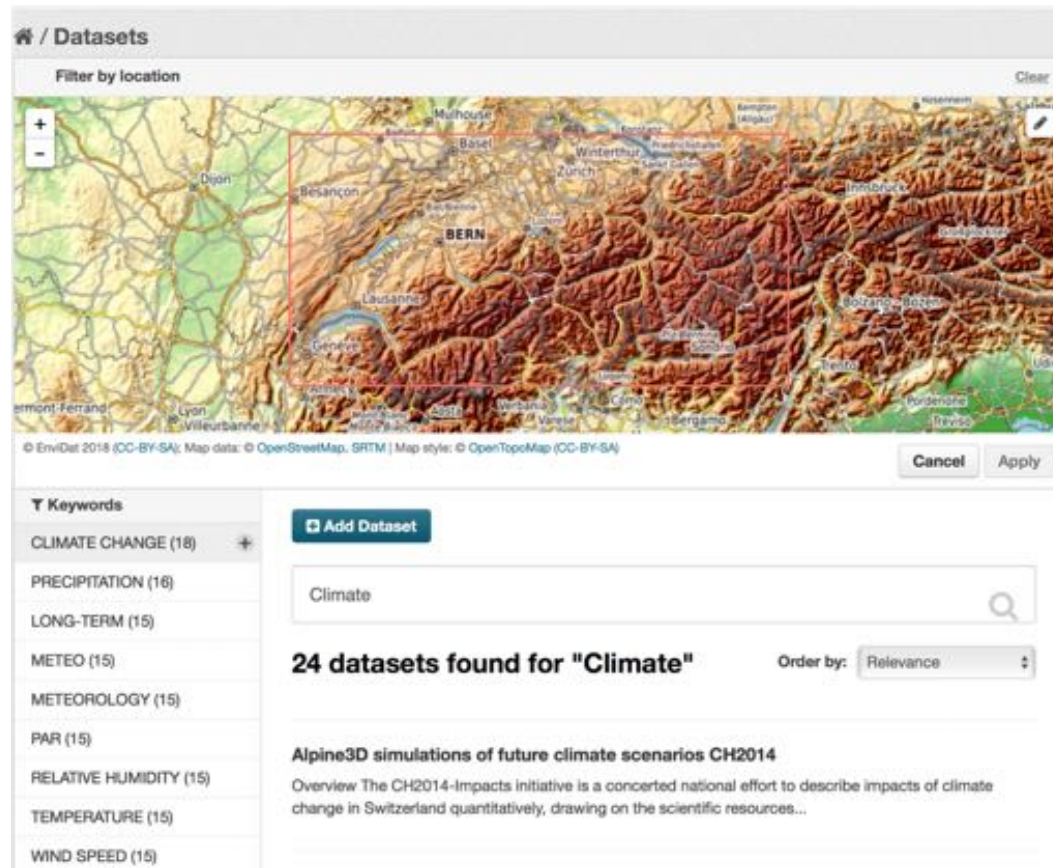


# Forest Data Integration in the WSL Environmental Data Portal EnviDat

**Ionuț Iosifescu Enescu**, Gian-Kasper Plattner, Marcus Schaub,  
Rolf Meile, Arthur Gessler, Urs-Beat Brändli, Martin Hägeli,  
Marco Ferretti, Michael Lehning & Konrad Steffen

# EnviDat – Environmental Data Portal



*EnviDat is the **WSL portal** providing **unified and managed access** to environmental monitoring and research data. EnviDat has the capability to **host and publish** data sets.*

# Trends in the RDM Community



**Project Objectives for Enabling FAIR Data:**

- FAIR-compliant data repositories will add value to research data, provide metadata and landing pages for discoverability, and support researchers with documentation guidance, citation support, and peer review.
- FAIR-compliant Earth and space science publishers will align their policies to establish a similar experience for researchers. Data will be available through citations that resolve to repository landing pages. Data are not placed in the supplement.

**FAIR Data Sharing Benefits Researchers by Providing...**

- More data in repositories, not supplements, so it can be discovered.
- Documentation of the data to better understand its purpose and origin.
- A common data experience when submitting papers to a journal.

