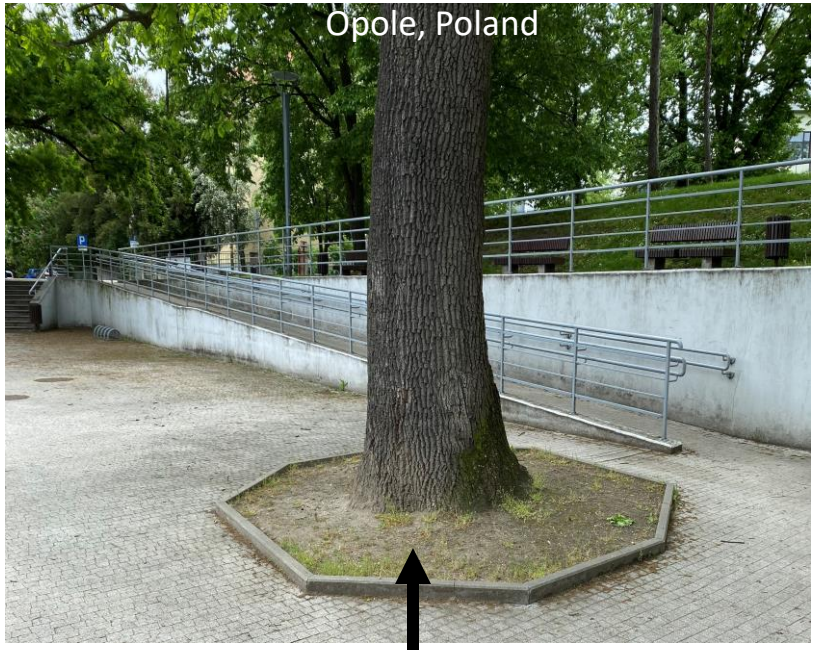
SVD - Soil Ventilation Duct

New, small but effective simple steps to solve old, big problems:

1. Soil compaction one of the major challenge for trees in urban areas
2. Excess of cardboard waste which is one of the consequences of the e-commerce development
3. Excess of slurry and rock debris waste from natural stone industry

1. Compaction increases soil bulk density and reduces soil porosity, limiting the availability, transport of water and nutrients



Soil compaction

- Limiting gas exchange and water penetration to the soil
- Accumulation of ethylene in soil

2. Excess of cardboard waste which is one of the consequences of the e-commerce development

The excess stream of used cardboard often goes to incinerators as high-calorific waste, with a ban on depositing in landfills.

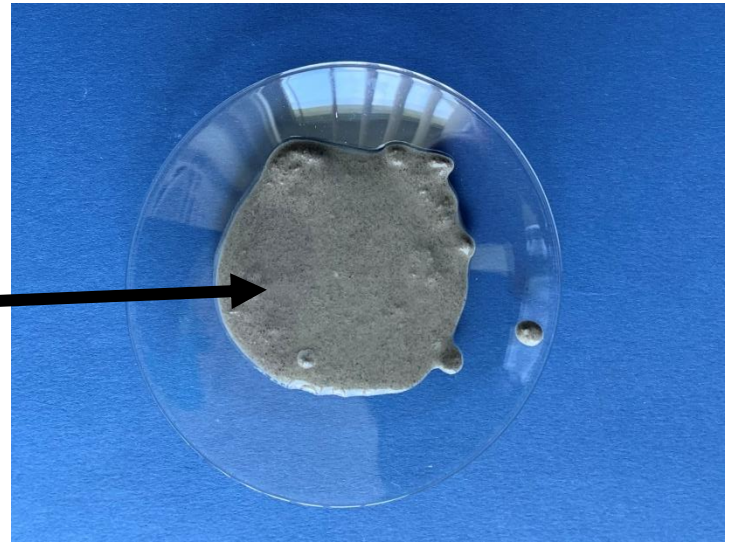
Source: https://www.monitorsaintpaul.com/stories/understanding-the-life-cycle-of-recycled-cardboard,2015

