

Cartographic Activities in Sweden

2019 - 2023

National Report to the
19th General Assembly of the ICA
Cape Town, South Africa, August 2023



kartografiska.se

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Introduction

The national report “Cartographic Activities in Sweden 2019-2023” is published by the Swedish Cartographic Society (Kartografiska Sällskapet). The report is addressed to the delegates of the General Assembly of the International Cartographic Association in Cape Town, South Africa.

The focus in this report is geographic information, displayed in a variety of presentations from national and regional authorities.

The articles are produced by the contributing organizations themselves. They describe the main goals with activities of the organizations and their cooperation and collaboration with other organizations in geodata matters.



1 CARTOGRAPHIC SOCIETY

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The Swedish Cartographic Society was founded in 1908 and has represented Sweden in the International Cartographic Association since 1961.

We are an association for individual members (professionals and others) who are interested in geodata, who want to learn more about it and who want to become better at using and putting their knowledge into practice.

The goal of the Cartographic society is to promote and stimulate professionals and other interested parties to use and implement geodata in everyday life, encourage education and research, regardless of industry; increase interest in and knowledge of the use and availability of geodata as well as mediate research and education in this field.

The society is organized in six different sections, described below. We communicate and work with “Kart & Bildteknik” magazine of the cartographic community, online information, seminars focused on specific subjects for sharing best practise, scholarship for members that want to join conferences. Within KS awards are also given in categories as, the medal of Olaus Magnus – for person who has made considerable work for the interests of KS and the specific award of innovation.

The main activity of the society is to organize an annual conference “Swedish Map days” (“Kartdagarna”), where governmental authorities, municipalities, scientific institutes and different companies are urged to participate and present their achievements. This year the conference [“Kartdagarna 2023”](#) was held In Helsingborg with around 650 participants.

COMMITTEE BOARD

The committee board consists of a president, a vice president, a secretary, a treasurer, seven members, and two deputies. The president is Fredrik Davidsson who is also international contact person of the society.

SECTIONS

The society is organized in six sections: Geographic Information Systems, Photogrammetric and Remote Sensing, Geodesy, Historical maps, Cartography and Education. Each section has responsibility for its respective disciplines and among other activities the sections arrange seminars, exhibitions and study visits in different places in Sweden.

THE GEOGRAPHIC INFORMATION SYSTEMS SECTION

The section communicates advantages of GIS and geodata, for the societal and business use. The GIS section consists of a board of four members with GIS experience from different areas like state and regional agencies, and private companies. Its main duties are to arrange sessions at the Swedish annual conference “Kartdagarna” and to acquire papers to the magazine of the Cartographic Society “Kart & Bildteknik”. Aiming to find the topics that are of greatest use and interest for the participants. In addition, the section has been involved in communicating the Swedish Cartographic Society’s activities on the web page and social media.

The present convener of the Geographic Information System section is Jenny Rasmus and the address to the section is:

Web: [GIS/GIT - Kartografiska Sällskapet](#)

E-mail: jenny.rasmus@skane.se

THE PHOTOGRAMMETRIC AND REMOTE SENSING SECTION

The section consists of a board of four members. The main duties are to arrange sessions for the annual conference “Kartdagarna” and to acquire papers to the magazine of the Cartographic Society “Kart & Bildteknik”. Every second or third year, the section organizes a seminar in photogrammetry and remote sensing. The interest for the seminar is large and seems to have an important role when it comes to educating and presenting new products and technology for surveyors and similar professions.

During the pandemic, no seminar was arranged, but in autumn 2022 a group of 60 persons gathered again to share what had happened in real-time 3D, remote sensing for statistics, new remote sensing methods (including AI methods) and satellite data in analyses for urban climate adaptation.

Many applications for use within city planning have been evolved during the last years using remote sensing data, focusing on monitoring and planning of the cities from a sustainable perspective. Examples are measuring and monitoring of urban green structures, estimation of ecosystem services and scenarios related to climate change, e.g. urban heat islands and flooding. Focus areas are also dense image matching, UAVs, mobile mapping and laser scanning.

The second run of the national laser scanning, Laserdata Skog, will cover 75% of Sweden with open data of high quality, when fully developed. This data set, together with

Copernicus data, is among the most important open data accessible in our field. Sweden has a large program for data exchange between governmental and other official organizations, including municipalities. To ensure good quality and standardized data formats, The Swedish Mapping, Cadastral and Land Registration Authority, the National Transport Administration, some municipalities and companies are cooperating as a governmental unit on issues concerning data in that program.

The European Commission has recently approved an addition to the Open Data Directive that certain data sets, which are particularly valuable to society, must be provided free of charge and with as few restrictive conditions as possible. The coming period thus brings greater openness, where access to important geodata such as orthophotos, elevation and map data gives the opportunity to develop many new ideas and solutions for society.

The present convener of the Photogrammetric and Remote Sensing Section is Sara Wiman and the address to the section is:

Web: [Fotogrammetri och fjärranalys - Kartografiska Sällskapet](#)

E-mail: sara.wiman@geografiskainformationsbyran.se

GEODETTIC SECTION

For several years, the geodetic section of the society has focused on subjects related to geodetic reference systems and GNSS e.g. the improvement of Swedish geoid models and land uplift models.

RTK positioning with centimeter accuracy based on Network-RTK services covering the whole country, is still the most used geodetic survey technique in Sweden today.

Effective use of the Swedish national reference network SWEREF 99 and the national elevation system RH 2000 (ETRS89 and EVRS realizations respectively) is important and for large projects there are project adaptations available to increase the reliability for the user. Elevation measurement using GNSS has not yet replaced the traditional benchmarks. Most common is to combine the use of a benchmark together with GNSS technology.