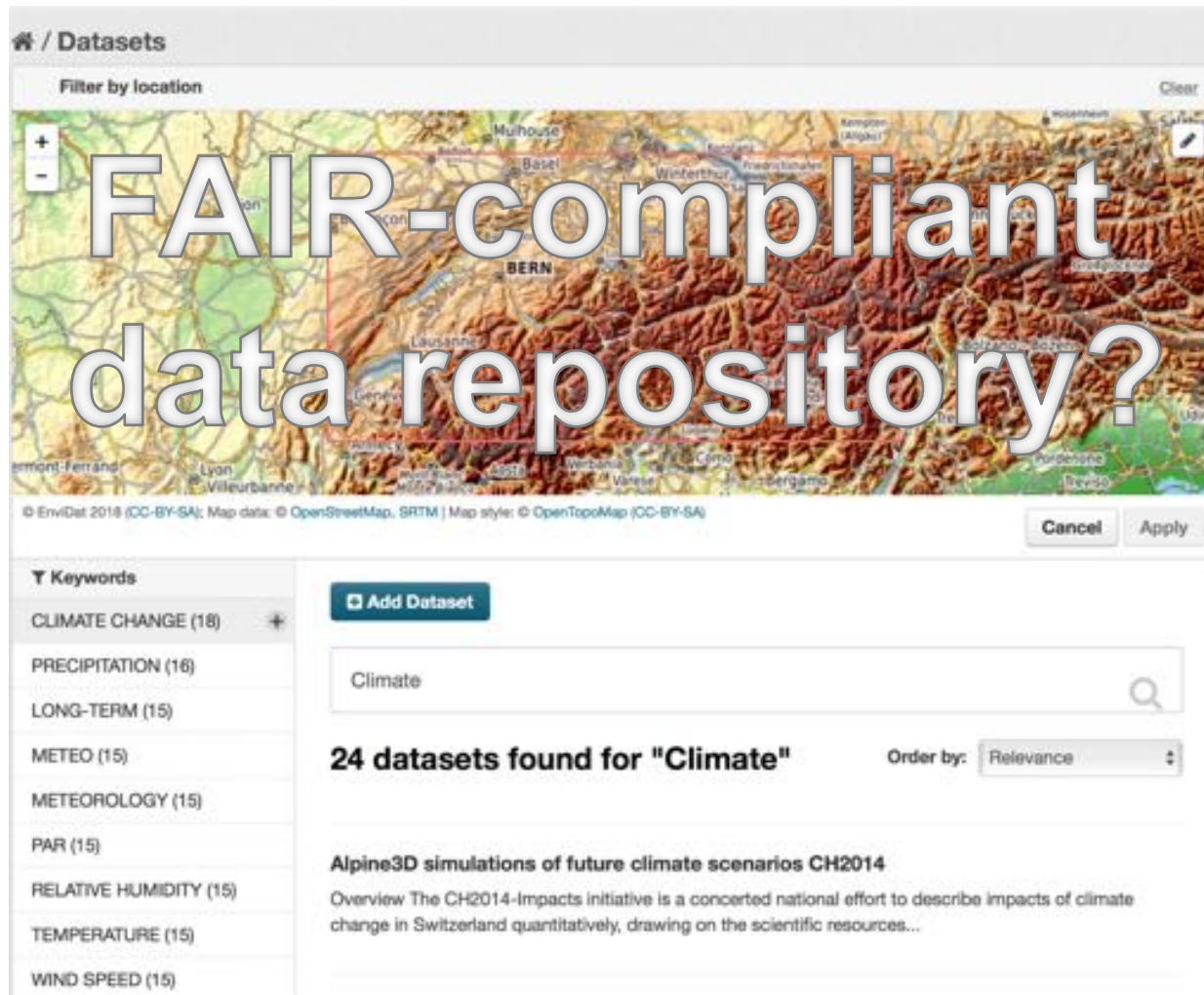
Funded by the Laura and John Arnold Foundation

**AGU100** ADVANCING EARTH AND SPACE SCIENCE

**RDA** RESEARCH DATA ALLIANCE

**ESIP** EARTH SCIENCE INFORMATION PARTNERS

# What Does This Mean for EnviDat?



# 1. Data Publishing with Metadata and Document Object Identifiers (DOIs)

The screenshot shows the EnviDat website interface. At the top, there's a navigation bar with 'Datasets', 'Organizations', 'Projects', and 'About'. Below this, the breadcrumb path is 'Organizations / WSL / FoReMa / Resource Analysis / LWF-Tea bag sites'. The main content area is titled 'LWF-Tea bag sites' and includes a 'Dataset extent' map showing the study area in Switzerland. A detailed description of the dataset is provided, explaining the decomposition of plant litter and the use of tea bags as a standard substrate. The 'Organization' section features a photo of a forest. At the bottom, there are links to 'Get DataCite XML' and 'Get ISO 19139 XML'.

doi:10.16904/envidat.36

Prefix

Postfix

## Resource Analysis

We analyze recent state as well as future development of forests and its services. Based on the Swiss national forest inventory (NFI) we estimate growing stock, increment, cut... read more

## Social

Google+

Twitter

Facebook

## License

Open Data Commons Open Database License (ODbL)

[Open Data Commons](#)

