

1. Summary

In 2023, SITES entered a new funding phase (2023-2028). Thus, many of the activities during the year focused on strategic planning and documentation as well as connecting with the internal and external SITES community. Highlights from the year include; 1) Establishment of the [SITES Strategy 2023-2028](#) and [SITES Gender Equality Plan](#), 2) All-hands SITES III Kick-off meeting (54 participants), 3) In-person Scientific Advisory Board and Steering Group meeting, 4) Lake mesocosm experiments at all 5 SITES AquaNet stations, 5) Outreach presentations to 12 departments within the Partner Organizations, 6) Data mobilization leading to 191 data uploads on the SITES Data Portal, and 7) strategic discussions on SITES-ICOS-ACTRIS coordination. This report was compiled by the SITES Secretariat, with input from SITES Station Managers, Thematic Program leads and Steering Group, and final approval from the Steering Group on 2024-03-26 with the assigned DNr SLU.ua.2024.2.6-933.

2. Popular science

The Swedish Infrastructure for Ecosystem Science ([SITES](#)) is a network of stations that enables field-based ecosystem research. Each station brings unique research foci, expertise, experiments, long-term monitoring and societal settings to the infrastructure built on shared scientific goals and methodologies. To facilitate comparison between climate zones, landscape elements and management systems, as well as to strengthen the collaboration within the network of stations, SITES stations participate in Thematic Programs focused on remote sensing, water monitoring and aquatic mesocosms. SITES focuses on terrestrial and freshwater ecosystems and recognizes the connectivity of elements within landscapes and between regions. Open access to the infrastructure and data attracts national and international scientists, facilitating excellent environmental science. This has made SITES a highly valued, critically important infrastructure for research on Swedish ecosystems and landscapes, not least in the context of how the Earth System will respond to drivers of environmental change.

3. Description of Operations

SITES contributes to long-term, field-based ecosystem research at a top level by offering a unique infrastructure and scientific competence that attracts researchers to the SITES stations and use of SITES data. To accomplish this, SITES features six modules; Organizational Leadership (Module 1), Station-based User Support (Module 2), Data Coordination and Analysis (Module 3), and three Thematic Programs (TPs) – Water (Module 4), Spectral (Module 5), and AquaNet (Module 6).

3.1. *Time Plan* (See Gantt Chart)

SITES developments and activities in 2023 corresponded to the deliverables outlined in the SITES time plan, with the only change to move the Scientific Advisory Board (SAB) rotation from 2024 to 2025, since the SAB was officially established in 2022. From an organizational perspective, in 2023, SITES hosted organizational meetings, which included the Steering Group (SG) (7 meetings), SAB (2 meetings), Partner Organizations Advisory Board (1 meeting), and Management Team (1 meeting/mo), i.e. Secretariat, Station Managers and TP leads. Most meetings were virtual, however, a joint in-person SG and Management Team meeting was held (Asa Station, 8 Feb) as well as the first in-person SAB and SG meeting (Uppsala/Erken, 16-17 Oct). In addition to this annual report, SITES approved the consortium agreement for the new funding phase, including contract agreements for purchased services, and established a [SITES Strategy 2023-2028](#) and a [SITES Gender Equality Plan](#). With the documentation for the new funding phase established, an update to the Business Plan and Communication Plan will be the focus in 2024. SITES outreach efforts in 2023 focused on outreach talks to all SITES Partner Organizations and the hosting of an all-hands SITES

meeting to kick-off the new funding phase (Asa station 8-10 Feb, 54 participants). SITES communication efforts included, updating fieldsites.se, a quarterly newsletter, and weekly news highlights and social media posts (on Facebook, X and LinkedIn).

SITES continues to provide open access and user-based support (see *Section 7*), which includes both physical and remote access to the stations, as well as maintaining and mobilizing SITES data, including station specific data and data linked to the TPs. Maintaining the SITES Data Portal, henceforth, Data Portal, an open data repository, is key to data mobilization (see *Section 3.4*). Within the TPs, a main deliverable is uploading data, resulting in 191 data uploads to the Data Portal, including updates and new uploads. The infrastructure provided by the TPs also offers users access, which resulted in 42 TP projects in 2023. Of note, coordinated lake mesocosm experiments were run at all 5 SITES AquaNet stations and a single-lake winter mesocosm experiment took place at Erken. As part of the all-hands SITES meeting, a data workshop and TP personnel meetings took place.

