



This document explains the functionality of the Groasis Earth Observation.

Use Groasis' 6 high-tech solutions to plan, execute, and monitor reforestation projects that are low-cost, scalable, and successful. You can use high-tech to reach low cost reforestation.

Groasis has developed a range of solutions that reduce costs and improve the results of reforestation projects in hot and dry climates, and on degraded land. Our scalable, low-cost solutions replace expensive technologies such as drip irrigation to help you plant where nature cannot recover without our help. Groasis' solutions include:

1. Groasis Terracedix: to increase infiltration of rain into the soil from 25% to 90%;
2. Groasis capillary drill: to make planting holes that leave the capillary system stays intact;
3. Growmaxx mycorrhizae: a natural solution that replaces fertilizers and works with very little water;
4. The intelligent water buckets: the 10x reusable Waterboxx[®] and the 1x usable biodegradable Growboxx[®] plant cocoon;
5. Growsafe or BioGrowsafe tree protector: shields the young tree from sand storms, heat, frost or grazing animals;
6. NEW: Groasis Earth Observation: this tool helps you to improve and monitor your planting results through the intelligent use of remote sensing, in combination with high-tech software and databases. The Groasis Earth Observation can also be used to monitor and track existing reforestation projects or tree plantations.

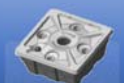
This document describes the amazing **new tool** that Groasis has developed: the Groasis Earth Observation.

Summary

Over the past 5 years Groasis has developed the Groasis Earth Observation. The Groasis Earth Observation is a system that 'translates' data from ESA and NASA satellites so that they can be easily interpreted by the user. The Groasis Earth Observation currently consists of 4 modules:

1. Identification & Planning;
2. Organization & Implementation;
3. Growth & Monitoring;
4. Learning & Improvement.

The Groasis Earth Observation is accessible from your own PC, tablet or smartphone and you can easily identify the ideal area for your project, plan your project in detail, follow the organization and implementation of the project, track the growth of the trees, and constantly improve the results of your projects.





How it works

The Groasis Earth Observation uses data that is collected by satellites from ESA and NASA. These satellites cover almost every part of our planet at least once every 5 days. The data is then 'translated' into information that you can analyse and use.

The system is as easy as this: You download a GPS tracker app onto your mobile phone. When you plant trees, you log the GPS points of the edges of your project, and enter the location of your plantation onto your Groasis Earth Observation. The satellites make photos of this area, and you can analyse the state of the project as it was before you planted (for most locations on earth, historical data is available), from the moment when you planted, and from then on. The Groasis Earth Observation can inform you about survival rate, growth speed, the health of the trees, differences in growth results between soil type A and soil type B, and a lot of other useful information.

Remote sensing versus drones

Groasis has chosen to use remote sensing with satellites instead of drones for a number of reasons:

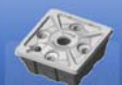
- Lower costs
- Daily, weekly, monthly, annual updates possible and easily organised
- Easily scalable, whether the project is 3,600 hectares or 1,000,000 hectares
- Includes info about weather: e.g. temperature, rain, humidity, etc.
- Includes info about soil: e.g. soil type, inclination, soil humidity, etc.
- Almost no restricted areas (many governments now restrict flying drones (*))
- Comparable results between areas, climates, planters
- Easy connections and cooperation between phone and PC
- App for checking in the fields
- Can work above any kind of terrain, including cities
- No travel and accommodation costs for drone operators
- The work is done from the office PC
- Historical data is often available (prior to project being realised)

(*) except for military bases and some other excluded areas such as for instance North Korea

1) Identification & Planning

When you plan your project, you wish to identify **where you want to plant**. You can use the **Groasis Earth Observation data** to analyse and search the land that you need. You can search **based on inclination, soil type, climate patterns, and many other factors** that define where you want to locate your plantation. Once the area is selected, you find everything that you need to plan the best approach to make your project a success!

Here is one example: Groasis has developed the Groasis Terracedixx. This is a new way of making terraces (swales). When you use the Terracedixx, you can increase the infiltration of precipitation into the soil significantly. This means that your trees (in dry areas) grow much faster - because they receive much more water. You can 'ask' the Groasis Earth Observation to identify all land based on your classification in the area that you have chosen where you can make these terraces. You decide for example to identify all land that has 1) a sandy soil, 2) with an inclination of less than 10%, 3) with less than 10% vegetation and 4) with less than 10% rocks. The Groasis Earth Observation then identifies land that meets these criteria and





tells you where you can use the Terracedixx. Once the area is selected, you can start to plan the project. The Groasis Earth Observation can draw the planting areas, draw the planting lines, calculate water transport, calculate how many trees you need and where you want to plant them. Everything that you need to plan your project is available in the Groasis Earth Observation.