Source: https://www.supushredder.com/cardboard-waste-recycling

3. Excess of slurry and rock debris waste from natural stone industry

MINERAL SLURRY

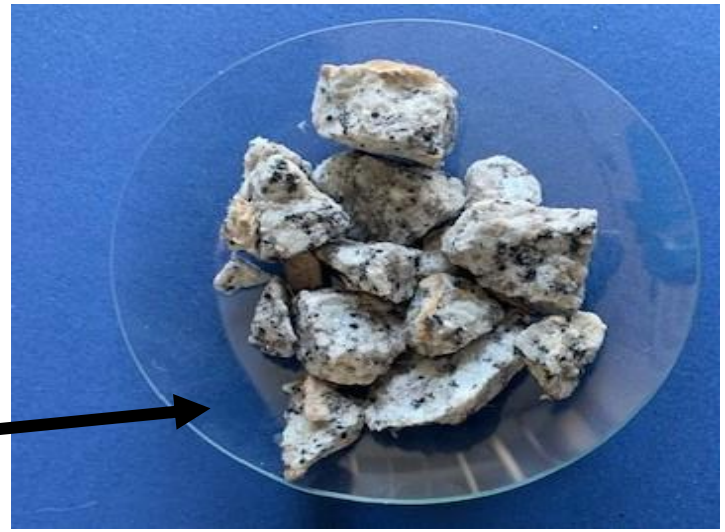
Source: https://parwanimachines.com/product/single-cutter-2-0-meter-blade/



Slurry waste generated by cutting. The equipment used in stone cutting processes requires the use of large amounts of water, for cooling, lubrication and cleaning. Approx. 20% of the total weight of the stone block is converted into slurry waste.

ROCK WASTE DEBRIS

Source: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1069.4146&rep=rep1&type=pdf



Granite gravels waste generated during mining extraction accumulated on sites

Known Technology of soil areation

Air spade excavation

Source: https://cdn.shopify.com/s/files/1/2656/7538/products/AS3000-enduse_768x.jpg?v=1536759915

- Works by jetting high powered compressed air into the ground
- Process is complicated and requires professional equipment
- Air dust contamination

Plastic ventilation tubes

Source: https://myglogow.pl/co-to-za-rury-wystaja-z-ziemi-sa-potrzebne-aby-lipy-na-alei-wolnosci-przezyly/

- Installation only before planting tree
- Pipes in winter create the possibility of freezing deeper layers of soil
- Possible sources of microplastic

Our Innovation – Close To The Nature

Soil Ventilation Duct made of used cardboard waste, rock slurry and gravels.

Roots can burst the rocks free from ethylene contamination

Inspired by new science research:

"The inhibition of roots growth by compacted soils is triggered by ethylene signalling, rather than simply by mechanical forces". (Source: Bipin K, et.al, Plant roots sense soil compaction through restricted ethylene diffusion, Science, Vol. 371, Issue 6526, pp. 276-280, 2021)

Ethylene is produced by root, and its level increases when roots are exposed to compacted soil .

SVD ventilates the soil and removes ethylene. It allows the roots to grow even in compacted soil