3.2. Development and operations

The station-specific infrastructure (Module 2) and TPs (Module 4-6) in SITES enabled high quality and relevant research by an extensive research community in 2023 (see *Section 7*). The three TPs are well established. They actively support and enhance research on aquatic and terrestrial landscape components as well as their functioning. Each station and TP interacts closely with Data Coordination and Analysis (Module 3) for data mobilization and archiving in the Data Portal. Data are continuously updated for the TPs and new station specific time series have been added to the SITES data catalogue (see *Section 7*).

SITES equipment budget is mainly for servicing and upgrading instrumentation within the TPs. However, Skogaryd used all its allocated equipment funds to maintain and upgrade ongoing long-term monitoring of local greenhouse gas emissions. For the TPs, strategic discussions on how best to use equipment resources was a priority in 2023. Specifically, within SITES Spectral an upgraded drone was tested, and based on positive results the drone was ordered by all stations and its use will be implemented in 2024. SITES AquaNet ran lake mesocosm experiments at all stations in 2023, from which, equipment priorities were identified, i.e., replacement sensors/loggers and a robust hand-held multi-probe. For SITES Water, specific station equipment needs were identified, in addition to replacement loggers, repairs, and upgrades to discharge instrumentation at all stations. SITES submitted an "Equipment Purchase Extension Request" (SLU.ua.2024.2.6-932) to VR on 2024-03-12, with a decision currently pending. The submission includes a detailed overview of equipment per TP.

3.3. Collaboration with other infrastructures

Collaboration with similar infrastructures and networks across Sweden is a high priority for SITES ([list of collaborations](#)) and includes collaborations with data services and mobilization. SITES has established strong links with other national infrastructures in Sweden, including ICOS-Sweden via the Data Portal and valuable co-localization of SITES and ICOS infrastructures as well as similar synergies expected with ACTRIS-Sweden (*as proposed in SITES-ICOS-ACTRIS report to VR, SLU.ua.2024.2.6-934*). SITES further collaborates with INTERACT on the development and operation of SITES/INTERACT GIS. Finally, SITES recently initiated a collaboration with SBDI to implement flexible and reproducible processes and standards for archiving and mobilizing biodiversity data from the SITES infrastructure. This concerns both environmental DNA-based biodiversity information and traditional species records, to ensure national and international data compatibility and FAIR data.

Internationally, SITES participates in strategically building the eLTER Research Infrastructure (RI) and will align operations, infrastructure, and services to enable future participation in this

developing ERIC (as submitted by SITES in the “Needs inventory of RI of national interest” application to VR). Transnational access (TA) offered within international infrastructure projects, such as eLTER and AQUACOSM-plus, is envisioned to become an increasingly important way researchers can engage and lead larger synoptic research projects, while at the same time promoting international visibility and relevance of the Swedish research stations. In 2023, this was indeed the case for SITES AquaNet, where 28 TA participants (35 total) conduct lake mesocom experiments at 5 lakes within SITES. Additionally, SITES continues to engage with the Global Lake Ecological Observatory Network (GLEON).

3.4. Data management and supporting e-infrastructure

The [SITES Data Portal](#) has been in full operation for several years. Further development of the software tools, data and metadata catalogue focuses on increasing the FAIRness of SITES data. The overarching aims are to increase the discoverability of SITES open data, broaden the user base within the research community, and continue to improve the user experience of the Data Portal. Contributors from SITES and the Carbon Portal have become part of an expert group formed by the Swedish National Data Service (SND) for establishing common metadata formats across research fields. This promotes alignment of metadata established by SITES with a national metadata research catalogue and the exchange of expertise across RIs.

SITES Data Management Plan ([DMP](#)) guides the data work and is revised annually. Within the SITES Data Management group, meetings are a forum for in-depth data and metadata discussions. Established workflows and increased knowledge of data requirements, tools and standards across the infrastructure and data contributors has reduced the need for meetings to a quarterly basis. An internal training workshop on data processing in R was hosted during the all-hands meeting. The open data processing scripts discussed in the workshop were distributed via a newly established [SITES GitHub](#) providing open access to the new tools. The plan is to continue this work in future workshops linked to in-person technician meetings.