The number of educated surveyors, geodesists and engineers at the level of Master of Engineering does not fulfil the need on the market. This problem is not new and the Swedish Cartographic Society is conscious of the problem and supports efforts to turn this negative trend. The Cartographic Society continues to pay attention to this and support universities and students to participate at the annual conference "Kartdagarna". The short-term solution is to bring in educated surveyors from other countries but the long-term goal must be to interest students in Sweden to choose an education related to Geodesy.

Geodesy has a role in the discussion of global climate change and the mobile mass market's need for reliable and ever more accurate positioning of autonomous vehicles and the use of drones. The use of drones is increasing and is used with both cameras and scanner. Correctly used it is a reliable way to rapidly gather data for various projects. Data collection speed and reducing the time spent in the field is getting more and more important. This we can see since Mobile Mapping and SLAM-scanning are other tools that are increasingly used both in infrastructure and industry projects. Laser scanning is becoming more and more used as a primary data source.

Finding ways to minimize the use of time spent in the field is becoming new standard methods and another good example of that is InSAR (Radar from satellites) that reduces the need of levelling in the field to monitor surface movements.

The softwares used to process data are getting more and more automatic so there is a need to maintain and not neglect the need of quality control in our processes.

Autonomous carriers (drones, robots, etc.) of survey equipment are being developed and used in hazardous areas such as mines and are improving work conditions and lowering the risks for surveyors in the field. Even VR and AI has being brought to the market as tools to be used by the modern Surveyor.

The present convener of the Photogrammetric and Remote Sensing Section is Lennart Gimring and the address to the section is:

Web: [Geodesi - Kartografiska Sällskapet](#)

E-mail: lennart.gimring@afry.com

HISTORICAL SECTION

The Historical Section of the Swedish Cartographic Society consists of a board of four members, whose main duties are to arrange a session at the annual conference "Kartdagarna" and to acquire papers to the magazine of the Cartographic Society "Kart & Bildteknik". In addition, study visits are arranged. Conference papers tend to be either on the history of proper cartography or on the use of "historic" maps as a source for research within quite diverse fields, ranging from urban agriculture, and the design of forestry plans to family history.

Section members attend conferences like the International conference for the History of Cartography (Antwerp 2015, Amsterdam 2019), Members are occasionally consulted on matters of cartographic history and historical cartography.

The Swedish Association for Map Archivists (Kartarkivärföreningen) has been inactive as an organization for some years. But scholarly archival competence (including the still unsolved problem of long-term preservation of digital data) is available within the historical section, and presentations on archival matters and questions are regularly included in Kartdagarna.

Sweden is lacking a university chair in the history of cartography, so the field has a rather weak academic support. But some research is carried out within e.g. the National Archives including the Military Archives, university institutions in history, human geography, agrarian history, the Committee for the History of Cartography within The Royal Swedish Academy of Letters and History and Antiquities (Kungl. Vitterhets Historie och Antikvitets Akademien).

Recent theses dealing with History of Cartography:

Hallgren Karin (2016) – En kåhltäppa eij att räkna, Kökväxtodlingen i 1700-talets jordbrukssystem.

Höglund Mats (2017) – Kampen om fredsmilen, Kartan som makt- och kontrollinstrument i 1655-års reduktion.

Forss Charlotta (2018) – The Old, the New and the Unknown, The continents and the making of geographical knowledge in seventeenth-century Sweden.

Jupiter Kristofer (2020) – The function of open fields. Agriculture in early modern Sweden.

The present convener of the Historical Section is Mats Höglund and address to the section is:

Web: [Historisk kartografi - Kartografiska Sällskapet](#)

E-mail: mats.hoglund@ub.uu.se

CARTOGRAPHICAL SECTION

The Cartographical Section consists of a board of four members. The section's primary responsibility is to arrange national map exhibition at the annual map conference "Kartdagarna". The section members are also involved in planning and the work of making the conference program focusing especially on the technical sessions. The section is also represented in the editorial board of the magazine of the Cartographic Society "Kart & Bildteknik", contributing with content and article topics. Occasionally, the section is involved in arranging study visits and seminars planned in the context of the cartographic society.

The Swedish National Report to the ICC is edited by members of the Cartographical Section as well as the cartography part of the society website. Members of the section regularly attend the ICA conferences and are responsible for the Swedish contributions to the International Map Exhibitions at the ICC, including Barbara Petchenik Children's Map Competition. The section cooperates with other sections of the society when it comes to education in cartography.

Swedish universities have no chair in cartography and the challenges concerning maintaining and building up skills in the next generation of cartographers is an important area that this section and the cartographic society as a whole is monitoring and bringing up for discussion in various contexts.

The present convener of the Cartographical Section is Zepyur Gevorkjan and the address to the section is:

Web: [Kartografi - Kartografiska Sällskapet](#)

E-mail: zepyur.gevorkjan@stockholm.se

EDUCATIONAL SECTION

The section for educational matters in the Swedish Cartographic Society was formed in 2006. The aims of the section include:

- work with educational matters relating to cartography, geodesy, GIS, photogrammetry and remote sensing on all levels, both nationally and internationally,
- promote increased competence development in cartography and related fields in Sweden, such as land surveying, spatial planning, geomatics, computer science, earth science and geography.