SVD - Soil Ventilation Duct

ROCK GRAVELS SCAFFOLD

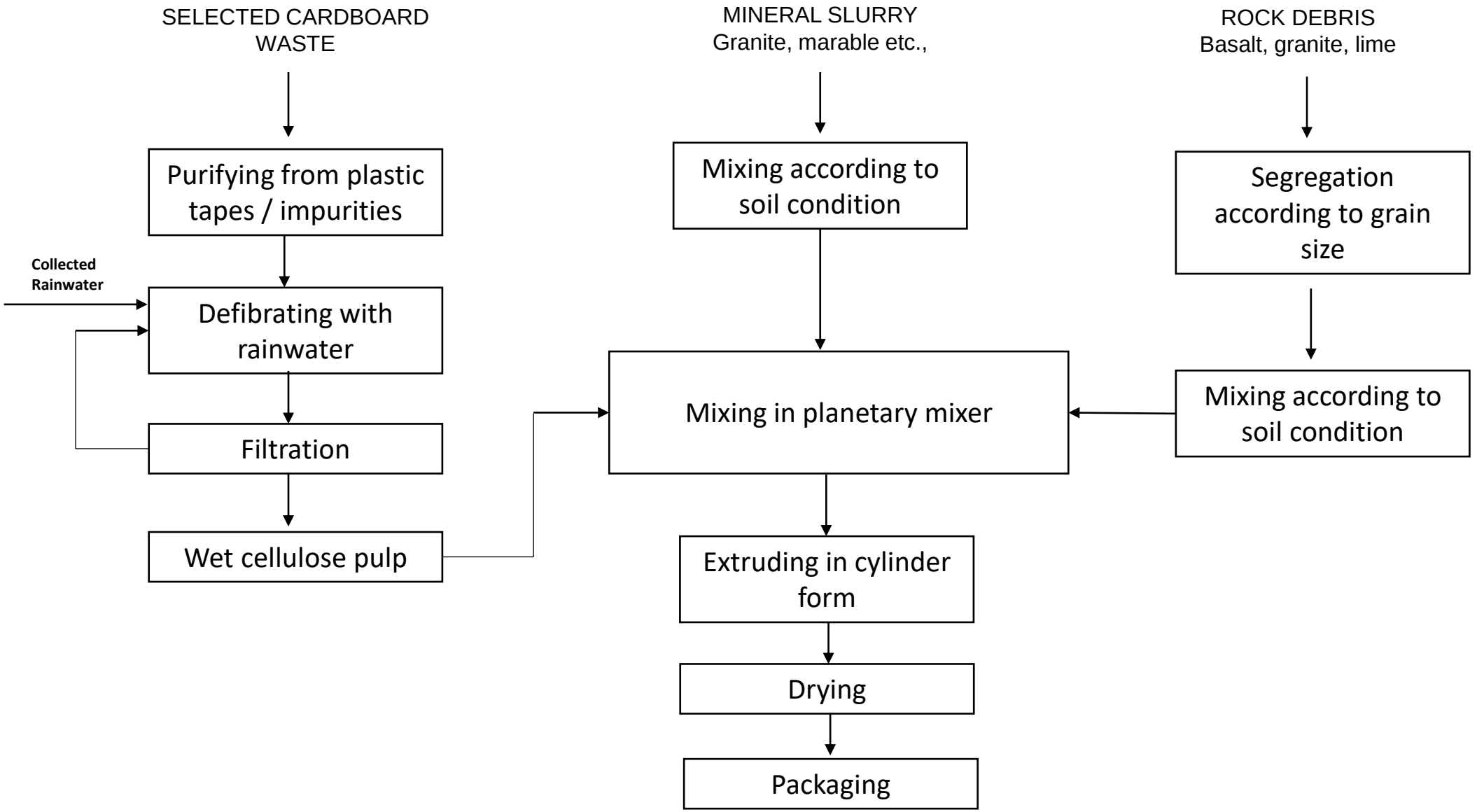
ROCK-CELLULOSE COMPOSITE

ORGANIC – MINERAL MATRIX

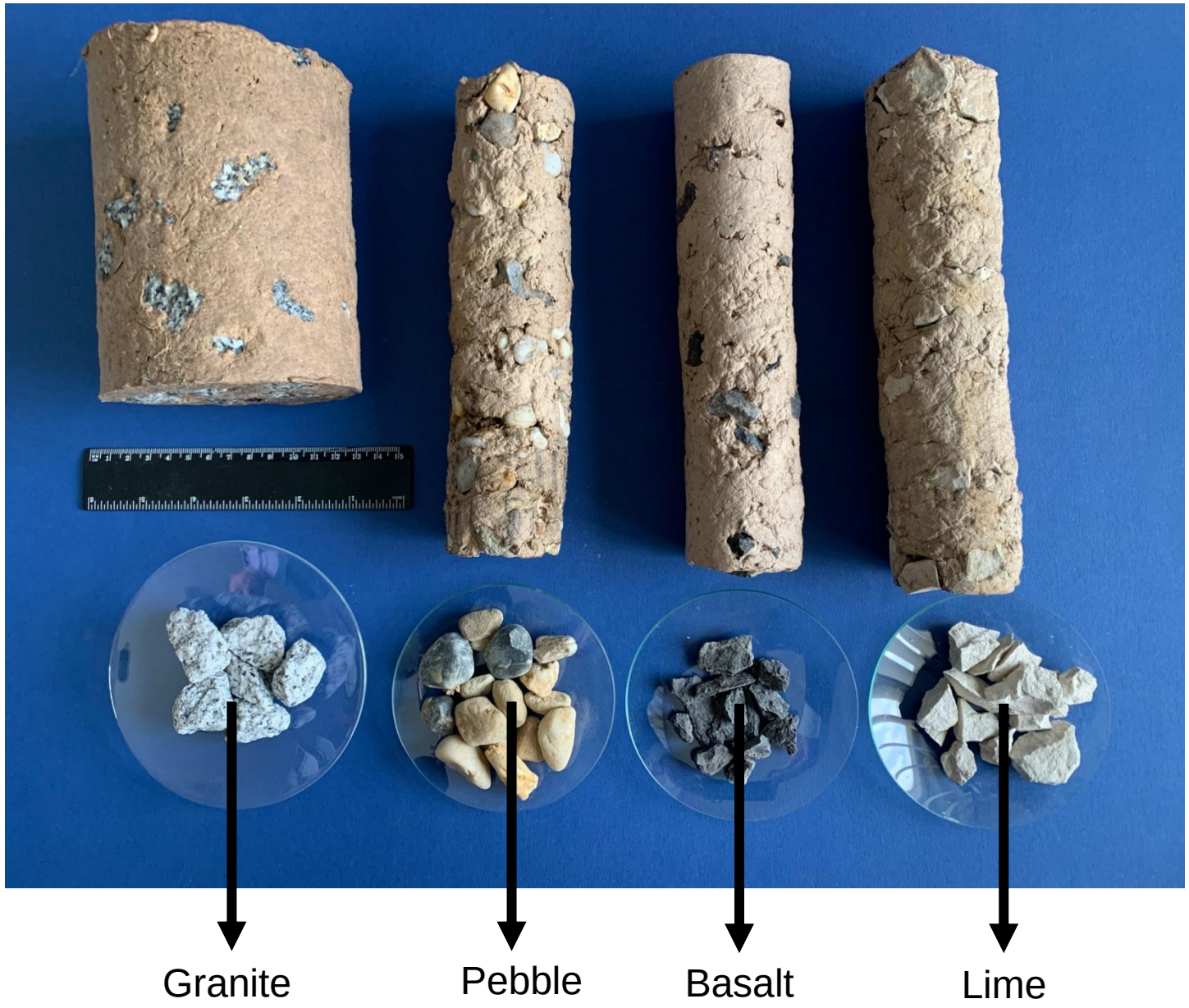
12x magnification

75x magnification