## Data and Resources

### Site Information

Descriptive information on sites

Explore

CARBON DECOMPOSITION FOREST GREEN TEA LITTER MODELING  
ROBOOS TEA BAG VERIFICATION

## Metadata

DOI	10.16904/envidat.36
Authors	<ul style="list-style-type: none"><li>Name: Markus Didion, Affiliation: WSL, Email: markus.didion(at)wsl.ch, Identifier: 0000-0003-0346-0646, Scheme: ORCID,</li><li>Name: Flurin Sutter, Affiliation: WSL, Email: flurin.sutter(at)wsl.ch,</li><li>Name: Pierre Vollenweider, Affiliation: WSL, Email: pierre.vollenweider(at)wsl.ch,</li><li>Name: Arthur Gessler, Affiliation: WSL, Email: arthur.gessler(at)wsl.ch,</li><li>Name: Peter Waldner, Affiliation: WSL, Email: peter.waldner(at)wsl.ch,</li><li>Name: Marcus Schaub, Affiliation: WSL, Email: marcus.schaub(at)wsl.ch,</li></ul>
Subtitles	
Publication	Publisher: Swiss Federal Research Institute WSL, Year: 2018,
Dates	<ul style="list-style-type: none"><li>Type: Created, Date: 2016-01-06,</li></ul>
Contact Person	Name: M. Schaub (ITER national representative), Email: marcus.schaub(at)wsl.ch, Affiliation: WSL,
Version	
Type	Dataset
General Type	Dataset
Language	English
Location	Switzerland
License	Open Data Commons Open Database License (ODbL) <a href="#">Open Data Commons</a>
Last Updated	April 5, 2018, 2:43 PM (UTC+02:00)
Created	March 29, 2018, 3:23 PM (UTC+02:00)




## 2. Repository for Publication Data

/ Organizations / WSL / Data set for testing the ...

Data set for testing the repository and storage


Followers  
0

Dataset extent



© EnviDat 2018 (CC-BY-SA); Map data: © OpenStreetMap, SRTM | Map style: © OpenTopoMap (CC-BY-SA)

Organization



**Swiss Federal Institute for Forest, Snow and Landscape (WSL)**  
The Swiss Federal Institute for Forest, Snow and Landscape

Dataset Projects Activity Stream

### Data set for testing the repository and storage

These are some large GIS raster files (GeoTIFFs) made with Natural Earth data. Natural Earth is a free vector and raster map data © naturalearthdata.com. The data used for creating these large files was the "Cross Blended Hypso with Shaded Relief and Water". Data was concatenated to achieve larger and larger files. Internal pyramids were created, in order that the files can still be opened in a GIS software such as QGIS.

Citation:  
*Ionuț Iosifescu Enescu (2018): Data set for testing the repository and storage; WSL;*

Get DataCite XML Get ISO 19139 XML

#### Data and Resources

map 0.2GB	Explore
map 0.5GB	Explore
map 1GB	Explore
map 2GB	Explore

LARGE FILES NATURAL EARTH TEST

#### Metadata

DOI	
Authors	• Name: Ionuț Iosifescu Enescu, Affiliation: WSL, Email: ionut.iosifescu(at)wsl.ch, Identifier: 0000-0002-1770-7833, Scheme: ORCID,
Subtitles	
Publication	Publisher: WSL, Year: 2018,
Dates	• Type: Created, Date: 2018-03-21,
Contact Person	Name: Ionuț Iosifescu Enescu, Email: ionut.iosifescu(at)wsl.ch, Affiliation: WSL, Identifier: 0000-0002-1770-7833, Scheme: ORCID,



# 3. Giving Choice to Researchers for Publishing Curated, Reusable Data

- ❖ For Metadata (Visibility Unpublished)

\* Organization: NFI

Visibility

- ✓ Unpublished
- Public

- ❖ For Data (Access Restriction + Encryption for Sensitive Data)


Access Restriction

\* Level

- ✓ Public
- Registered Users
- Any Organization Members (Trusted Users)
- Same Organization Members

Allowed Users

GNU Privacy Guard




License	Other
Last Updated	May 13, 2018, 7:10 PM (UTC+02:00)
Created	May 13, 2018, 7:10 PM (UTC+02:00)

- ❖ For License

Custom Metadata

License	All data and text are copyrighted and further use is restricted. Copying these files or parts of them into any publicly accessible service is NOT permitted without a prior agreement with the authors.
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# Forest Data Integration in EnviDat



Swiss Federal Institute  
for Forest, Snow and  
Landscape Research WSL

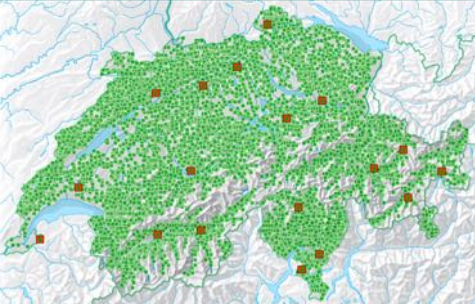
Forest

Landscape

Biodiversity

Natural hazards

Snow and Ice




## EnviDat

[Datasets](#) [Organizations](#) [Projects](#) [About](#)

/ Datasets

Filter by location



© EnviDat 2018 (CC-BY-SA); Map data: © OpenStreetMap, SRTM | Map style: © OpenTopoMap (CC-BY-SA)

Cancel Apply

**T Keywords**

- GRID NFI4 2009-2013 (65)
- PRODUCTION REGION (57)
- BIOGEOGRAPHICAL REGION (56)
- ECONOMIC REGION (56)
- PROTECTION FOREST R... (55)
- ACCESSIBLE FOREST W... (52)
- CANTON (51)

[Add Dataset](#)

**97 datasets found for "forest"** Order by: Relevance

**UNPUBLISHED Forest area by forest function**

The forest area refers to all areas classified as forest according to NFI's forest definition. The forest definition includes shrub forest. For each forest function (including...