The Educational Section also takes part in the annual conference “Kartdagarna”, the biggest conference of its kind in Scandinavia. Among the recurring activities arranged by the educational section is the aim to arrange an annual conference or workshop for lecturers and others, where educational matters are discussed. The aim is to facilitate the sharing of experiences, to improve collaboration opportunities, networking and competence development, and to enhance course quality and recruitment of new students. The location of the venue varies in order to encourage diversity among the hosting educational institutions and to reach new participants. The next workshop is planned to take place at the University of Gävle in cooperation with The Swedish Mapping, Cadastral and Land Registration Authority in November 2023.

The presentations are normally published afterwards on the website of the Swedish Cartographic Society.

The present convener of the Educational Section is Jesper Paasch and the address to the section is:

Web: [Utbildning - Kartografiska Sällskapet](#)

E-mail: jesper.paasch@hig.se

2 The Swedish mapping, cadastral and land registration authority

LANTMÄTERIET

Lantmäteriet is a governmental agency, originating from 1628.

The mission for Lantmäteriet is to give support for creating an efficient and sustainable use of Sweden's real property, land and water. The organisation has three main activities, which also form the organisational structure with three divisions: Cadastral Services, Land Registration and Land and Geographic information services (Geodata). Support for these activities is provided by corporate functions. Lantmäteriet has about 2,200 persons in the staff and 50 offices in Sweden. The head office is situated in Gävle.

Maps and geographic information

Lantmäteriet provides the society with digital maps, images and other fundamental geographic information. Land surveys, aerial photography and airborne laser scanning are carried out by Lantmäteriet and this leads to a production of different information for whole of the Sweden together with a cooperation with both central and local authorities in order to collect fundamental data and reliable geographic information.

Innovation and development

There have been two main focus areas during 2019 – 2022 for innovation and development of maps and geographic information.

Automatic generalization of small-scale maps have been developed during this period. This development includes harmonization of the information models within the different scales and migration of data from the old small-scale databases to a new database with the new information model that is the foundation for all maps and geographic products.

From this new database we have developed fully automatic generalization routines for the maps in scale 1:50 000 and 1:100 000. The project was successfully finished in Mars 2023.



Topografi 50 Nedladdning, vector.

Using machine learning to extract building footprint from aerial images is the other focus area during the period. This is more of an innovation activity, and we have done testing

and knowledge building during the last years. We now have a workflow with good performance and the plan is to implement this in our process for updating buildings during 2023. We will then continue working on extracting other objects with this method for coming years.



The red marking is AI detected buildings.



Original Aerial image.

Access to our products

Our maps are accessible in the e-service *Min karta*: <https://minkarta.lantmateriet.se/>
or at our web portal for our products:

<https://geotorget.lantmateriet.se/bestallning/produkter>

Address

Lantmateriet

S-801 82 Gävle, Sweden

Web: www.lantmateriet.se

E-mail: kundcenter@lm.se

3 Sweden's County Administrative Boards

LÄNSSTYRELSENA

Organisation

Sweden is divided into 21 counties, each of which has its own County Administrative Board (Länsstyrelsen) and County Governor. The function of the County Administrative Boards is to be a representative of the national state in their respective counties, and to serve as a link between the inhabitants, the municipal authorities, the Central Government, the Swedish Parliament, and the central state authorities.

GIS/GIT activities

Maps and databases are frequently used in many of the legislative tasks, such as permits or recommendations for a proposed expansion of some exploitation request etc., in the work carried out by officers in the administration. The County Administrative Boards are both data consumers and data producers. In the day-to-day work, officers make extensive use of background data from The Swedish Mapping, Cadastral and Land Registration Authority, the Geological Survey of Sweden, the Swedish Maritime Administration, Swedish Meteorological and Hydrological Institute and many other data providers. The access to all this background data is made possible by our membership in the national SDI collaboration. Internally produced data from surveys, analyses, and processes, is also used to a large extent by our officers.

The 21 County Administration Boards share the same IT-platform which includes a common GIT-platform and storage of geographic information. To coordinate the use of GIS on the 21 authorities there is a GIS-policy which provides the framework for the use, production, and administration of geographic information. The goal is providing standardized and harmonized geographic information with national coverage for both internal and external users. The hub for distribution of our geodata, Web Map Services (WMS), web map applications etc., and its associated metadata is our metadata catalog called "Geodatakatalogen". The catalog is web based and contains a well-developed search engine. The catalog is based on the Open Source software GeoNetwork and the ISO standards 19139 and 19115, and is in addition adapted with some in-house generated functions. The purpose is to create easy access and management of our geodata, both for internal users and the public. Metadata is provided using core components from ISO19115, INSPIRE, the Swedish national profile and some specific elements for the County Administrative Boards.

Through "Geodatakatalogen" the public gets access to:

- About 2400 regional GIS-related layers provided by the separate Counties.
- Over 200 harmonized layers with national coverage of which many also are provided as OGC Web Map Services (WMS).
- 12 datasets consisting of INSPIRE-specified information in WMS-format with ATOM services.
- Over 100 web map applications (regional, national, and thematic).

Technical development

Due to an enterprise agreement with ESRI our GIS environment is based on server and client software from ESRI.

- We use ESRI's ArcSDE for a "standardized" repository with internally produced Geodata.
- We provide Geoservices, both internal and external, by the use of ArcGIS Server
- We have approximately 1,500 installations of ArcGIS Desktop.
- We distribute our web map applications through Portal for ArcGIS.
- Portal for ArcGIS is also the platform for data access for our mobile GIS usage. We use Survey 123 and Field Maps for ArcGIS as our main mobile GIS applications.
- Data collection and aerial photographing with drones are an upcoming trend.
- The demand to have GIS-components integrated in administration systems are rising as well, to make this integration easier we have developed a generic map API.

