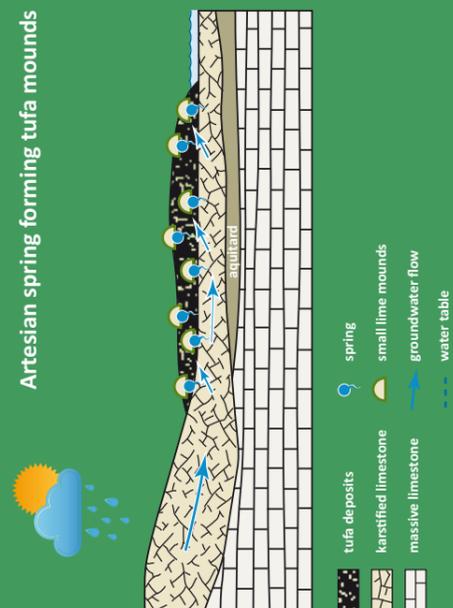
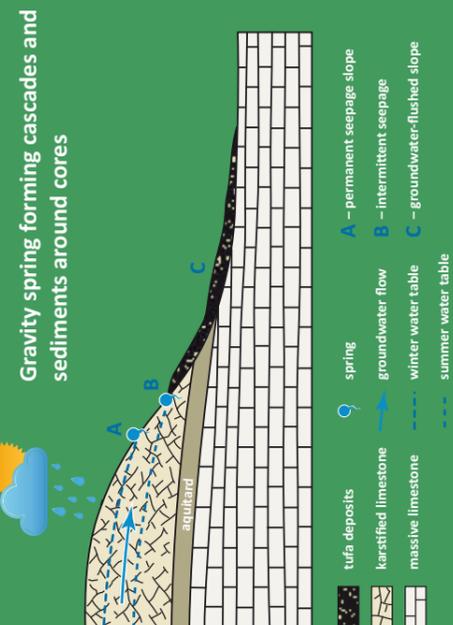


Artesian spring forming tufa mounds



Gravity spring forming cascades and sediments around cores



Petrifying spring habitat type (*7220)

The **health of our springs** is a mirror for our use and safeguarding of the earth and its natural resources. From this mirror, we receive the big picture in the form of monitoring data about the quality of our groundwater. However, there are very few springs still in their natural state, not influenced by human activities.

Main factors threatening springs:

- Drainage of marshy areas; dredging of the receiving bodies of water.
- Mining.
- Dredging or damming the springs; edesigning them into ponds; using them as a water source.
- Too large number of beavers – beavers often construct obstacles on the streams’ natural outflows, thus flooding the outflow and turning them into muddy ponds.
- Groundwater pollution.



The springfen habitat on the right has been destroyed because of the drainage system and is in afforestation.

Protecting the springs. With preserving and protecting the springs in addition to clean groundwater, we guarantee also the preservation of our historical and cultural values. Springs have been objects held in great respect; they have been considered sacred and have been used as sites of religious ceremonies. Often some healing properties have been attributed to spring water.

Only through cooperation between several spheres, it will be possible to protect the bodies of water, including springs, and habitats associated with them.

In order to organize the protection of springs better, it is important to:

- Make the inventory of the springs; specify and unify the definitions of springs and databases.
- Protect the vicinity of the springs, the habitats depending on their water and cultural heritage as an integral whole.
- Preserve the feeding and outflow conditions of groundwater in their original state.
- Restore, if possible, the hydrological regime (incl. closing the ditches); cut down the shrubs.
- Use the water of the springs without damaging the spring itself (without drainage, dredging, damming, redirecting the flow).
- Allow sustainable use of water at those springs where their natural state has already been greatly changed, incl. using the spring as a part of already existing park design.

- Give all the support to the local communities who are actively protecting the springs and taking care of the surrounding landscape.

Where would I find springs I could visit?

The list of springs could be found from the internet page of Estonian Environment agency: <http://loodus.keskkonnainfo.ee/>, with the search word allikad (“springs”).

To find the springs that may be more interesting to visit, one may start from the springs listed as the objects of primeval nature. Here is a small exemplary list of them: Siniallikad (“Blue Springs”) of Aegviidu; the springs, lake and spring fen of Varangu; the area of spring lakes and eskers of Äntu; the springs of Sinialliku; the springs of Prandi; the area of Külmaallikad (“Cold Springs”) in Roosna-Alliku; Ohvriallikas (“Sacrificial Spring”) in Lavi; Siniallikad (“Blue Springs”) in Saula.

From the same web-page, information on any spring in Estonia could be obtained. Information about the springs protected as culturally valuable is available from the Registry of Cultural Monuments (<https://register.muinas.ee>)

Photos by Heikki Bauert, Nele Ingerpuu, Jaanus Paal, Marko Kohv and Eesti Loodushoiu Keskus.

Further reading:

- Heinsalu, Ülo et al. 1976. Looduskaitset vajavad allikad Eesti NSV-s. – Viiding, Herbert (ed.) Eesti NSV maapõue kaitsest. Tallinn: Valgus, pp 68–95
- Heinsalu, Ülo 1995. Põhjavesi ja allikad. – Raukas Anto (koost.) Eesti loodus. Tallinn: Valgus, Eesti Entsüklopeediakirjastus, pp 302–315
- Vilbaste, Kristel. 2013. Eesti allikad. Tallinn: Varrak



Petrifying springs at Viidumäe are a typical gravity springs.