2) Organisation & Implementation

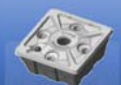
When you plant a project, you need to plan where to start, how to distribute, where you get the water from, who are the instructors, where they live, how they will assist the planters, and all kinds of other factors that help you better execute the plantation. Using analytical tools built in the Groasis Earth Observation, geographical planning tools can support your decision-making process. You can give every tree that you plant an individual GPS tag. You can give an individual description of each tree, make a photo when planted, and describe many other details. Everything can be done from your PC, laptop or via the mobile app.

3) Growth & Monitoring

With the Groasis Earth Observation you will be able to monitor the result of the project, or of an existing plantation. Individual trees with a diameter of more than 60 cm are photographed from space. You don't need expensive drones which can only check limited areas. Through the tagged GPS coordinates of each planted tree you can follow the growth of each individual tree, the individual and overall survival rate, the soil type, the planting density, diseases, plagues, shortages of minerals and fertilizers, problems with drought or flooding, the total increase of the tree cover and the carbon offsets generated by the project, the difference in success rates between one planter and another, and many other important facts to know. You can choose to monitor areas from as little as 3,600 hectares – and the Groasis Earth Observation has no problem dealing with project of more than over 1,000,000 hectares. With the push of a button you can request and analyze the data and images daily, monthly or annually. The Groasis Earth Observation will be able to calculate automatically the diameter of crown of the planted trees and through a correlation calculate the CO₂ offsets. Many countries have already accepted (agro)forestry as an accepted method to obtain carbon credits as part of the compliance market – and credits can already be used in the voluntary market. Tree planting programs can thus (partly) be financed by selling the carbon credits. In the past the cost of monitoring (validation and verification) was very expensive, but with the use of the Groasis Earth Observation it is going to be so cheap, that carbon credits from tree planting projects are going to be financially attractive.

4) Learning & Improvement

With the monitoring you can improve the results of your plantations. The Groasis Earth Observation will help you learn, for instance, that planning a tree species 'X' on sandy soil gives better results than planting the same species on a clay soil. Or you can learn that a planting density of 300 trees per hectare gives a higher production than a planting density of 400 trees per hectare. It helps you to compare the results of 'Area A with Area B', or the results between 'Farmer A and Farmer B', so that if Farmer A has considerable worse results than Farmer B, you can check out why, and help Farmer A to improve his results with the knowledge that you got from the learning part of the Groasis Earth Observation. The 'learning capabilities' of the Groasis Earth Observation can lead to a continuous improvement cycle as you execute more and more projects – thus improving your results.





Important tool to check results

Until now it was difficult or even not possible for the financier - such as a government, an NGO, a corporate company who wants to neutralize CO₂ emissions or an investor - to check **whether** and **where the trees were planted**. Or, it was not possible to check **how good the results** of the plantations were. Now, with the help of the Groasis Earth Observation, you can check all this information - of each individual tree, some trees, or all trees - on your own computer in your office or on your smart phone.

Independent use from the other Groasis tools

You can use each Groasis invention independently from the other tools. You do not need to use the other 5 Groasis tools to use the Groasis Earth Observation.

If you are a Ministry of Forestry, or a Ministry of Spatial Planning, you can use the Groasis Earth Observation for planning and monitoring of tree plantations in your country.

If you own a million hectares of palm trees that produce oil, or you have the same size of banana plantations, or you plant big areas for timber production, then you can easily and intelligently monitor and increase your production at very low costs. The Groasis Earth Observation can help you find suitable land, analyze the causes of a lower production, help optimize yields and many other things that help you to significantly reduce your planning, implementation and monitoring costs, while simultaneously increasing your production and revenues.

If you are a city you can use the Groasis Earth Observation to increase and monitor your tree cover at extremely low costs.

If you are a company and want to monitor the growth of you nature based offset plantations and in the same time automatically calculate the annual CO₂ offsets through a correlation with the increase of the tree cover, you can do this with a press of the button of the Groasis Earth Observation.

If you are an NGO you want to be sure that the money that you donated to plant trees, is indeed used to plant trees – you can use the Groasis Earth Observation to verify the impact of your donation.

In all previously mentioned cases in this paragraph you have the possibility to follow the growth and production of each tree through the individual GPS tag and see this tree as soon as its diameter is more than 60 cm, from your computer screen in your office.

