

GeoFluv-Natural Regrade course.

Technical training (Action B1)

LIFE16 ENV/ES/000159 TECMINE

Nicholas Bugosh, GeoFluv, United States, nicholas@geofluv.com

José Francisco Martín Duque, Universidad Complutense de Madrid, josefco@ucm.es

Cristina Martín Moreno, Universidad Complutense de Madrid, crismartin@geo.ucm.es

Miguel Ángel Sanz Santos, Universidad Complutense de Madrid, massinfo@ucm.es

Cristina Beseler Soto, VAERSA, cristina.beseler@vaersa.org

Beatriz Olmo Gilabert, VAERSA, olmo.bea@vaersa.org

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ABSTRACT

This action describes all levels of training in the GeoFluv – Natural Regrade methodology, and within them, the levels that will be taught within the TECMINE project, which are:

- Level 1, for staff of different regional administrations of Spain dealing with mining restoration, along with other stakeholders. Personnel from SIBELCO will also participate.
- Level 2, for the same group of people, using the TECMINE scenarios for completing a constructible design project.
- Level 3, making use of the sites of the TECMINE project.
- Level 4, Training/Coaching for the users.

INTRODUCTION

SCOPE OF THE DOCUMENT

The objective of this deliverable is to give details of the training about GeoFluv-Natural Regrade that was carried out during the months of September 2018 to January 2019 (Levels 1, 2 and 3).

This course constitutes the main activity of the Action B1: Technical training.

STRUCTURE OF THE DOCUMENT

Firstly, in the Background section, a brief description of the GeoFluv method is tackled. The aim and context of the B1 Action and of the course, and the participants, are included. Secondly, a description of the four different GeoFluv training levels is included. After that, the adaptation of these four levels to LIFE TECMINE project course is briefly described afterwards. Later, a list of materials that were provide during the course is showed. Finally, a course schedule and description of participants is included.

Structure:

- GeoFluv Training Level Descriptions
- Adaptation to the TECMINE project
- Detailed contents for Level 1 training
- Materials
- Schedule and participants

BACKGROUND

Synthesis of GeoFluv-Natural Regrade

The GeoFluv™ method, created by Nicholas Bugosh, is implemented in the Natural Regrade software and constitutes a new tool for Geomorphic mine restoration. The fundamental concepts of the GeoFluv™ approach to stable landform design are taken from the study of the development of landforms over time, from youthful, actively eroding landforms to mature, 'stable' landforms. The approach has critical input factors that measurements integrate the effects of local variation in climate, earth materials, and vegetation that define local landform stability against erosion. By collecting empirical measurements from stable landforms in the area of interest and using these as inputs to the design, the designer can have a high degree of certainty that the GeoFluv™ landform design will perform similarly to the stable, natural landform (source: www.geofluv.com).

Action context and target public

This action aimed to provide to the public staff of the Valencia Administration, and others public bodies of Spain, that is currently responsible for monitoring compliance with legislation regarding mining activity and its environmental and social impact, with technical training about the GeoFluv-Natural Regrade techniques included in this demonstration project.

This action is crucial in order to support public bodies in the assessment of mine restoration projects and the subsequent monitoring when those projects are implemented. With this course, technicians will be able to better understand the feasibility and suitability of the different techniques including a geomorphic approach when mining companies propose them in their restoration projects.

Ultimately, this action also aimed to enhance the project impact by fostering transferability and replicability of the demonstrated techniques in other scenarios.

1. GEOFLUV-NATURAL REGRADE TRAINING LEVEL DESCRIPTIONS

The GeoFluv-Natural Regrade training course will be taught by **Nicholas Bugosh**, the GeoFluv Technical Director at Carlson Software in which role he develops, promotes, and sells the Natural Regrade software that is based on the GeoFluv design method and the Principal of GeoFluv in which role he provides training in using the GeoFluv method and Natural Regrade software and also assists people making designs.

The GeoFluv-Natural regrade training course is organized in four levels. Below, a brief explanation of the contents of each level is described. As a complement of this course, Greg Hancock, University of Newcastle, gave a lecture about Landscape Evolution Models and the SIBERIA software, to complement a broader overview about Geomorphic Mine Reclamation.

1.1. Level One

Level One is Introductory Training in the GeoFluv method and use of the Natural Regrade software. The Introductory Training typically takes two or three days depending on the user's CAD experience and includes 1/2 day in the field to study relevant landform characteristics and how to measure the fluvial geomorphic input parameters.

Level One training is appropriate for those who intend to make GeoFluv designs and for those, like regulatory staff, who want to learn how to evaluate landform designs for erosion resistance and long-term sustainable land use.