Sopa spring is a deepest artesian-type of spring in Estonia (4,8 m).



Springs at Jäneda.

Petrifying springs in Estonia

In 2013, Wildlife Estonia initiated the **project LIFE SPRINGDAY** for conservation and restoration of petrifying springs. The aim of the project is to preserve and restore the springs and the habitats depending on this type of springs. The activities take place on three protected areas belonging into the network of Natura 2000 – on the springs of Kiikumõisa in Kõrvemaa and Kiikumõisa Landscape Protection Area in Järva County; on the Lake Prästvik and on the springs in the northern part of this lake situated in Vormsi Landscape Protection Area on the island of Vormsi; and on the springs of Viidumäe in Viidumäe Nature Reserve in Saaremaa.

The project has the financial support of European Union’s LIFE Program and Environmental Investment Centre of Estonia.



A **spring** (*allikas, läte*) is a natural site where fresh water flows to the earth's surface. Springs usually occur at lower parts of a landscape – on the lower slopes or at the foot of highlands or terraces and in the banks of river valleys.

There are many springs in Estonia: different estimations consider the number to be somewhere between 5,000 and 15,000. However, since the source of River Prandi (the springs of Prandi) with several hundred liters of water production, as well as hardly noticeable seeping springs in fens, but also small water outlet in the fen under Laiuse Hill captured into a wooden barrel (Laiuse Siniallikas) are all considered to be springs, it is virtually impossible to determine the exact number of springs in Estonia.

The flow rate in the springs in Estonia is usually under 10 L/s, but many discharge less than 0.1 L/s. The number of large springs (with discharge rate over 100 L/s) is small, and they are mainly found from the slopes of Pandivere hills.

Their outflow type also classifies springs. In the artesian-type of springs, the water under pressure is forced to the surface by vertical channels, and on reaching the surface, the water forms spring wells.

On the sites covered by this project, typical artesian wells were found from Kõvemaa and Vormsi. Typical specimens of the springs of this type were Salula Siniallikad

(“Blue Springs of Salula”) and Aegviidu Siniallikad (“Blue Springs of Aegviidu”).



Artesian-type of spring at Kiigumõisa.

In landscapes there are spring-rich and marshy areas where one of the formative factor is groundwater seeping through porous earth causing the emergence of the so-called “seeping springs”.

If water-carrying layers on which the groundwater flows are cut through, e.g. on the slopes of hills or in the valleys of rivers, non-artesian springs are formed.

A place inhabited by a species is called its habitat. Springs and other outflow sites of groundwater are associated with several valuable habitats, including: springs and springfens (7160), calcareous fens with *Cladium mariscus* (7210*), petrifying springs with tufa formation (7220*), alkaline fens (7230).

All the aforementioned habitats are protected under the European Union Habitats Directive.



Springfen at Kiigumõisa.



Springfen at Viidumäe.

However, in order to notice and recognize one of the rare type of springs – **petrifying springs** – it is necessary to pay attention to its special features. The most characteristic feature is tufa formation, either around plants and around stones, on the surrounding land or within the stream flowing out from the spring. On flat ground, small protuberances may start forming at the outlet;

this kind of phenomenon may be seen in the northern part of Lake Prästvik in Vormsi.

During the eras of intensive precipitation, thick deposits and terraces may be formed at the foot of the hills or on the banks in river valleys. In Estonia, the thickest tufa deposits occur in southern Estonia.



Petrifying spring at Viidumäe.



Tufa mound at Vormsi.

Precipitation of tufa is caused by either physico-chemical processes (higher temperature,

evaporation) or biological factors (microorganisms, photosynthesis).

Of plants, mosses play the most active role in precipitation of tufa. Their closely packed stems and leaves slow down the flow of water and function as an adhesion site for calcareous particles. Water in petrifying springs is alkaline, thus suitable environment for only some specialized moss species. In Estonia, the characteristic mosses of this habitat and the ones actively participating in tufa precipitation are three species of the genus *Palustriella*, and three species of hook-mosses (*Scorpidium*). Vascular plants grow sparsely in this type of habitat and they do not participate in tufa precipitation. Characteristic vascular plant species are several *Carex* and *Juncus* species, but also butterwort and bird's-eye primrose.



Bird's-eye primrose, alpine butterwort, sedges and mosses are growing in lime-rich environment

Project sites and activities

In **Kiigumõisa**, obstacles will be built on the streams flowing out of the springs to restore the most natural-like hydrological regime. To create conditions suitable for characteristic species, shrubs will be cut down from the fen area.

On the **island of Vormsi**, the spring-fed Lake Prästvik is cleaned of vegetation. Also, the walking rout of Allika ('Spring') introducing Lake Prästvik and some typical springs to people interested in nature will be cleaned and extended.

Viidumäe is a unique area where under the slope to the central, higher lands of western Saaremaa (prehistoric Ancylos Lake) a spring fen with over 40 petrifying springs and other valuable habitats is situated. To restore spring fen habitats exacerbated by drainage systems, many ditches will be closed, and if possible, also forest grown after drainage works will be cut down in some areas. To introduce this unique place under the slope, in a way occurring in Viidumäe only, to people interested in nature, the educational rout of Allikasoo (“Spring Fen”) will be restored and extended.



Tufa precipitation takes part on the surface of the accumulation centres.