URL

# The Swiss National Forest Inventory

- ❖ **Records the state and changes** of the Swiss forest
- ❖ Results based mainly on **statistical analysis of around 6500 sample field plots** (and includes data from enquiries and RS)



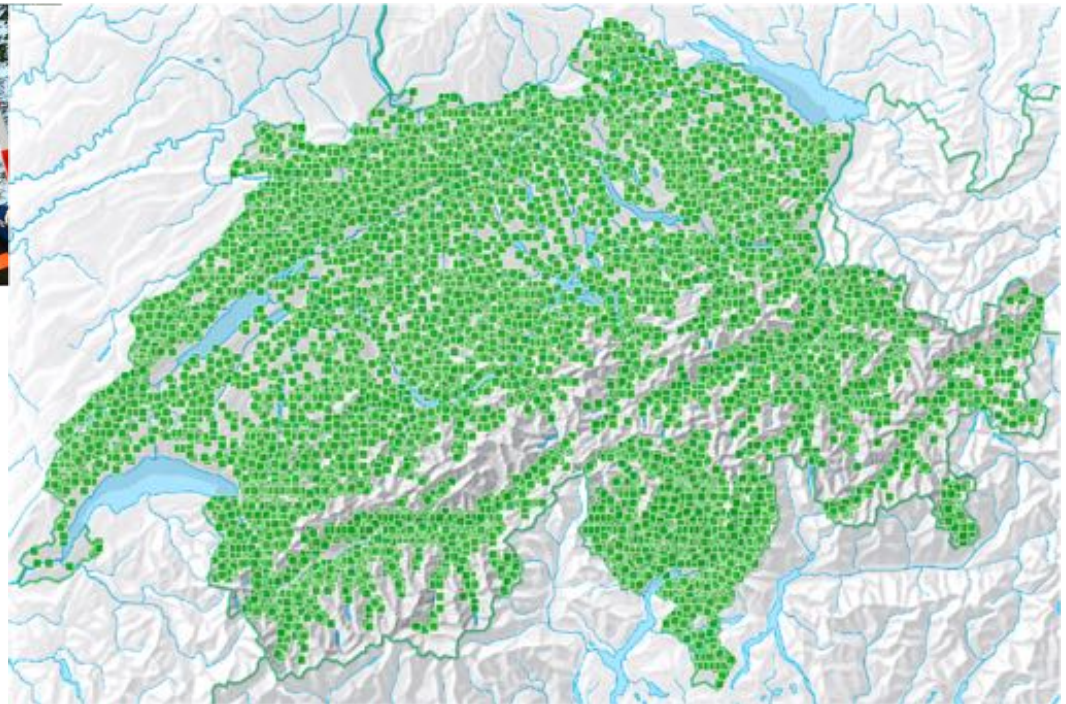
WSL Home > Forest > Forest development and monitoring > NFI

## Swiss National Forest Inventory NFI

What does the Swiss forest look like and how does it change over time? The Swiss National Forest Inventory (NFI) answers these questions.

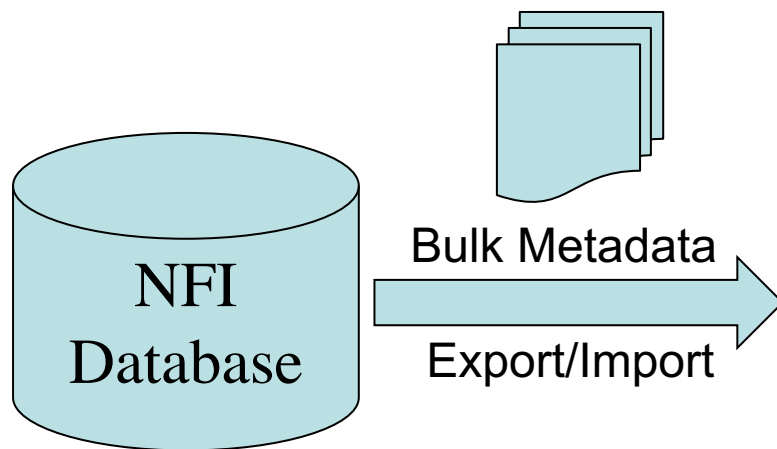
The forest fulfills many tasks: It prevents avalanches, rockfall and mudslides. The forest provides wood to be used as fuel and material for construction. It serves as a place of leisure and recreation and last but not least is home to animals and plants. Therefore, the forest has to be protected, but also managed sustainably with the clear goal of fulfilling these functions. Exact knowledge of its condition is necessary, thus an inventory. Valuable information on how the forest develops in the long run is obtained from carrying out several inventories over a long period of time.