Collaborations and forums

- Participation in the national SDI collaboration and the National Geodata Advisory Board.
- Participation in a geodata exchange collaboration, with the purpose of improving the quality of web services for end users.

Address

County Administrative Board at Västra Götaland
403 40 Göteborg, Sweden
E-mail: generelltkartstod@lansstyrelsen.se

4 Geoforum Sverige

– a smart and sustainable future through geodata and digitalization.

Geoforum Sverige is an independent, national association for geographic information in Sweden, representing some of 200 governmental agencies, municipalities, private companies, universities, and other educational institutions as well as other organizations at all levels. The association was founded in 1986 with the aim to encourage Sweden to make use of the potential in the field and to achieve more efficient services in society through the use of geodata.

As of 2023, the board of Geoforum Sverige consists of thirteen members. The chairman since 2022 is Patrik André, strategist at the Swedish Forestry Agency. The ongoing operations are carried out by the office, which consists of two employees, the CEO and the head of communications.

Collaboration is an important part of the association's activities. Geoforum Sverige operates the network GI Norden, the Nordic network for geodata and GIS, together with its Nordic sister associations. Geoforum Sverige also has a close collaboration with the Swedish Cartographic Society and with several other associations active in urban development in Sweden. The association also participates in the Swedish Institute for Standards (SIS) committee for geodata standards.

Geoforum Sverige aims to increase knowledge of the potential of geodata

Geoforum Sverige works to provide increased knowledge about the potential of geodata and to improve the dialogue in this field between users, producers, and decision makers. Geoforum Sverige has long promoted open data in Sweden and other issues related to the digitization of the urban development process and the transition to a sustainable society.

The association responds to referrals, arranges webinars to inform politicians and decision makers, writes opinion articles, and much more. A recent example is an opinion piece on AI in urban development that was published in May 2023 in the newspaper "Dagens Industri" (the article is in Swedish).

Events for knowledge sharing and exchange of experience

Every year, Geoforum Sverige organizes several events and webinars for members and the outside world. Here, current topics within the field and good examples and case studies from the industry are highlighted.

Together with the BIM Alliance, Geoforum Sverige organizes the annual meeting place "Arbeta smart inom planering och byggande" (Work smart in planning and construction). The conference bridges the gap between geodata/gis and BIM and creates opportunities for new creative collaborations and knowledge exchange. The conference was organized for the 20th time in 2022 on the theme of sustainability and gathered around 150 participants. In 2023, the meeting place will be held in October in Stockholm.

AI in urban development

Geoforum Sverige is one of the initiators of the knowledge forum AI Arena, which is run in collaboration with other associations and actors within urban development. Since its inception in 2021, several webinars, workshops, and other types of activities have been carried out aiming at increasing the knowledge and application of AI within the urban development sector.

Important initiative to attract young people to the geodata industry

Skills supply has long been a major challenge in the geodata industry in Sweden. Geoforum Sverige, together with The Swedish Mapping, Cadastral and Land Registration Authority has initiated a project to increase the awareness and interest in the geodata field among young people. The long-term goal is to increase the number of admissions to educations in geodata and that more people with relevant skills apply for available jobs in the industry. The initiative involves many different actors in the geodata field.

Podcast, newsletter, and environmental scan

Geoforum Sverige publishes a newsletter ten times a year that reaches about 1500 subscribers. The newsletter spreads information and the news about the latest in the geodata field. Geoforum Sverige also has a podcast, Positionspodden, which delves into topics related to geodata and digitalization. During 2021-2023, the podcast has released episodes on digital property boundaries and AI in urban development. Geoforum Sverige also has an updated and well-visited website where the latest news from the geodata field is shared.



Geoforum Sverige's Board of Directors and staff in September 2022.

Address

Geoforum Sverige

Drottninggatan 33, 2nd floor, 111 51 Stockholm, Sweden

Web: <https://geoforum.se/>

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Phone: +46 70 321 64 88

5 Swedish civil contingencies agency

MSB

Organisation

The Swedish Civil Contingencies Agency (MSB) is a central government agency under the ministry of defence. MSB is responsible for helping society prepare for major accidents, crises and the consequences of war and reducing the risks to and vulnerability of the Swedish society.

A Director General, appointed by the Swedish Government, leads MSB.

MSB has approximately 1,200 employees working in Karlstad, Kristinehamn, Stockholm, Sandö, Revinge and Rosersberg.

Integrate GIS in crisis management

In 2020 MSB started a project aiming to get a better cooperation and communication between people with GIS competence and the expertise responsible for situational assessments. As a result, GIS gets better integrated into Swedish crisis management by being a natural part of the work with situational awareness, analyses and decision making support.

The project has been carried out in close collaboration with a large number of organisations and people active in Swedish crisis management through information sessions, exercises and training sessions, participation in seminars and workshops.

As a result, there is now a manual guiding through a method in how to integrate GIS in operative crisis management to get better use of GIS, digital data and geographical analysis in emergency management.

<https://www.msb.se/sv/amnesomraden/krisberedskap--civilt-forsvar/samverkan-och-ledning/integrera-gis-i-krishantering/>

National heat map

The climate change will lead to more frequently appearing heat waves, both global and national and this may cause severe impact on vulnerable groups of people as well as vital societal functions & critical infrastructure.

Using Landsat data as basis for the analysis, a national heat mapping service was launched in 2023. The service is a collaboration between MSB, The Swedish Mapping, Cadastral and Land Registration Authority, Swedish national space agency and the County administrative board of Södermanland.

The purpose of the service is the use for identifying areas frequently affected by high temperatures as well as cooling areas and to use that information as basis for planning. For example for use when prioritizing preventive measures to limit negative impact.