1.2. Level Two

Level Two GeoFluv training brings the student through actual project design. The Level Two Training/Coaching changes from a student/teacher classroom format to a user/coach format. Typically, the user works on an actual project with the coach guiding them as new design challenges arise. There is no set time for completion of Level 2 training because it varies with the user's skill and necessary project design time, but a user is considered GeoFluv Level Two trained, and it GeoFluv-certified as such, when they have completed a constructible GeoFluv design.

1.3. Level Three

Level Three GeoFluv training is about getting the completed design constructed in the field. As the Level Three GeoFluv Training/Coaching takes the user's GeoFluv design into the field and constructs it to the design, it can include training/coaching for foremen and equipment operators also. The time required to attain Level Three depends on the client's project needs, and the level is attained with successful construction of the project design.

Level Three training is appropriate for those who intend to construct GeoFluv designs and for those, like regulatory staff, who want to learn how to inspect GeoFluv landform designs for meeting design criteria and specifications that will support erosion resistance and long-term sustainable land use.

1.4. Level Four

Level Four Training/Coaching helps the user understand, design, and use qualitative and quantitative methods to verify their reclamation project is functioning as designed. The verification results can be used for various purposes. The purposes can be to improve site-specific designs and construction methods, to satisfy regulatory monitoring and reporting requirements, to establish that performance bond criteria have been met, and other similar performance verification needs.

2. ADAPTATION TO THE TECMINE PROJECT

2.1. Level One

Level One training has been taught by Nicholas Bugosh, with the help of Cristina Martín Moreno, at the premises of the Regional Administration of Valencia. In addition to people of the Regional Administration of Valencia, staff from other Autonomous Communities of Spain has attended (i.e. Andalucía, Aragón, Cataluña y Madrid). The course has held the days September 24 and 25.

A short talk by Greg Hancock, University of Newcastle, about Landscape Evolution Models, has complemented this training.

2.2. Level Two

According to the description above, Level Two training has consisted in Nicholas Bugosh coaching the design of a real scenario, actually one of the two that will be built under TECMINE. This only has training purposes, because these two projects (platform and pond area) were already designed and partly implemented when the training of this Level Two started.

2.3. Level Three

This was carried out on September 26th, conducted both by Nicholas Bugosh and the UCM staff. It has been complemented by the UCM staff during the whole process of construction.

2.4. Level Four

The TECMINE project does not include specific tasks for Level Four training. However, since the project includes monitoring tasks which seek to evaluate the performance of the GeoFluv based restorations, the own development of the project can be considered a Level Four training.

3. DETAILED CONTENTS FOR LEVEL 1 TRAINING

3.1. Day 1

Setup, load example files (will determine during course of training if updates are needed)

Explanation about software functions, PowerPoint overview of GeoFluv™ approach (include Essentials), introductory remarks about training goals and paradigm shift

Carlson Software / AutoCAD package overview

General Menu

- File: clipboard/copy with basepoint, drawing cleanup
- Layer Properties Manager: on/off, freeze/thaw, new layer, layer colors
- Edit: Erase/select, by layer, by closed polyline, Offset/standard offset, Break/ by crossing polyline, at selected point, Polyline Utilities/reduce vertices, edit polyline/add polyline vertex
- View: Extents, 3D viewer window, Surface 3D viewer, change layer, freeze layer
- Inquiry: list, layer ID
- Settings: Carlson configuration, AutoCAD options, Carlson menus
- Points: draw/locate points, import text/ASCII file, crd file
- Draw Polyline, 2D vs. 3D polyline, close polyline, erase, draw circle,
- Commonly used tools
- drag vertices, drag polyline, read elevation from vertices, object snaps, ortho, distance (type: dist)

Civil Menu

- 3D Data: Edit/Assign Polyline Elevations, 2D to 3D Polyline, 3D polyline utilities/offset 3D polyline
- Surface: Volumes by Triangulation

Natural Regrade demonstration (Regrade 1) without explanation of commands

Class runs through Regrade 1 example

Explain 'Design GeoFluv Regrade' dockable dialog box commands

- Version number
- 'File' button
- 'Settings' button, show slides of 'ridge to head of channel', show effects of 'ridge to head of channel' setting, pcp. setting
- 'Setup' tab, file selection boxes have three options

Explain ‘Channels’ tab

- displayed information only relevant to channel in ‘Current Channel’ window
- channels and subwatersheds are designed at this point, show profile
- naming convention
- ‘Add’ all channels, explain interactive dialog
- drainage density update
- generate channel ‘Report’
- explain ‘Reread Valley Bottoms’

Explain ‘Output’ tab

- the design output is the result of the inputs (garbage in, garbage out), changes to the drawing do not change the inputs (DWG tab next)
- ‘Preview’ allows cursory inspection to make major edits before proceeding, demonstrate adding channel bend
- ‘Draw Design Surface’ outputs the draft design as a drawing, explain ‘Triangulate and Contour’ dialog box
- explain contouring inspector
- show completed draft Regrade 1 design
- review ‘Summary Report’
- return to Natural Regrade menu and demonstrate ‘GeoFluv Channel Inspector’