The Swiss National Forest Inventory (NFI) records the current state and the changes of the Swiss forest. The survey obtains data about trees, stands, sample plots and through



background map based on data © 2007/2014/2016 swisstopo (JD100042)

# NFI Integration in EnviDat



The screenshot displays the EnviDat interface for the "Swiss National Forest Inventory (NFI)" dataset. The breadcrumb trail at the top reads: "/ Organizations / WSL / FoReMa / NFI". The page header includes "Landesforstinventar", "Inventaire forestier national", "Inventario forestale nazionale", "Inventari forestali nazionali", and "National forest inventory". The main content area shows the dataset title "Swiss National Forest Inventory (NFI)" with a description: "The Swiss National Forest Inventory records the current state and the changes of the Swiss forest. The survey obtains data about trees, stands, sample plots and through... read more". Below the description is a "Follow" button and a "Keywords" section listing: "GRID NFI4 2009-2013 (65)", "PRODUCTION REGION (57)", "BIOGEOGRAPHICAL REGION (58)", and "ECONOMIC REGION (56)". The "Followers" count is 0, and the "Datasets" count is 66. The "Add Dataset" button is visible. The "Search datasets..." field is present. The "Include Sub-Organizations" checkbox is unchecked. The "Order by" dropdown is set to "Relevance". The "66 datasets found" message is displayed. The first dataset listed is "UNPUBLISHED Young forest with browsing damage" with a description: "Number of regeneration trees where browsing of the shoots from the previous year was recorded in NFI's regeneration survey. Source: Abegg, M.; Brändli, U.-B.; Cioaldi, F.;...". The second dataset is "UNPUBLISHED Yield\*" with a description: "Volume of stemwood with bark of all trees and shrubs starting at 12 cm dbh cut between two inventories. \*In the calculation no D7/tree height data were used. The values...". The third dataset is "UNPUBLISHED Yield" with a description: "Volume of stemwood with bark of all trees and shrubs starting at 12 cm dbh that were felled between two inventories. The correction for bias with the sample Tarif trees may be...". The fourth dataset is "UNPUBLISHED Yield of merchantable timber".

# NFI Integration in EnviDat

**Data and Resources**

NFI3 (2004/06) [Explore](#)

NFI4b (2009/13) [More information](#)  
[Go to resource](#)  
[Edit](#)

ACCESSIBLE FOREST W... BIOGEOGRAPHICAL REGION CANTON

ECONOMIC REGION FOREST FOREST AREA FOREST AREA BY FORE...

FOREST FUNCTION GRID NFI4 2009-2013 NFI3 NFI4B OWNERSHIP

PRODUCTION REGION PROTECTION FOREST R... TERRESTRIAL GRID NFI3

**Metadata**

**forest area by forest function divided by forest area forest function**

unit of reference: biogeographical region  
unit: %  
unit of evaluation: accessible forest without shrub forest  
grid: terrestrial grid NFI3  
state 2004/06

biogeographical region

forest function	Jura		Plateau		Northern Alps		Western Central-Alps		Eastern Central-Alps		Southern Alps		Switzerland	
	%	±	%	±	%	±	%	±	%	±	%	±	%	±
no special forest function	2	0	1	0	3	0	10	1	11	1	18	1	6	0
wood production	80	1	91	1	58	1	33	2	35	2	25	1	60	1
agricultural use	10	1	0	0	6	1	8	1	11	1	3	1	6	0
shelterbelt	1	0	0	0	0	0	0	0	0	0	0	0	0	0
drinking water protection	8	1	8	1	3	0	2	1	1	0	1	0	4	0
protection against natural hazards (SPF)	3	1	1	0	29	1	23	2	37	2	32	2	19	0
protection against natural hazards (non-SPF)	9	1	7	1	36	1	47	2	19	2	28	2	24	0
nature protection	19	1	14	1	14	1	8	1	10	1	10	1	13	0
landscape protection	9	1	7	1	9	1	12	1	8	1	11	1	9	0
wildlife protection	2	0	2	0	7	1	4	1	9	1	5	1	5	0
recreation	8	1	20	1	6	1	9	1	12	1	9	1	11	0
military	1	0	1	0	0	0	0	0	0	0	0	0	0	0
total	1	0	1	0	1	0	1	0	1	0	1	0	1	0

© WSL, Swiss National Forest Inventory, 01.02.2016 #107104/193372

[definitions](#) (in German) [methods](#) (in German) [download](#) [display map](#)

EnviDat

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[Projects](#)
[About](#)

/ Datasets

Filter by location

Clear

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Cancel

Apply

T Keywords

GRID NFI4 2009-2013 (65)

PRODUCTION REGION (57)

BIOGEOGRAPHICAL REGION (56)

ECONOMIC REGION (56)

PROTECTION FOREST R... (55)

ACCESSIBLE FOREST W... (52)

CANTON (51)

ACCESSIBLE FOREST W... (46)

Add Dataset

97 datasets found for "forest"

Order by: Relevance

UNPUBLISHED Forest area by forest function

The forest area refers to all areas classified as forest according to NFI's forest definition. The forest definition includes shrub forest. For each forest function (including...