Technology of SVD production – block chart

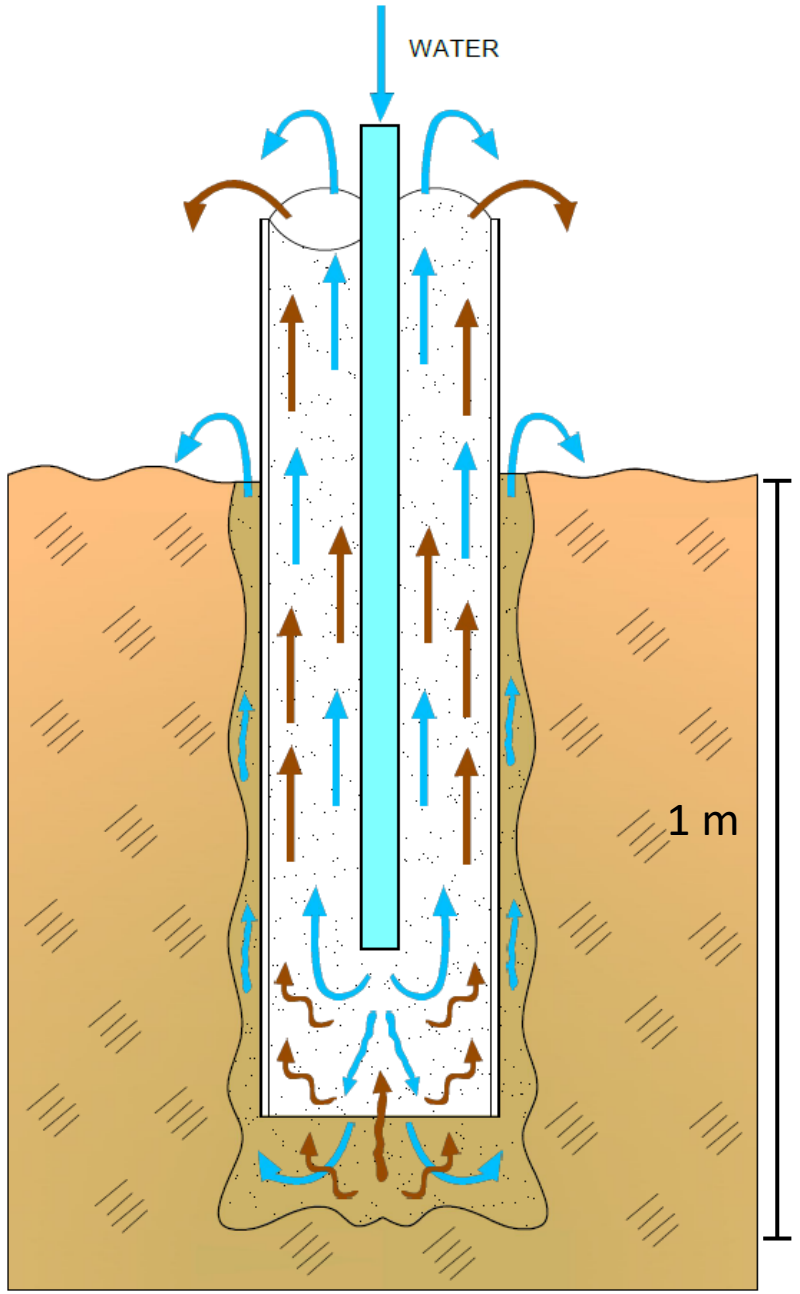


The rock gravels recycled from stone industry can be selected according to soil composition, pH and protected tree needs

