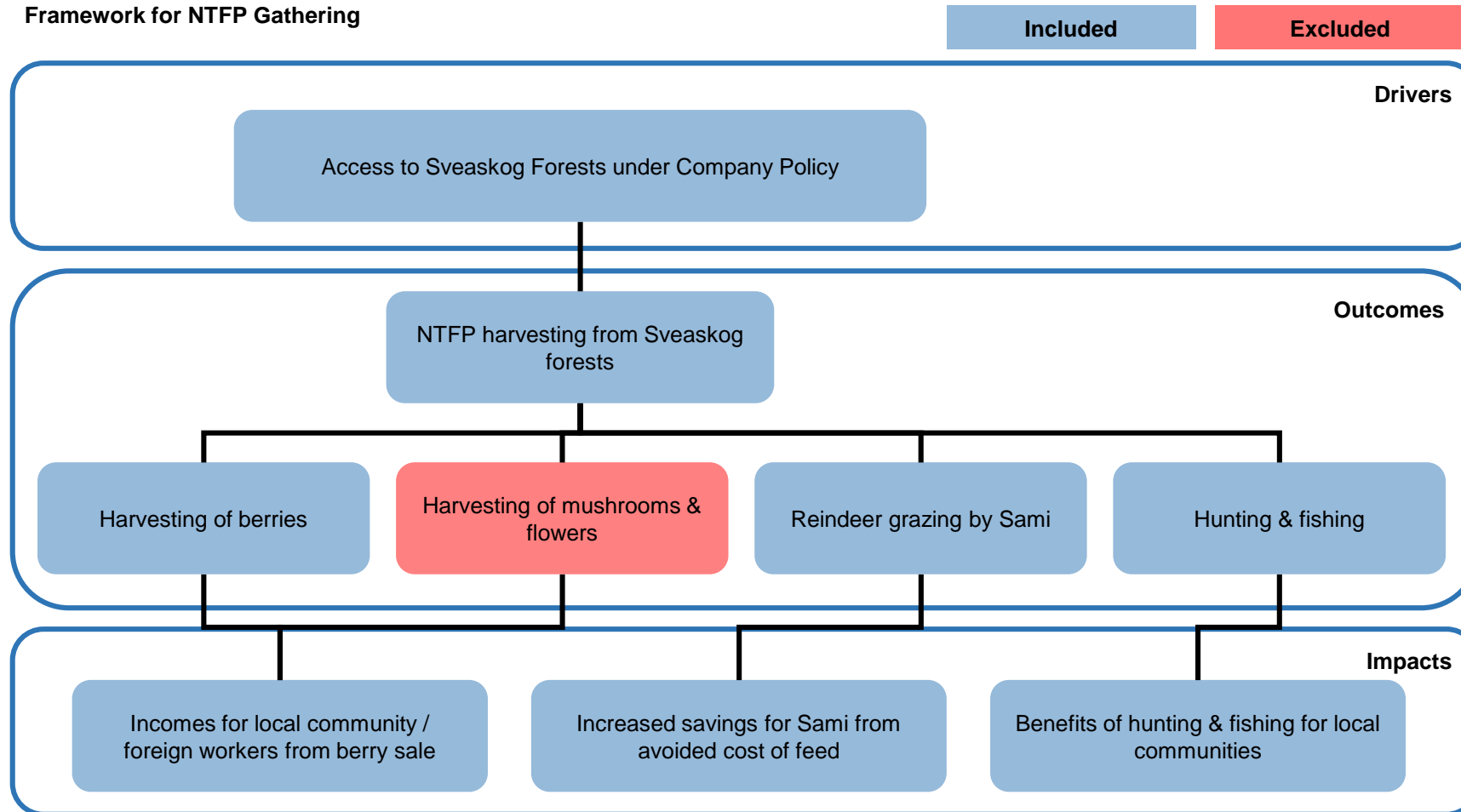
Source

Population data (SEDAC)



Methodology Example (2): Estimating NTFP Benefits

Framework for NTFP Gathering



Methodology Example (2): Estimating NTFP Benefits

Valuation Methodology for Estimating NTFP Benefits

Nature of Benefit	Description	Valuation Methodology
NTFP Gathering from Sveaskog Forests	Local communities and foreign workers derive significant economic benefits from collection & sale of berries from Sveaskog forests to which they have free access	<ul style="list-style-type: none"> • Production Function (PF) approach to determine total production & harvesting of berries from Sveaskog forests • Income benefits estimated based on local market prices for berries (Data from Sveaskog)
	Local population derives significant value from hunting game & fishing in Sveaskog forests	<ul style="list-style-type: none"> • Production Function (PF) approach to determine total number of game hunted in Sveaskog forests (moose & roe-deer) & fishing licenses issued (Data from Sveaskog) • Estimate economic value of hunting based on WTP Methodology (Mattsson et al. 2006; Engelman et al. 2016) • Economic value from fishing estimated via market pricing based on opportunity cost of time spent in fishing activity (Data from Sveaskog)
	Local Sami Communities benefit from grazing of their reindeer in Sveaskog forests	<ul style="list-style-type: none"> • Hedonic pricing methodology to estimate economic value of reindeer grazing based cost of artificial feed (Sara Askelund, 2014), seasonal grazing trends and proportion of Sveaskog forests in Northern Sweden (Data from Sveaskog & Statistics Sweden)



www.sveaskog.se



www.gistadvisory.com