URL

UNPUBLISHED Forest area

Iosifescu Enescu et. al (2018) | EnviDat | Swiss Federal Institute for Forest, Snow and Landscape Research WSL  
7th ICP Forests Scientific Conference | Riga, Latvia

12

## Forest area by forest function

Followers:

0

[Follow](#)

### Dataset extent



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### Organization



Landesforstinventar  
Inventaire forestier national  
Inventario forestale nazionale  
Inventari forestal național  
National forest inventory

Dataset

[Projects](#)

[Activity Stream](#)

[Manage](#)

## Forest area by forest function

UNPUBLISHED

The forest area refers to all areas classified as forest according to NFI's forest definition. The forest definition includes shrub forest. For each forest function (including no special forest function) identified in the survey of the forestry services, the size of the associated forest area is displayed. One forest region may fulfil several different forest functions and may thus contribute to the forest area for several forest functions.

### Citation:

Abegg, M.; Brändli, U.-B.; Ciolli, F.; Fischer, C.; Herold-Bonardi, A.; Huber M.; Keller, M.; Melle, R.; Röslar, E.; Speich, S.; Traub, B.; Vidondo, B. (2014). Fourth national forest inventory - result tables and maps on the internet for the NFI 2009-2013 (NFI4b). [Published online 06.11.2014] Available from World Wide Web <http://www.bf.ch/resultate/> Birmensdorf, Swiss Federal Research Institute WSL. doi:10.21258/1057112. <https://doi.org/10.21258/1057112>

[Get DataCite XML](#)

[Get ISO 19139 XML](#)

### Data and Resources

NFI3 (2004/06)

[Explore](#)

NFI4b (2009/13)

[More information](#)

[Go to resource](#)

[Edit](#)

ACCESSIBLE FOREST W...

BIOGEOGRAPHICAL REGION

CANTON

ECONOMIC REGION

FOREST

FOREST AREA

FOREST AREA BY FORE...

FOREST FUNCTION

GRID NFI4 2009-2013

NFI3

NFI4B

OWNERSHIP

PRODUCTION REGION

PROTECTION FOREST R...

TERRESTRIAL GRID NFI3

 basket (0)

search result: 15 entries on 1 page



## Results by theme

[back](#)

### NFI3

#### forest area by forest function divided by forest area forest function

unit of reference: biogeographical region

unit: %

unit of evaluation: accessible forest without shrub forest

grid: terrestrial grid NFI3

state 2004/06

forest function	biogeographical region													
	Jura		Plateau		Northern Alps		Western Central-Alps		Eastern Central-Alps		Southern Alps		Switzerland	
	%	±	%	±	%	±	%	±	%	±	%	±	%	±
no special forest function	2	0	1	0	3	0	10	1	11	1	18	1	6	0
wood production	80	1	91	1	58	1	33	2	35	2	25	1	60	1
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shelterbelt	1	0	0	0	0	0	0	-	0	-	0	-	0	0
drinking water protection	8	1	8	1	3	0	2	1	1	0	1	0	4	0
protection against natural hazards (SPF)	3	1	1	0	29	1	23	2	37	2	32	2	19	0
protection against natural hazards (non-SPF)	9	1	7	1	36	1	47	2	19	2	28	2	24	0
nature protection	19	1	14	1	14	1	8	1	10	1	10	1	13	0
landscape protection	9	1	7	1	9	1	12	1	8	1	11	1	9	0
wildlife protection	2	0	2	0	7	1	4	1	9	1	5	1	5	0
recreation	8	1	20	1	6	1	9	1	12	1	9	1	11	0
military	1	0	1	0	0	0	0	0	0	0	0	0	0	0
total	-	-	-	-	-	-	-	-	-	-	-	-	-	-

© WSL, Swiss National Forest Inventory, 01.02.2016 #207104/193372

[definitions](#) (in German) [methods](#) (in German) [download](#) [display map](#)

#### Table citation

Abegg, M.; Brändli, U.-B.; Ciodi, F.; Fischer, C.; Herold-Bonardi, A.; Huber M.; Keller, M.; Meile, R.; Rösler, E.; Speich, S.; Traub, B.; Vidondo, B., 2014:

Swiss national forest inventory - Result table No. 207104: forest area by forest function

Birmensdorf, Swiss Federal Research Institute WSL

<https://doi.org/10.21258/1382448>

# The Long-term Forest Ecosystem Research (LWF)

- ❖ Multifunctional long-term monitoring data
- ❖ Swiss contribution to the UNECE LRTAP
- ❖ 19 non-systematically distributed plots + 50 overlapping with NFI

## Long-term Forest Ecosystem Research (LWF)

Air pollution and climate change have an effect on the forest. We examine these effects as part of the Long-Term Forest Ecosystem Research (LWF) programme.