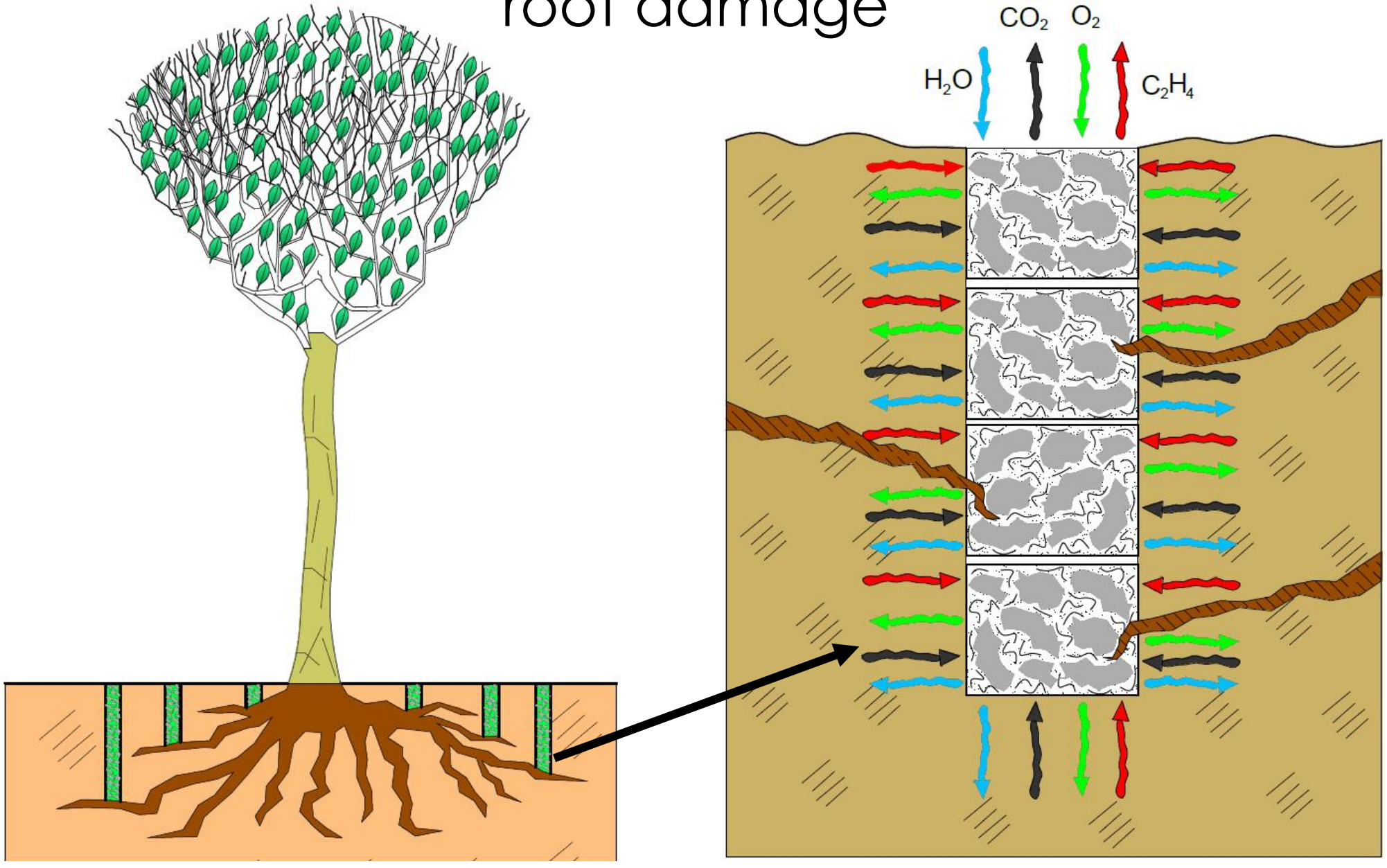


Simple and safety equipment for application

