

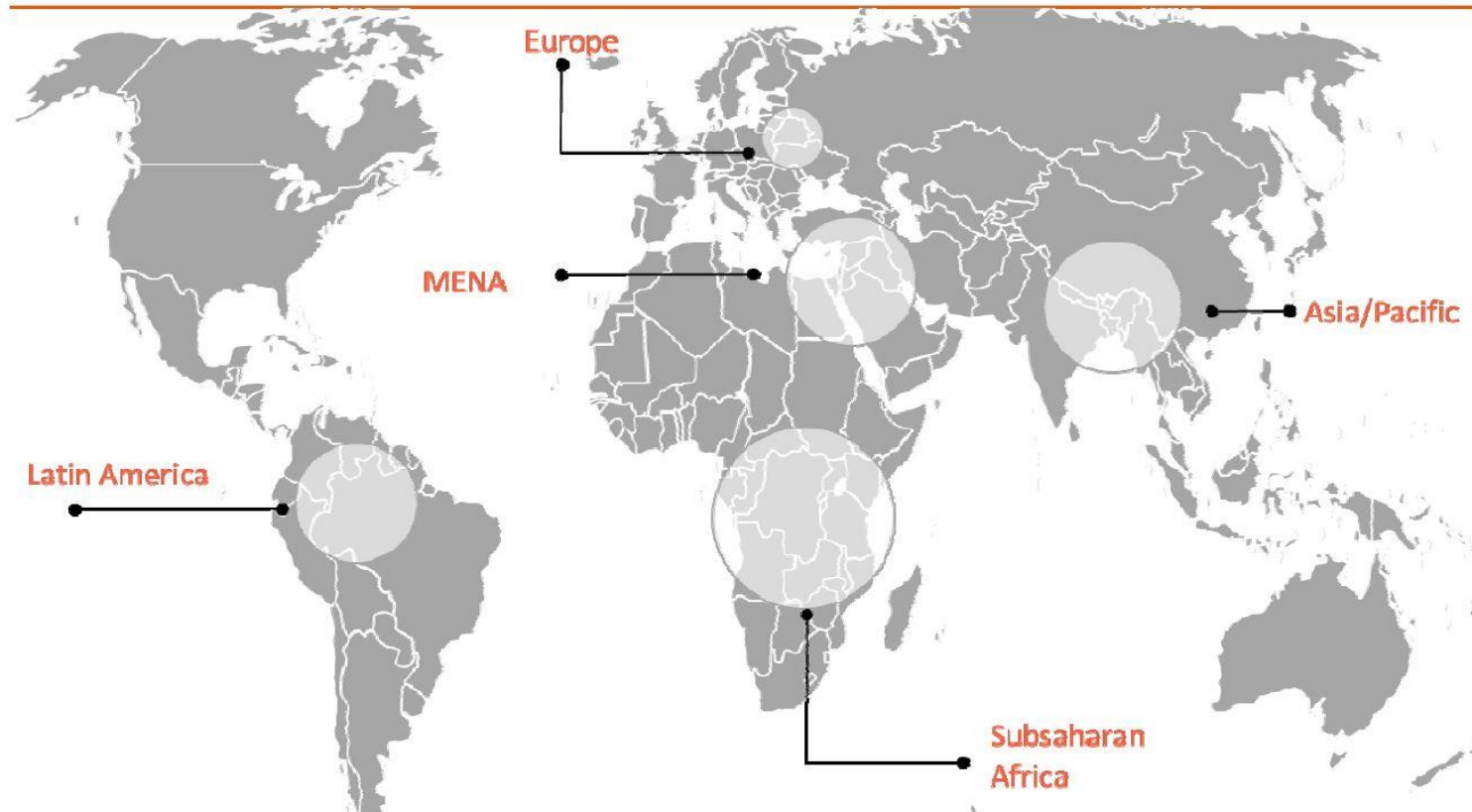


National Forest Inventory Design México

6th Field Map International User Conference
Slovica, Czech Republic

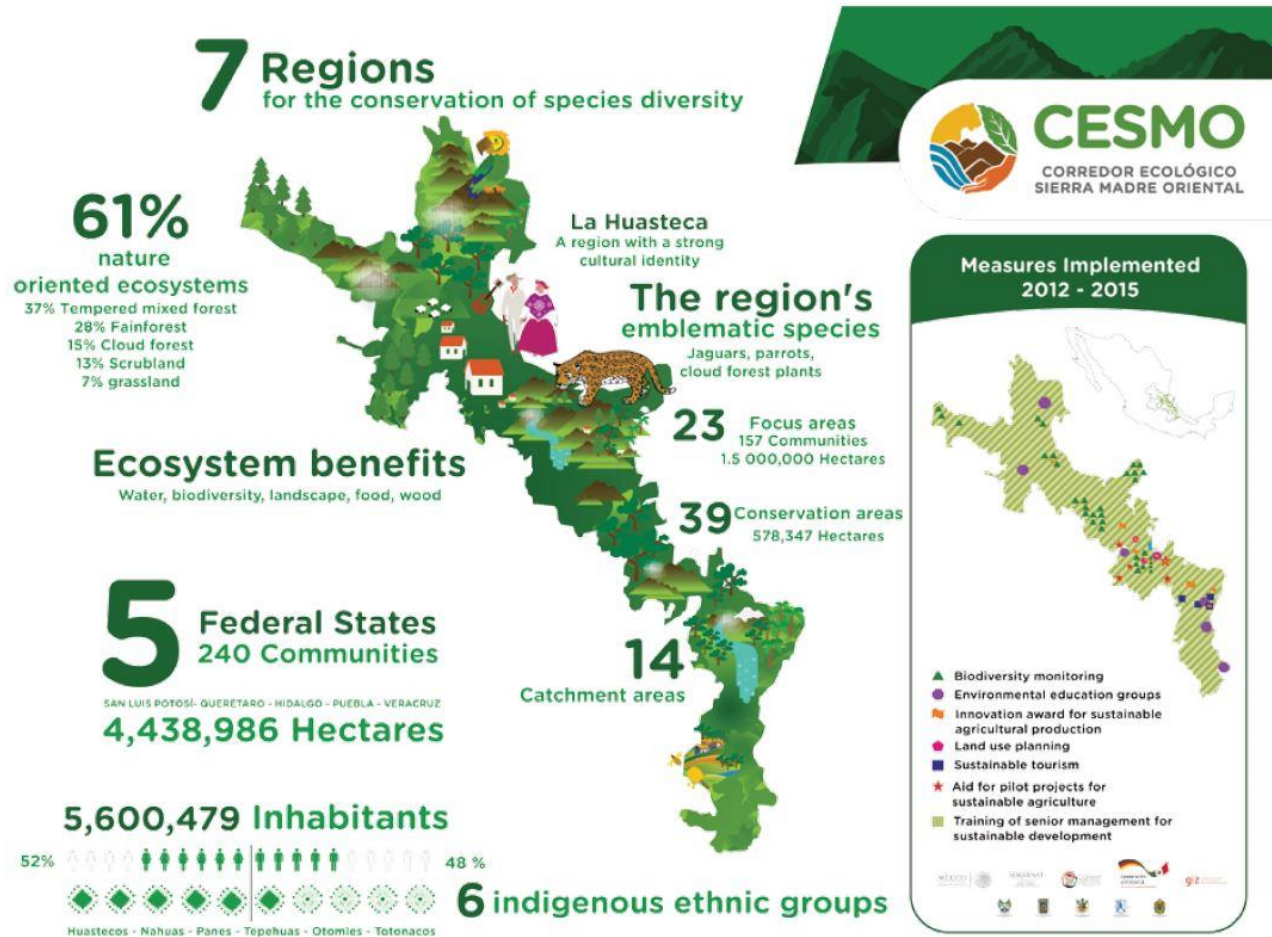
28 -30 September

Activities Worldwide



Frame: German Technical Cooperation (GIZ) - 2012-2016

Protecting the biodiversity in the Sierra Madre Oriental



Protecting the biodiversity in the Sierra Madre Oriental

Project Characteristics:

- Project financed by German Federal Ministry for Economic Cooperation and Development (BMZ)
- Implemented by GIZ and GITEC
- **Goal:** to stabilize or improve the quality of species diversity on 80,000 hectares.
- **Project Approach:** An innovative corridor concept for the protection of the diversity of species (CESMO) as core of a regional strategy for sustainable development
- **Comp. 1:** Creating political consensus and governance structures – GIZ
- **Comp. 2:** Improve economic instrument - GITEC

Results achieved so far:

- **Ecological corridor Sierra Madre Oriental established** (CESMO) – Cooperation networks – Regional reference for the management of ecological corridors
- **Financing the ecological corridor** - „Greening“ of public development programmes and investment of private sector (roughly 4,3 million EUR)
- Development partnership with economic players (Volkswagen, CEMEX, etc.)
- Installation of **40 biodiversity measurement stations** and integration into the national biodiversity monitoring system
- Mobilization of the agricultural and forest sector by competitive measures: **„Innovation Prize for sustainable production“**

Pilot Project: National Forest Inventory Design (INFyS)

- Course in data analysis with the productive clusters
- Presentation of the results in CONAFOR
- **Pilot project:** Integrating the design of the National Forest Inventory into Field Map technology.
- **30 PMP** have been installed with FM technology in selected forest concessions of SFM (Winners of the Innovation Prize)
- CONAFOR participated in the design of the variables as observer and validator of the results.