4. Changes in organisation

In 2023, with the start of the new funding phase, SITES welcomed Kevin Bishop as the new Director to SITES (*SLU.ua.2022.2.5.1-3380*). Towards the end of the year, Station Manager, Johanna Wallsten, from Rönneåsdalen, left her position, and in January 2024, Brooke Micke started as SITES Rönneåsdalen Station Manager.

5. Steering Group Activities

The SITES SG is appointed by SLU with the mandate to oversee the infrastructure in line with the governing documents and in cooperation with the Partner Organizations. The current SG has its mandate from 2021-03-01 to 2024-03-31 and consists of seven members. In 2023, the SG met seven times, including two in-person meetings connected to the SITES all-hands meeting and the first in-person SAB meeting. All other meetings were conducted virtual. The main topics covered by the SG included SITES III Strategic documentation, RI collaborations (with ICOS and ACTRIS as well as eLTER), engagement with the SAB and SITES Secretariat roles and responsibilities.

6. Financial outcome (See Economic Reporting)

The funding for SITES is partly covered by an infrastructure grant awarded by VR (19 577 kSEK/ year), and partly from equivalent or larger co-funding from the SITES consortium Partner Organizations. The financial report includes both the central coordination functions within the Secretariat and the SITES activities at the individual stations for the year 2023. The negative financial results for most of the stations and also for the infrastructure as a whole

reflects an increased level of co-financing by the partners that is needed to maintain strategically important activities and programs at the SITES stations.

7. **Key numbers** (See Nyckeltal and Appendix)

In 2023, a total of 498 scientific projects were carried out at SITES stations. This is on par with previous years, which ranged between 492-518 projects. The total number of user days in 2023 increased to 19,630 (from 18,228 in 2022), of which 98% were physical access and 2% were remote access. Compared to previous years, total user days on location was much higher (~3,500 more days in 2023 compared to 2022), even compared to years prior to the Covid-19 pandemic. There were a total of 46 multi-station projects, which is still a small portion of total projects but a positive step towards the goal of increasing collaboration across stations.

SITES is a national infrastructure open to all researchers and offers access to the infrastructure according to the equal conditions principle. SITES is also actively working through outreach and distribution of information to be diverse, inclusive, and equitable. The number of unique users involved in scientific projects that have used any SITES station was 949 in 2023, which is slightly less than the 1,063 in 2022. In 2023, project leaders were from 11 Swedish universities and 13 domestic research institutes/organizations, in addition to 46 international academic affiliations, representing 16 countries.

The Data Portal became fully operational in autumn 2019, and the number of openly available data sets as well as the different data types has been increasing ever since. The total number of downloads between years is as follows: n=2982 in 2023, n=3645 (2022), n=2317 (2021), and n=1119 (2020). Total number of single user access in 2023 is 1036, up from 717 in 2022. The SITES Data Management Team continues the work on tracking bots influencing the download statistics. In 2023, 1941 downloads from bots have been identified and removed from the provided statistics, affecting also numbers reported in previous years.

8. **Publication list** (See Publication List)

A total of 185 peer-reviewed articles were published in scientific journals in 2023, on par with the 186 peer-reviewed articles published in 2022. Published articles were divided into research fields based on SCB's standard for the Swedish division of research topics. Earth and related Environmental Sciences (55.7%) made up more than half the publications, with Biological Sciences (16.8%), and Agricultural Science (18.3%) making up the next largest subject areas. Research conducted at the SITES Stations covers a much wider range of research areas, including Engineering and Technology (3.8%), Computer and Information Sciences (2.2%), Physical Sciences (1.6%) and Health Sciences (1.6%).

9. **Equality** (See Nyckeltal and Appendix)

Gender equality is one aspect of SITES ambition to be diverse, inclusive, and equitable. As outlined in the SITES Gender Equality Plan, the annual reporting is one way to address these ambitions. This is the second year SITES has collected information on gender and position distribution among station employees, and thus the first year a comparison can be made. There was a total of 90 staff that worked for SITES in 2023, of which 38 were female and 52 were male, i.e. SITES staff currently meet the EU gender 40–60% balance aspiration. However, the total hours worked by females was only 36% of the total hours and females tended to work < 0.5 FTE. This trend is similar to 2022. Females tend to hold Research Assistant and Lab Technician positions, whereas males tend to hold Research Engineer and Technician positions, with both genders evenly holding Field Technician positions.