The product contains five map layers, with a 30 m resolution. The map layers visualizes max temperature for ground level during the period June 1st - August 31st for four different time intervals plus one aggregated layer for the total time interval.

You can either use the data online or download the data for use offline or in your own GIS.



<https://geovis-msb-vk.metria.se/>

Adress:

MSB

651 81 Karlstad, Sweden

Web: www.msb.se

E-mail: registrator@msb.se

5 Swedish Geotechnical Institute

SGI

Organisation and operational goals

The Swedish Geotechnical Institute (SGI) is an expert authority. We work for safe, efficient and sustainable construction and sustainable use of land and natural resources in a changing climate. Our tasks include preventing landslides and beach erosion. We also work to develop new knowledge and new methods to clean up contaminated areas. In addition, we contribute to the work of reaching the national environmental quality goals. We work with both research, knowledge transfer and consultancy and have an important role as support for municipalities, county administrative boards and other authorities throughout the country.

Development and innovation

In the last 4 years, development has taken place partly within the research missions [CAMEL](#), [COALA](#), [CAZULU](#), [PIGALL](#) and [Mapping quick clay](#), partly within the domain of the [Coastal Data Portal](#), and [GeoCost](#). Within DIGG's national framework for geographic basic data SGI, Geological Survey of Sweden and The Swedish Mapping, Cadastral and Land Registration Authority collaborate to establish data hosting for geotechnical information as national basic data. Within SGI's support to the rescue service, the process flow has been optimized with regard to [video filming/measurement with drones in acute landslide situations](#). In 2020-2023, SGI has also explored various themes for applying the concept of story maps (see Web maps below).

Climate stance

Within the framework of grant 1:10 Climate adaptation, SGI carries out landslide and erosion risk mapping, method development and utilization of the results obtained. For 15 years now, SGI has delivered county-wise climate and vulnerability analyzes in collaboration with Swedish Meteorological and Hydrological Institute. Since 2015, the authority has been responsible for coordinating and harmonizing map data relating to landslides and erosion. In the report *Risk areas for landslides, erosion and flooding, 2021*, 10 national risk areas are identified with a risk of natural disasters in relation to a changed climate. The report is now the basis for an ongoing investigation, *Preliminary study - Targeted climate adaptation work in national risk areas*, which takes a firmer grip on the identified risk areas. Climate thinking also pervades SGI's regional coastal cooperation with a focus on erosion and sea level rise. SGI assesses that the authority can have a significant impact on Sweden's goal fulfillment for 10 goals and a total of 30 sub-goals in the UN Agenda 2030.

Cooperation

SGI cooperates with a number of different authorities partly through various joint assignments, partly through the Geodata Council. As an example, synoptic stability mapping in coarse and fine soil is carried out together with Swedish civil contingencies agency and in collaboration with Geological Survey of Sweden, work is underway in data hosting for geotechnical information. In contaminated areas, SGI collaborates with, among others, The Swedish Environmental Protection Agency for the survey of environmental toxicants (PFAS).

SGI is a member of the Geodata Council and the Community Planning Council as well as the associations GIS-Väst and GIS-Öst.

Konferenser/Utställningar

SGI participates in several national and international conferences every year. For example:

- Kartdagarna, Helsingborg, 18-20 april, 2023. SGI presents [new map materials](#)
- [Regional coastal cooperation](#), Helsingborg, 10-11 maj 2023. Hosted by SGI.
- Sustainable Built Environment and Urban transition, Växjö, 12-13 okt. SGI presents GeoCost.

Web maps/Publications

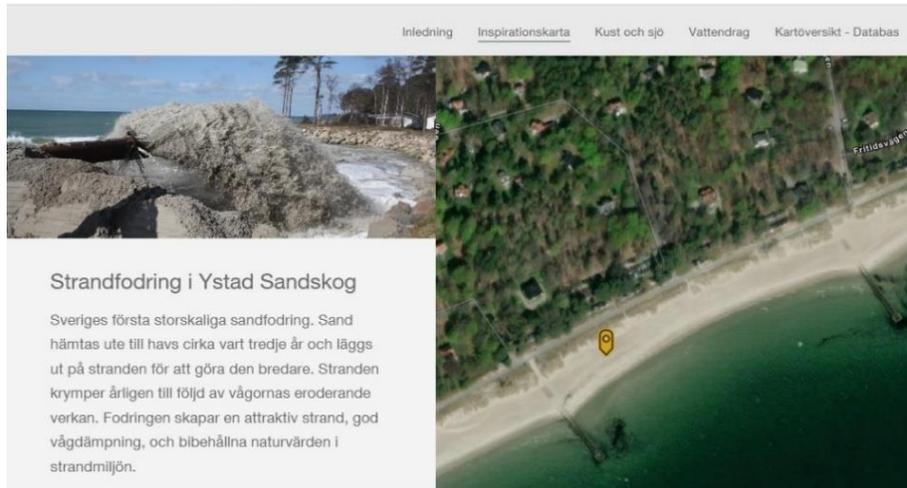
SGI's web map services are accessed via the website about [Maps and GIS](#).