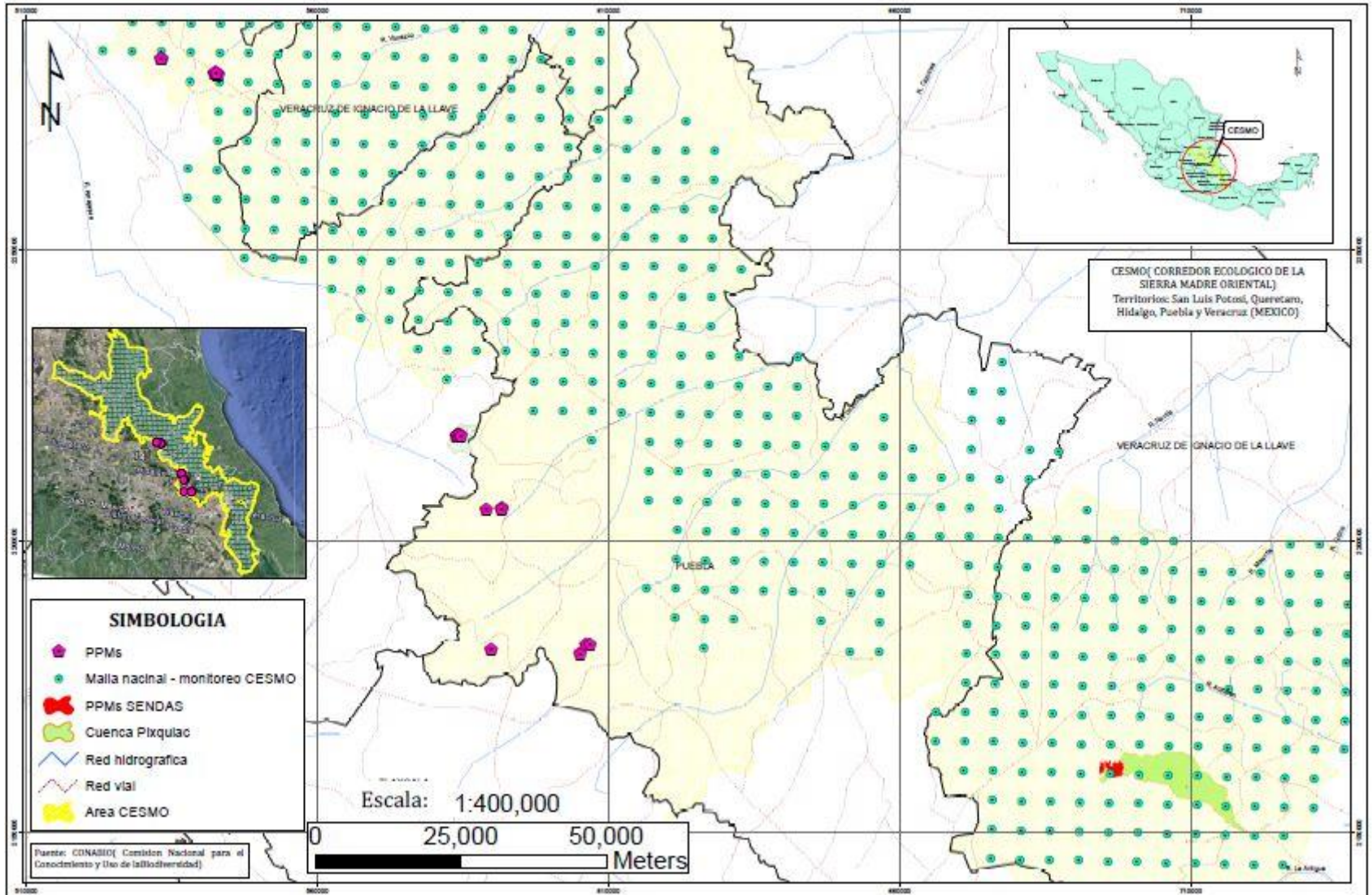


Workshop in Field-Map analysis



INF Mexico – Results

LOCALIZACION DE PARCELAS PERMANENTES DE MONITOREO EN EL CESMO

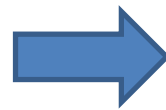


Manual of sampling procedures for the National Forest and Soil Inventory (INFyS), Version 15.8 CONAFOR (2015)

- The variables of the Manual have been defined, integrated and systematized into Field-Map.
- Validated in the field with forest producers and CONAFOR.
- Guide for the producer for their annual management plans