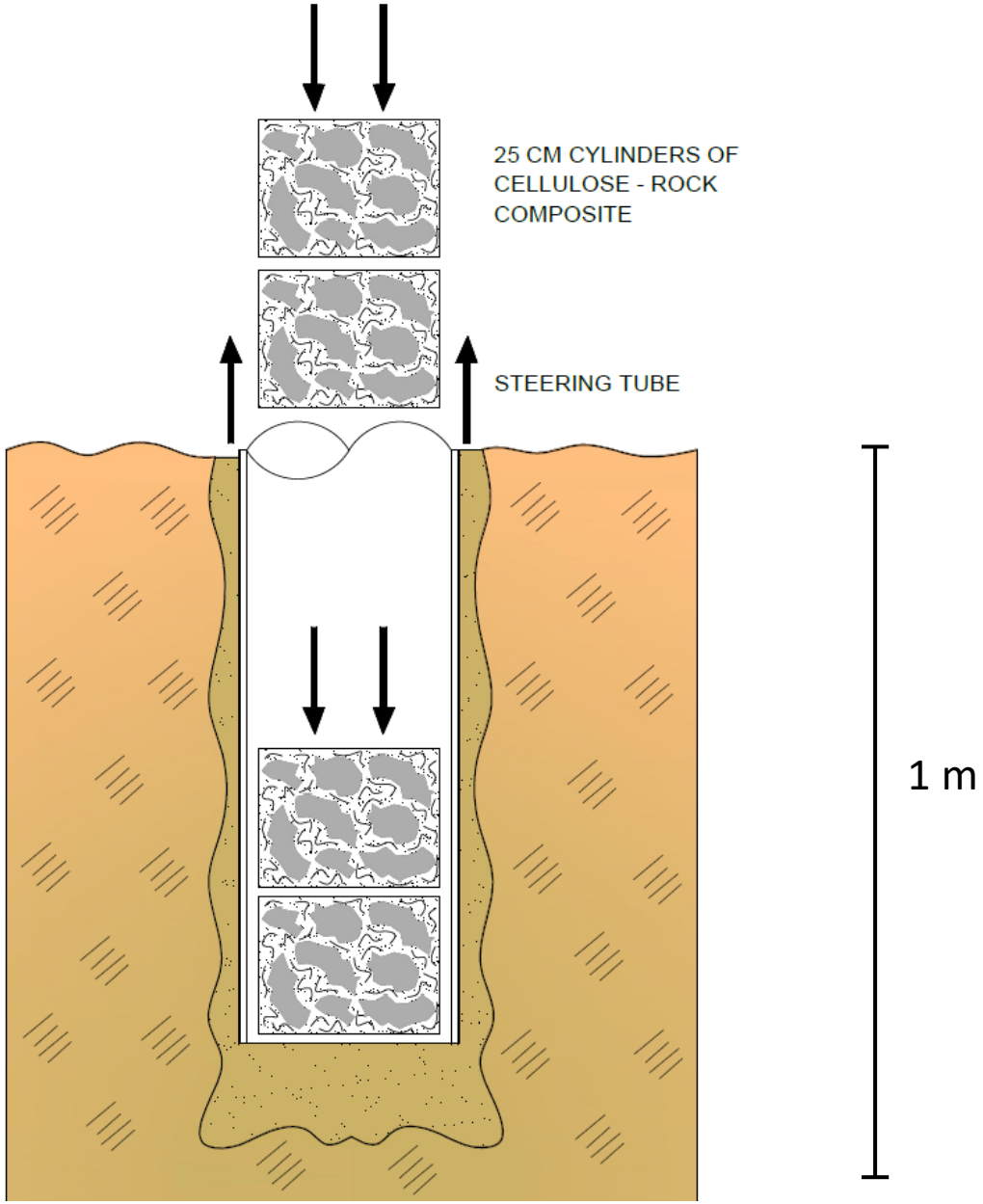
Non-invasive and easy application - WATER JET DIGGING