In 2023, the SITES Management Team (Station Managers and TP leads) included 2 females and 8 males, thus females were underrepresented. With the rotation of Station Managers in 2024 (See *Section 10*) there is already an indication that the gender balance will improve. The Secretariat was made up of 3 males and 2 females. SITES is directly involved in the hiring of the Secretariat and TP leads but the hiring of the Station Managers is with the Partner Organizations. SITES (via SLU as host organization) appoints the SAB (3 females and 2 males) and SG (3 females and 4 males). Maintaining gender balance is one aspect taken into consideration when forming the group.

Of scientific project leaders, the percentage of project leaders was 42% female and 58% male in 2023, which is a slight increase in female project leads compared to previous years. In terms of career stage, 73% of project leads are senior (24% female and 39% male) and 37% of project leaders are junior in their career (18% female and 19% male). It is encouraging that there is even gender distribution between junior career project leads, although SITES should take proactive steps to attract projects led by senior female PIs. Among other participants where gender was reported, the percentage for females and males is the same as project leaders. Though reporting of gender is not required for training development and outreach projects, of the projects that reported gender, 49% of participants were female and 51% were male, which is positive indication of gender balance within outreach projects at the stations.

10. Risk analysis

With the new funding phase starting this year, SITES had to make financial decisions (e.g. prioritization of equipment investments) as inflation and associated cost have increased since the budget was determined. This poses a risk for SITES over the funding phase, not just for equipment but also for, e.g., increasing cost of employees. Continued budget monitoring and strategic discussions will be needed. In April 2024, the Steering Group rotates, with only one member staying on. To help ease the transition Stefan Bertilsson (previous SITES Director) has been appointed chair of the SG for 18 months (*SLU.ua.2024.1.1.1-713*). Several SITES Station Managers will leave their post in 2024 (Svartberget, Skogaryd and Abisko), however, at Svartberget and Skogaryd, there will be overlap between the outgoing and incoming SITES Station Managers, to help transfer knowledge and transition.

11. Educational efforts, outreach and user support (See Appendix)

One of SITES strategic goals is to increase scientific courses and meetings at the stations. This creates opportunities to show the participants what SITES has to offer to the research community and increases knowledge about the research that is currently conducted within the infrastructure. It also promotes contacts and networking between researchers and station staff. The total training development and outreach projects carried out at SITES stations amounted to 191, which was not only an increase compared to 2022 (140 projects) but the largest amount of training development and outreach projects reported for SITES. Courses (n=59) and training (n=52) made up more than half the total number of projects. The total number of unique SITES users from training development and outreach projects was 4,103, which is an increase compared to 3,166 in 2022 and closer to pre-pandemic period (4,964 in 2019 and 3,998 in 2018). These projects corresponded to 7,084 user days, which is higher than the 5,958 user days in 2022, but lower than > 9,000 user days reported in 2019 and 2018.

12. Miscellaneous

SITES submitted an application to the VR call for “Needs inventory of RI of national interest”, to enable future participation in the developing eLTER ERIC, with a decision currently pending.

Appendix 1 – Key figures

Table A1: Project data key numbers for SITES scientific projects for 2023 and the previous funding period (2018-2022)