Explain ‘DWG’ tab

- demonstrate ‘GeoFluv Contour Viewer’
- demonstrate ‘GeoFluv Design Viewer’
- return to ‘Output’ tab and run ‘Update Cut / Fill’
- run ‘Cut/Fill Centroids’
- **compare ‘Channels Cross Section Report’ with ‘Channels’ tabs ‘Report’**
- demonstrate ‘View Longitudinal Profile’
- demonstrate ‘Edit Longitudinal Profile’
- demonstrate ‘Auto Longitudinal Profile’
- explain ‘Save Design Surface .tin’ , this is format for direct output to machine control

Return to ‘Channels’ tab, explain ‘Current Channels Settings’

Class returns to Regrade 1 example and varies settings to user’s estimated project and other site values, produce different draft alternatives

Compare and discuss example alternatives, Open question and answer / discussion

Review input values in order of importance, review ‘Essential GeoFluv Concepts’

Design Regrade 1 with different values in each subwatershed, search for optimal solution.

Discuss results.

3.2. Day 2

Address key issues, discuss planning, timing, construction (equipment, machine control, channel roughness, perennial streams, etc.)

Open discussion

Laying out pilot change for staged design with GeoFluv projects

- Make base .tin
- Set GeoFluv boundary
- Draw pilot channel
- Estimate and draw GeoFluv project boundaries
- Draw Design Surface
- Record key parameters at project boundaries for transition: elevation, slope, Q peak bankfull, Q peak FP

Resume

- Make GeoFluv project channel input lines
- Run Design GeoFluv Regrade, Save As project, save design lines GF channels & GF ridges to new project layers
- Make next project
- Use GeoFluv Channel Inspector tool to look for problems, tractive force, slope
- Make complete .tin
- Use Runoff Tracking to inspect design
- Make necessary edits to design to finalize

Resume

- Review Essential GeoFluv
- Review five inputs in order of importance
- Work on areas of special interest

At the end of this day, Greg Hancock, University of Newcastle, made a lecture on Landscape Evolution Models, to complement the training on Geomorphic Mine Restoration.

MATERIALS - ANNEX

A whole set of materials (Word, pdf and .dwg) files were supplied for the content of all training levels.

A list of currently available materials is included below and these materials are attached as independent documents. However, during the course development, Nicholas Bugosh and Greg Hancock provided any material they considered appropriated (i.e. presentations and additional notes).

List of currently available materials:

Level 1 folder

- Basic Natural Regrade Tutorial
- Natural Regrade Metric Drawing (.dwg file)
- Natural Regrade_Carlson_2018
- Basic_Manual_for_FGReview_of_Landform_Designs_28APR06 (Draft)
- The Essential GeoFluv

SIBERIA folder

- siberia_8.30_manual
- Folder with articles about SIBERIA software and Landscape Evolution Models

STRUCTURE OF LEVEL 2

Level 2 training has been conducted during 4 month along with participants developed the design of a real scenario, particularly the area called Platform.

Four participant concluded this level. The rest of technicians that participated in the Level 1 rejected the possibility of taking this level due to lack of time and difficulties to install the software. Public administration in Spain has limited the use of commercial software, which is a limitation to be considered, if personnel want to implement new technology.

The methodology followed has been:

1. Nicholas sent the information and files needed to resolve an exercise and set a deadline to the participants. Participants had several weeks to solve it.
2. Participants sent the exercise already solved and Nicholas set the date for the meeting.
3. The on-line meeting lasted about 2-3 hours during which Nicholas reviewed participants' solutions and solved their doubts.

Four sessions of coaching with Nicholas B. took place.

SCHEDULE

The different levels of the training were carried out according to the following training schedule:

LEVEL	DESCRIPTION	PLACE	DATES	TRAINER
LEVEL 1	(1)Introductory Training in the GeoFluv method and use of the Natural Regrade software. (2) Landscape Evolution Models	VALENCIA	24 th September 2018	(1) Nicholas Bugosh with support of Cristina Martín Moreno from UCM. (2) Greg Hancock, University of Newcastle
			25 th September 2018	
LEVEL 2	Design of a real scenario.	On-line training	1 st October.2018 to 31 st January 2019	Nicholas Bugosh
LEVEL 3	Training/coaching about project construction (for foremen and equipment operators also)	ADEMUZ	From 26 th September 2018 to the end of execution	Nicholas Bugosh and the UCM staff
LEVEL 4	Verification of the design	ADEMUZ	2019-2021	UCM staff under LIFE TECMINE (Action C1)

CERTIFICATION

At the end of the training, participants had to solve a test to obtain the certification of level 1. About Level 2, the four participants obtained a certification. And four people, 2 from VAERSA and 2 from SIBELCO will obtain a certification on level 3.

PARTICIPANTS

PICTURES