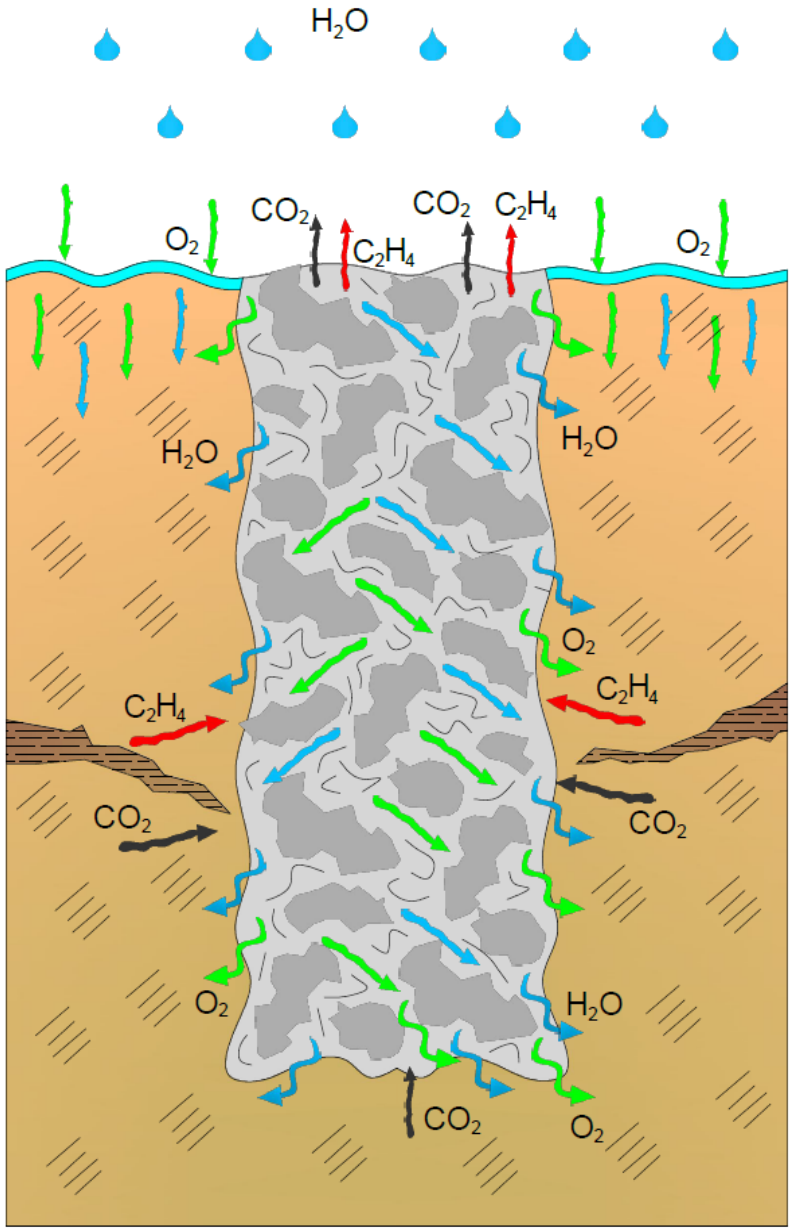
Length of SVD according to lateral roots pattern without root damage