Peer reviewed articles (last 4 years, GIS-related):

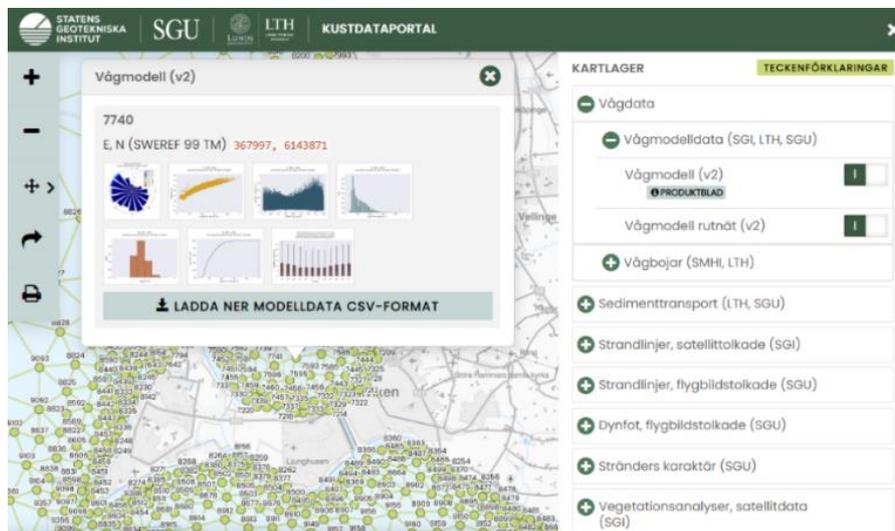
- [A methodology for mapping of quick clay in Sweden](#), *Nat Hazards*, 2022.
- [Territorial governance of managed retreat in Sweden: addressing challenges](#), *J. of Environmental studies and sciences*, 2021
- [Assessing the Risk of Contaminant Dispersion From Fibrous Sediments of Industrial Origin](#), *Frontiers in Marine Science*, 2021
- [Impact of climate change on natural ground and geoconstructions from a geotechnical point of view](#), *ECSMGE - Geotechnical Engineering Foundation of the Future*, 2019

Other media (mainly Swedish):

- City building no. 6 (Stadsbyggnad nr. 6): [Make way for the water – create flexible land](#)
- [Forskning & Framsteg: Ökad risk för ras när klimatet förändras](#)
The risk of landslides increases with the warmer climate. The newspaper meets SGI on site in Göta Älvdalen.
- [The Coastal data portal was launched by SGI in March and being noticed by TV4.](#)
A new map service for climate adaption is aimed, among other things, at municipalities and county governments that work with coastal planning.
- SGI has continued to stock up on Christmas trees in Göta Älv in order to prevent erosion:
 - SVT: [Used Christmas trees become a protective barrier in Göta Älv – to stop erosion](#)
 - Swedish Radio: [Christmas tree filling in Gäta Älv – may be about to become a tradition.](#)
- SVT West: [Västra Götaland has the greatest risk of landslides in Sweden – exacerbated by climate change.](#)
- Current on PFAS: Researchers at SGI has been interviewed in several media on the occasion of a pilot study on which remediation method should be used.
 - Swedish Radio: [This is how the airport in Timrå is to be cleaned of pollution.](#)



SGI story map that inspires natural adaptation of erosion protection and that shows information about protection already installed in Sweden.



SGI Coastal data portal for climate adaptation work and coastal planning.

Address

Swedish Geotechnical Institute
 Olaus Magnus Rd 35, 581 93 Linköping, Sweden
 Web: sgi@sgi.se
 Phone: +46 13 2018 00

6 The Swedish Forest Agency

SKOGSSTYRELSEN

Organization/Main goals of the business

The Swedish Forest Agency is the national authority in charge of forest-related issues. Our main function is to promote the kind of management of Sweden's forests that enables the objectives of forest policy to be attained. The forest policy places equal emphasis on two main objectives: production goals and environmental goals. In recent years, the authority has gone from being primarily a consumer to also being a major producer of geodata.

Development/Innovations

The basis for the Swedish Forestry Agency as a producer of geodata is a government assignment to produce forest attribute maps in collaboration with the Swedish University of Agricultural Sciences (SLU) and The Swedish Mapping, Cadastral and Land Registration Authority, as well as with co-financiers from the forest industry. By combining laser scanning of the ground with data on forest variables from sample plots, a comprehensive raster map is produced with, among other things, volume and average diameter. The current period of scanning began in 2018 as is due to be completed 2023. Among the most used products derived from this project is the soil moisture map, developed using AI. We are looking into the possibility to increase the value to the forest sector in the future by more frequent scanning and a denser point cloud.

During the last years major problems with forest damage, mainly from insects, have led to the development of geodata products to reduce damage. Examples of this are:

- In drone images, an AI model has been developed to identify elms to streamline the inventory of elm disease on Gotland. Work is also underway to develop a model to find pine trees infested with resin top disease in drone images. Orthophotos have been used to develop an AI model for finding dead spruce trees. The possibility of finding infested spruce trees at an earlier stage using several satellite images is evaluated.
- Since 2020 the Swedish Forest Agency has published risk index maps that show which forests are most at risk of being damaged by spruce bark beetle. These were updated in 2022.

For the past four years, the Swedish Forest Agency has developed a forest data lab together with Swedish University of Agricultural Sciences (SLU). The lab is an important channel for communicating the development in geodata that takes place at the Swedish Forest Agency and showing how innovative developments can benefit the sector. The attempt to find charcoal piles (a type of cultural heritage remain) using AI in 2021 resulted in full-scale production of a map layer with possible coal beds throughout the country.

The Swedish Forest agency and Swedish Environmental Protection Agency have been tasked with producing digital maps presenting ecological and cultural heritage values

in the forest. The data should identify where there are indications of certain values in the forest which may be of importance for forestry planning, work with biological diversity and national climate and environmental goals.