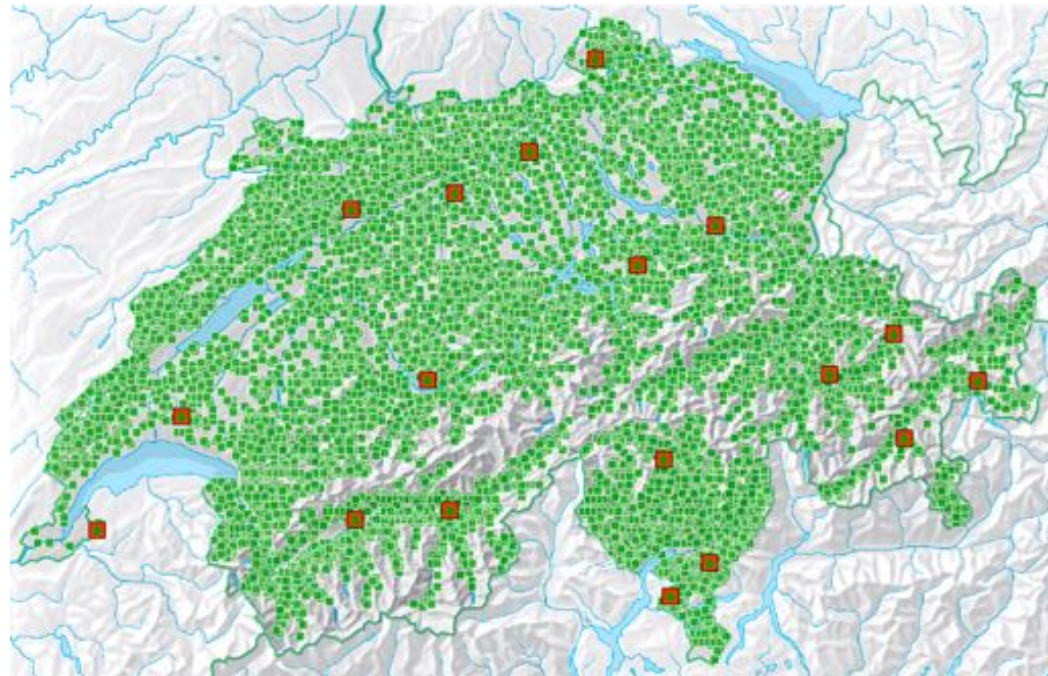
A researcher is emptying one of the litterfall collectors on the LWF plot in Beatenberg (canton Bern). Photo: WSL

We need reliable information in order to record the condition of the forest on an ongoing basis and to understand precisely what happens in the forest when the environment changes. An important source of data here is the Long-Term Forest Ecosystem Research (LWF) programme. It consists of 19 permanent monitoring sites on which we have regularly carried out numerous measurements since 1994. We have also been recording the health of trees on the monitoring sites of the Sanasilva Inventory, which is part of the LWF programme (see [Sites](#)), since 1985.

We disclose the gathered data, as well as the scientific interpretation of this data, to national and international decision-makers.

With the legally enshrined functions of the LWF programme, Switzerland participates in international research programmes such as the "International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests" ICP Forests and the LTER-Europe Network (Long-Term Ecosystem Research in Europe).

The Long-term Forest Ecosystem Research (LWF) programme is run and financed by the WSL.

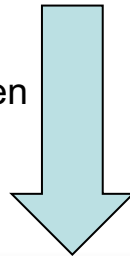


background map based on data © 2007/2014/2016 swisstopo (JD100042)

# LWF Integration in EnviDat



One time token



## Welcome to LWF Portal

We need reliable information in order to record the condition of the forest on an ongoing basis and to understand precisely what happens in the forest when the environment changes. An important source of data here is the Long-Term Forest Ecosystem Research (LWF) programme. It consists of 19 permanent monitoring sites on which we have regularly carried out numerous measurements since 1994. We have also been recording the health of trees on the monitoring sites of the Swiss inventory, which is part of the LWF programme (see Sites), since 1995. We disclose the gathered data, as well as the scientific interpretation of this data, to national and international decision-makers. With the legally enshrined functions of the LWF programme, Switzerland participates in international research programmes such as the "International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests" ICP Forests and the LTER-Europe Network (Long-Term Ecosystem Research in Europe). The Long-term Forest Ecosystem Research (LWF) programme is run and financed by the WSL.

Raw Data for crown conditions raw version

Year: 2015 Plot: 21412 Alpine Species: All Species Type Of Data: Basic Crown Information Detecting Progression Raw Data

Load

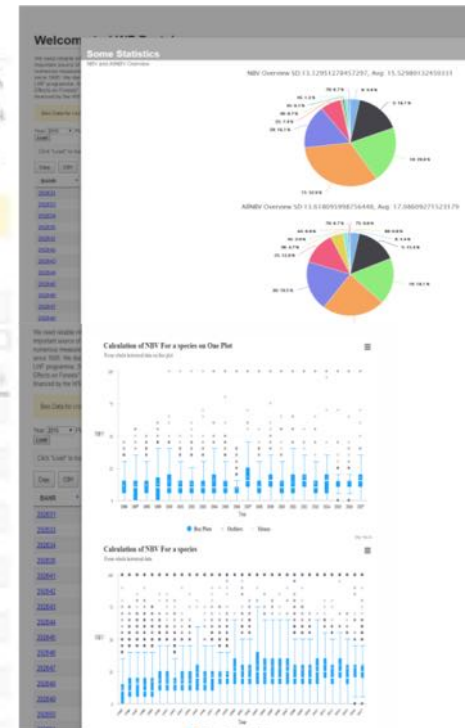
Click "Load" to load the data

Copy CSV Excel PDF Print

BANR	Banquet	Species	ANNEV	ANV	Diffusit	BHD	UMFANG	Height
202011	4	Fichte	5	5			108.8	18.7
202012	5	Fichte					77	14.1
202013	9	Fichte	108	100			82.5	15
202014	9	Fichte	10	10			103	24.5
202015	31	Fichte	20	15	5		86	17.3
202016	33	Fichte					107.5	21.9
202017	34	Fichte					115.5	20.5
202018	36	Fichte					236.5	25.4
202019	41	Fichte					143.9	20.8
202020	43	Fichte	8	8			122.2	19.9
202021	44	Fichte	10	10			93.7	16.5
202022	45	Fichte	10	10			93.9	16.2

under development

(final look and feel  
explicitly disclaimed)