SVD - Instalation



Rock permanent scaffold in the close vicinity of old trees

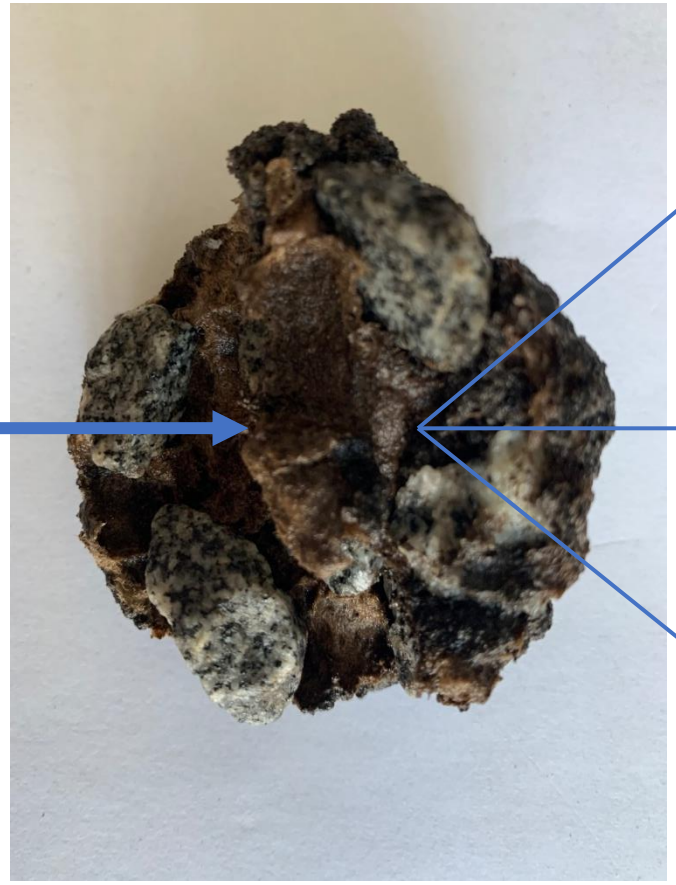


SVD – NEW PLANTING

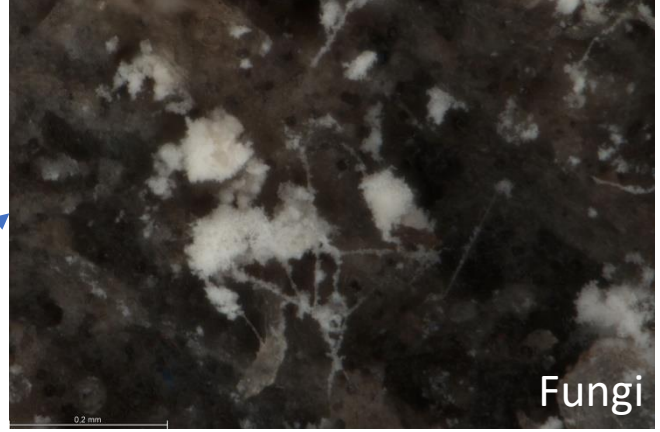
Demonstration in Bełchatów - town with problems with soil compaction and water shortages due to operation of biggest coal power plant open pit brown coal mine area in Europe

Our solution upgrades soil conditions by humus from decomposition of cellulose fibers and rock gravels which are easily colonize by mesofauna and fungi

50 mm diameter granite SVD in industrial soil



Cross section after 3 months



POROSITY OF ROCK GRAVELS

Porosity of rock gravels = 0,57

POROSITY OF CELLULOSE MATRIX

Porosity of cellulose matrix = 0,7

The porosity of a material (P) defined as the ratio of the volume occupied by the pores to the total volume of the porous material: P=Vp/Vp+Vs

Where: Vp - specific volume of pores; Vs - specific volume of a solid material

SVD creates permanent scaffold – resistant to compaction rock channel - imitation of natural rock layers. Rock gravels permanent scaffold with bluish water show space filled with cellulose matrix in SVD.

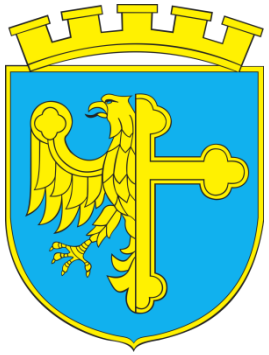
At this moment interest in project confirmed by:

Oslo
European Capital

Warsaw
Large agglomeration

Cracow
Historical town

Opole
Our hometown



We hope to save more trees
within LIFE project

In the respect to the nature
„*Primum non nocere*”

OPOLE
C.B.P.