Cooperation

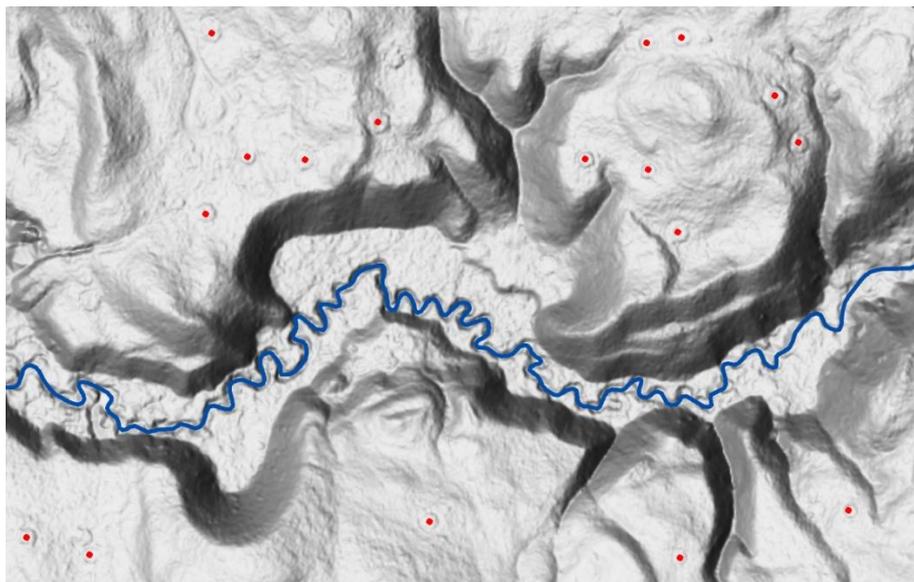
In 2022 the Swedish Forest Agency was tasked with starting a process together with the forest sector's actors and other relevant stakeholders to develop a sector-wide framework for digitization. The assignment also includes the development of a concept for a new model and standard for forest planning.

In the Swedish Tax Agency's property valuation, the Swedish Forest Agency has supplied volume and tree species per property using data from forest attribute maps. The calculation model was developed in collaboration with SLU.

Sitemaps/Publications:

[Nationellt Skogsdatalabb - Betaversion \(skogsstyrelsen.se\)](https://skogsstyrelsen.se)

[Förändringsanalys skador på skog](#)



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7 National Landcover database

NMD

Sweden's population is growing. With that grows pressure on our natural resources which leads to higher demands on up-to-date information for planning. The Swedish Environmental Protection Agency coordinates the work with NMD where Sweden is mapped using new technology. The goal is to ensure access to up-to-date, high-quality freely available land cover and land use data in Sweden.

National land cover data is needed in the work with plans for green infrastructure and to limit the impact of climate change. In discussions about sustainable community planning, climate and vulnerability analyses or action plans for green infrastructure, it is easy to assume that there already exist up-to-date, nationwide maps of Sweden. There has been a lack of such maps, and the Environmental Protection Agency therefore took the initiative for a collaboration between several Swedish authorities and organizations to make a new map of Sweden. The results are the National Landcover database (NMD), a database where satellite data, LiDAR and thematic sources are combined to create high quality and up-to-date land cover data at 10-meter resolution.

Shared vision and shared work

The first version of the National Landcover database was produced in 2017-2019 through a collaboration between seven authorities. The broad support around the product ensures that NMD can function as a common base and support respective authority's area of activity. During 2020-2022, additional authorities joined and the Swedish Agency for Marine Management, The Swedish Board of Agriculture, The Swedish Mapping, Cadastral and Land Registration Authority, the Swedish Civil Contingencies Agency, the Swedish Environmental Protection Agency, the Swedish Forest Agency, Statistics Sweden, the Swedish University of Agricultural Science and the Swedish Transport Administration collaborated in a project that partly received funding through Vinnova. The project called "Agenda for the landscape" further developed NMD and aimed to establish a long-term up-to-date and management which is anchored with the participating authorities and other stakeholders.

Satellites and new technology

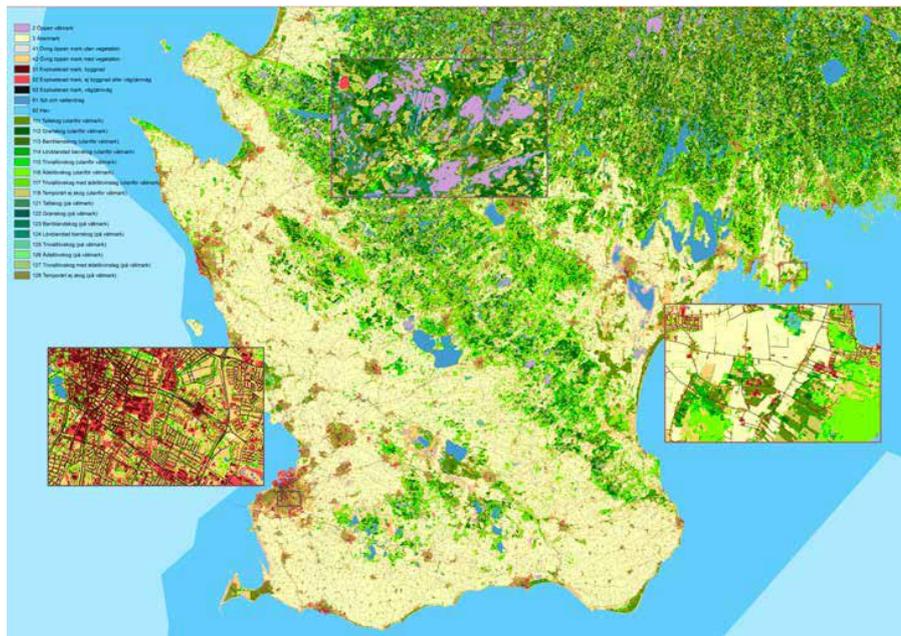
The basic requirement from users is that NMD should be updated regularly. The method must therefore be stable and repeatable, while being cost-effective. Fully and semi-automatic methods involving machine learning for classification of satellite data in combination with laser data therefore form the main source of input data. The mapping method has been developed with data from the EU's Copernicus program (Sentinel 1 and 2). Since Copernicus delivers data regularly, it is possible to get images of Sweden every two to three days. Like other satellite data from the EU's Copernicus program, it is free to use. For a country like Sweden, with a short summer and a lot of clouds, the possibility of getting many cloud-free images increases.