# Benefits

- ❖ **Unified access but distributed curation**
- ❖ **Integration of existing operational systems**
- ❖ **No data redundancy, no duplication of efforts**
- ❖ **Specific functionality available/possible (in external system)**

Filter Results

Inventory	Theme	Classification
<input checked="" type="checkbox"/> NFI3 (15)	<input checked="" type="checkbox"/> forest area by forest function (15)	<input type="checkbox"/> forest function (15)
<input type="checkbox"/> NFI4b (15)	<input type="checkbox"/> amount of dead wood (102)	<input type="checkbox"/> ownership (5)
	<input type="checkbox"/> area of shrub forest (18)	
	<input type="checkbox"/> basal area (711)	
	<input type="checkbox"/> basal area of dead wood (190)	
	<a href="#">show more...</a>	

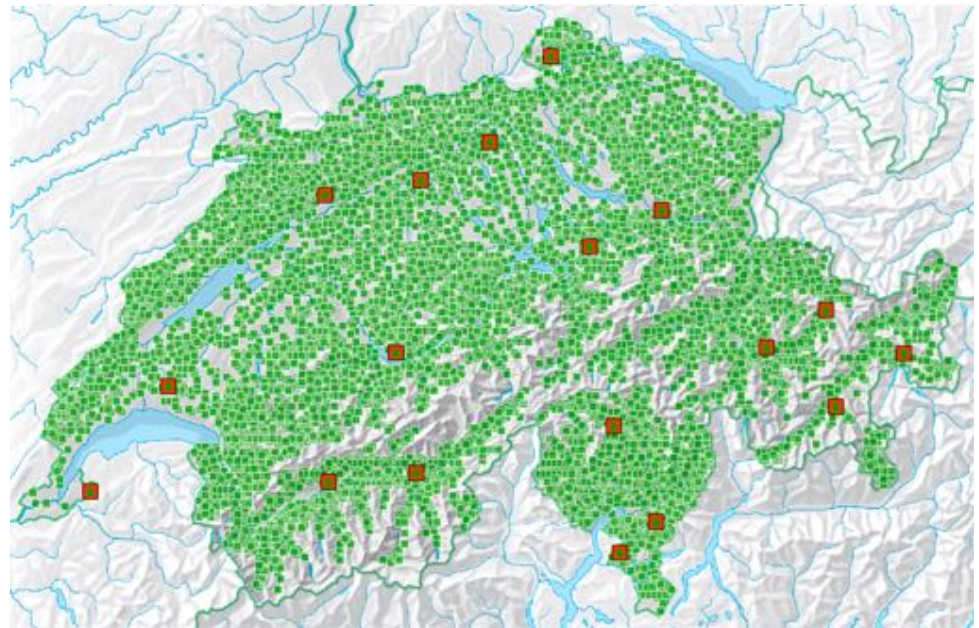
region	unit of evaluation
<input type="checkbox"/> biogeographical region (3)	<input type="checkbox"/> accessible forest without shrub forest (10)
<input type="checkbox"/> canton (3)	<input type="checkbox"/> forest (5)
<input type="checkbox"/> economic region (3)	
<input type="checkbox"/> production region (3)	
<input type="checkbox"/> protection forest region (3)	

Beo Data for crown conditions raw version

Year: 2015 | Plot: 214512 Alptal | Species: All Species | Type Of Data: Basic Crown Information

Click "Load" to load the data



background map based on data © 2007/2014/2016 swisstopo (JD100042)

# EnviDat@WSL

WSL acknowledges the responsibility to make publicly funded research data accessible & we are committed to ensure long-term access to our data

- ❖ Enable WSL data producers to **exploit the data and publish**
- ❖ Share WSL data and **benefit from added value** – as individual researchers and as institution
- ❖ Increase national and international **collaborations**
- ❖ Increase numbers of **publications and citations**
- ❖ **Foster environmental science**

# EnviDat: a Service for Researchers

*EnviDat is the **WSL portal** providing **unified and managed access** to environmental monitoring and research data.  
EnviDat has the capability to **host and publish** data sets.*

- ❖ **Unified access but distributed curation**
  - ❖ **Balance interests of data producers and data users**
  - ❖ **Enable WSL data producers to exploit the data and publish**
  - ❖ **Online at [www.envidat.ch](http://www.envidat.ch)**
- Contact [envidat@wsl.ch](mailto:envidat@wsl.ch)

**EnviDat poster is on display!**