Scientific projects	2023	2022	2021	2020	2019	2018
Total number of projects	498	518	507	492	515	570
Home institution of the project ¹						
<i>Host organization</i>	332	340	324	328	298	284
<i>Organization within the consortium</i>	34	34	24	25	33	50
<i>Other Swedish Universities and academic institutions</i>	56	61	59	77	90	100
<i>Public organization</i>	8	5	2	4	3	0
<i>Other organization (private or commercial)</i>	9	8	13	11	11	22
<i>International organization</i>	62	70	44	47	80	114
Projects linked to thematic programs or that use multiple stations						
<i>SITES Water</i>	25	25	28	29	35	52
<i>SITES AquaNet</i>	6	2	2	6	9	8
<i>SITES Spectral</i>	11	10	12	15	2	3
<i>Other projects that use multiple SITES stations</i>	46	34	53	50	30	12
Type of access²						
<i>Total number of days used</i>	22 112	18 228	16 938	14 198	16 831	14 323
<i>On location - number of projects</i>	332	353	388	377	451	332
<i>On location - number of user days</i>	16 443	15 853	13 534	12 276	14 464	12 309
<i>Remote access³ - number of projects</i>	328	313	241	195	158	237
<i>Remote access³ - number of user days</i>	2 160	2 375	3 404	1 923	2 367	2 014
<i>Data downloads – number of downloaded datasets</i>	3 279	4 339	4 594	1 897	2 592	910

¹ Home institution for the project is determined by that of the PI

² A single project can have both days on location and remote access

³ Remote access means that the researchers themselves were not on site and that the work was performed by station personnel

Table A2: User data key numbers for SITES Scientific projects for 2023 and the previous funding period (2018-2022)

Scientific projects	2023	2022	2021	2020	2019	2018
Users⁴						
Total number of unique users	949	1 063	979	1051	1 210	1 032
Number of unique project leaders	299	319	304	295	335	313
Number of other unique users ⁵	650	744	675	756	875	719
<i>Project leaders - split by gender and career stage</i>						
Female - junior	52	35	39	40	48	52
Female - senior	69	79	71	53	83	72
Male - junior	56	42	31	36	33	54
Male - senior	112	146	144	148	153	135
Unspecified gender or career stage	11	17	20	17	18	0
<i>Project leaders - home institute</i>						
Host organization	146	165	180	148	135	120
Organization within the consortium	31	35	24	21	31	27
Other Swedish Universities and academic institutions	48	53	52	68	75	65
Public organization	4	4	1	4	3	1
Other organization (private association or commercial)	9	6	9	10	10	12
International organization	61	63	65	44	81	88
<i>Other users - split by gender and career stage</i>						
Female - junior	85	182	83	99	129	121
Female - senior	98	103	97	120	178	116
Male - junior	76	126	105	101	127	161
Male - senior	178	207	225	292	314	315
Unspecified gender or career stage	211	128	171	144	127	60
<i>Other users - home institute</i>						
Host organization	165	150	206	254	179	152
Organization within the consortium	73	105	94	108	93	39
Other Swedish Universities and academic institutions	125	136	112	134	162	179
Public organization	15	28	8	17	5	7
Other organization (private association or commercial)	34	31	17	19	9	15
International organization	238	295	253	224	427	326

⁴ Unique users are identified by station and summed across stations, meaning that the total number of SITES users and PIs will be slightly inflated if they are a part of projects at multiple stations.

⁵ Manual adjustments have been made within stations for users that were listed as both PIs and "other users". They have been counted just as PIs

Table A3: Key numbers for SITES training, development and outreach projects for 2023 and the previous funding period (2018-2022)

Training, Development, and Outreach Projects	2023	2022	2021	2020	2019	2018
Total number of projects	191	140	63	59	171	173
Home institution of the project ¹						
Host organization	57	52	20	30	66	52
Organization within the consortium	7	2	1	0	8	5
Other Swedish Universities and academic institutions	23	9	3	2	23	69
Public organization	72	64	36	21	58	9
Other organization (private association or commercial)	21	3	3	5	12	20
International organization	11	10	0	1	4	9
Type of access ²						
Total number of unique users	4 103	3 166	1 881	553	4 964	3 998
Total number of days used	7 084	5 958	2 786	3 711	9 961	11 726
On location - number of projects	187	124	56	56	168	158
On location - number of user days	6 900	5 952	2 646	1 510	9 798	11 383
Remote access ³ - number of projects	9	10	12	19	14	17
Remote access ³ - number of user days	188	8	140	2 201	163	343

¹ Home institution of the project is determined by that of the PI

² A single project can have both days on location and remote access.

³ Remote access means that the researchers themselves were not on site and that the work was performed by station personnel

Table A4: Downloads per month from the SITES Data Portal in 2023 (graph created on data.fieldsites.se/stats/)

Downloads per time period