This ensures that the quality of the land cover data will increase in the long run because more images provide the opportunity for time series analyses. With time series,

phenological studies can be done to better distinguish between vegetation types. More satellite data will also allow us to better follow changes over time.

Looking ahead

The production of the next version of NMD has started in 2023. The regular update makes NMD a reliable basis for landscape analyzes of, for example, ecosystem services and green infrastructure.



NMD Base layer. National Land Cover Data, base layer over Skåne with magnifications for different types of areas.

Read more and download NMD

Web: [National Land Cover Database \(naturvardsverket.se\)](https://naturvardsverket.se)

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8 The Swedish Armed Forces

FÖRSVARSMAKTEN

The primary mission of the Swedish Armed Forces is to defend Sweden and the core values of Swedish society – peace, freedom, health, security and justice. The mission of the Swedish Armed Forces is to maintain and develop a military defence capable of facing an armed attack, to detect and repel violations of Swedish territory, to protect sovereign rights and interests, and to support civil society with its capabilities and resources.

Maps and geographic information are of fundamental importance for the fulfilment of these tasks. The units of the Armed Forces operate in all parts of the physical environment – In the air, on the ground, above, on and below the surface – both on Swedish territory and on the territory of neighbouring and partner nations. In order to describe all aspects of this physical environment, maps and a wide range of geographic information are required.

These categories of information include

- Topographic maps.
- Topographic data such as high-resolution elevation, land cover, aerial and satellite imagery.
- Thematic information describing physical phenomena and aspects of the environment such as population, power lines, infrastructure, geology, hazardous objects, etc.
- Military enterprise data such as training areas, routes, airspace, obstacles, etc.
- Tactical products such as cross-country mobility assessment, concealment, viewshed analysis, potential helicopter landing sites, etc.

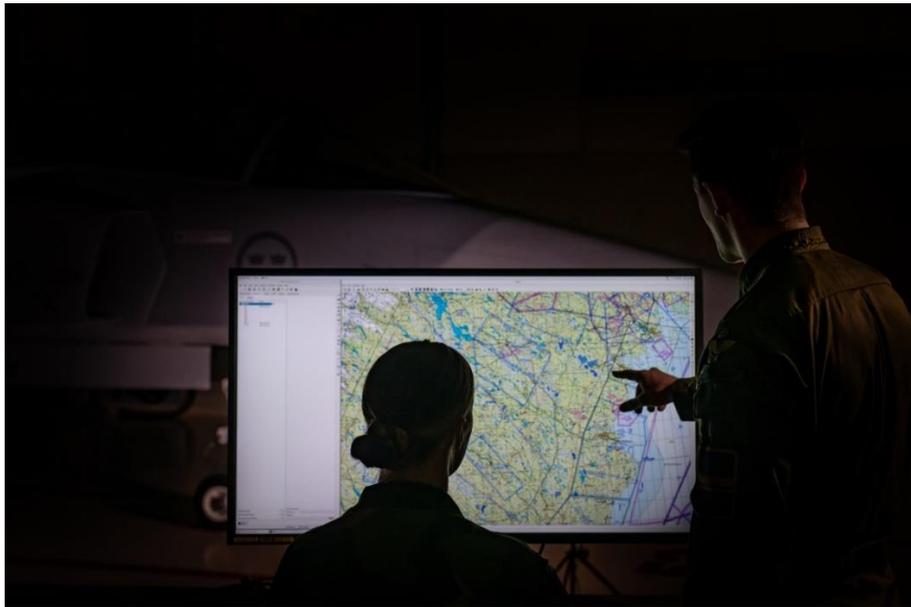
The mission of the Swedish Armed Forces Geospatial Support organization is to develop, manage and coordinate geospatial capabilities, maintain national and international relations, ensure access to all relevant data holdings, develop geospatial products, maintain a robust supply of both digital and printed products, support the development of methods and competencies, and provide guidance on system design, architecture and technical specifications.

The Swedish Armed Forces is one of the few organizations that maintains the capability to produce printed maps at various scales covering the entire Swedish territory. This is made possible by the close and long-standing cooperation with Lantmäteriet and its special unit organized for supporting the Armed Forces.

Over the past decade, the Armed Forces has participated in several international peacekeeping and security assistance military operations in the Balkans, Asia and Africa. In support of these operations, close geospatial cooperation has been developed with other nations, both bilaterally and in multinational organizations.

This cooperation, together with a deep and long-standing close cooperation with the Nordic nations, forms the basis for the exchange of geospatial information, products and support between the nations' military organisations.

Sweden's NATO membership will bring new challenges for military geospatial support capabilities; both in terms of supporting troops from other nations as well as Swedish units deployed in a wider area of operations, but also great opportunities in terms of integration into a well-established and functioning community of military support organisations.



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