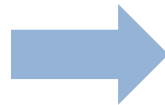
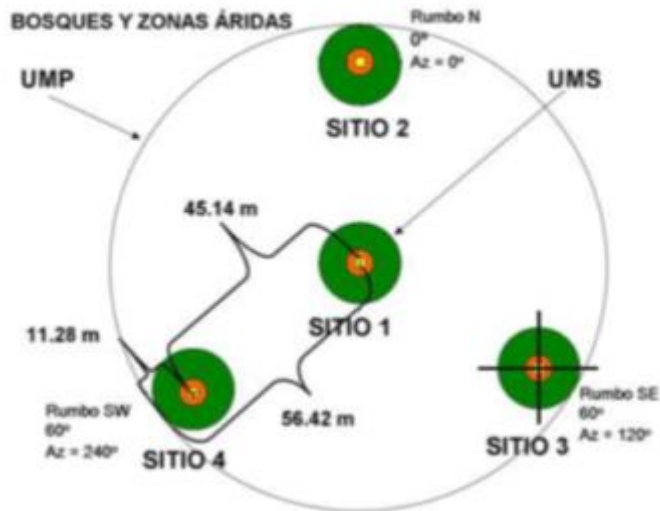
Manual of the sampling procedures



Validation in the field

Design of the conglomerate

- Systematic stratified sampling for each conglomerate
- National sampling grid with an equidistance of 2.5 km



Area: 1596.661

Perimetro: 283.028

Plano: []

Nombre: 4

Tipos de parcelas: []

Número de conglomerados: []

Identificación del proyecto: []

Fecha de inicio: []

Fecha de fin: []

Método de levantamiento: []

Tipos de conglomerados: []

Código: []

Planta: []

Terceros: []

Tipos de coberturas: []

Número de coberturas: []

Distancia de coberturas: []

Número de coberturas: []

Número de coberturas: []

Número de coberturas: []

Acciones: []

Condición de prioridad: []

Altura: []

Pendientes: []

Distancia de pendientes: []

Fotografías: []

Dimensiones de copias: []

Foto: []

Videos: []

Código de foto: []

Código de video: []

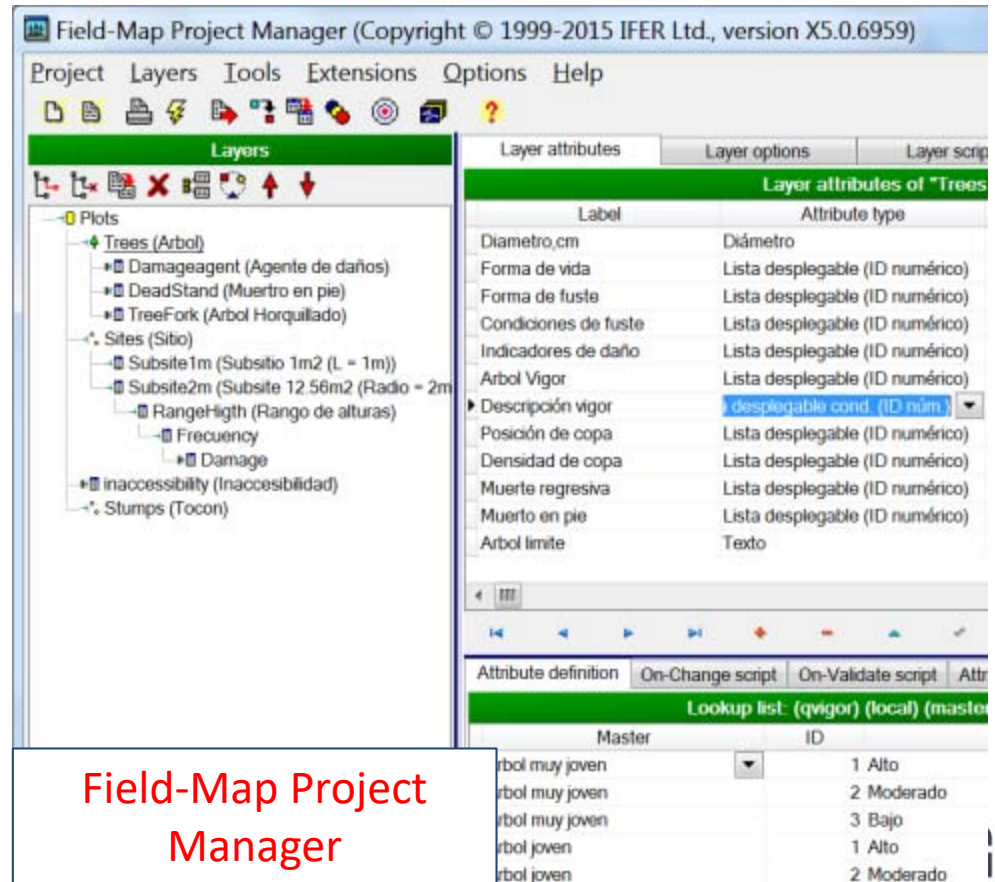
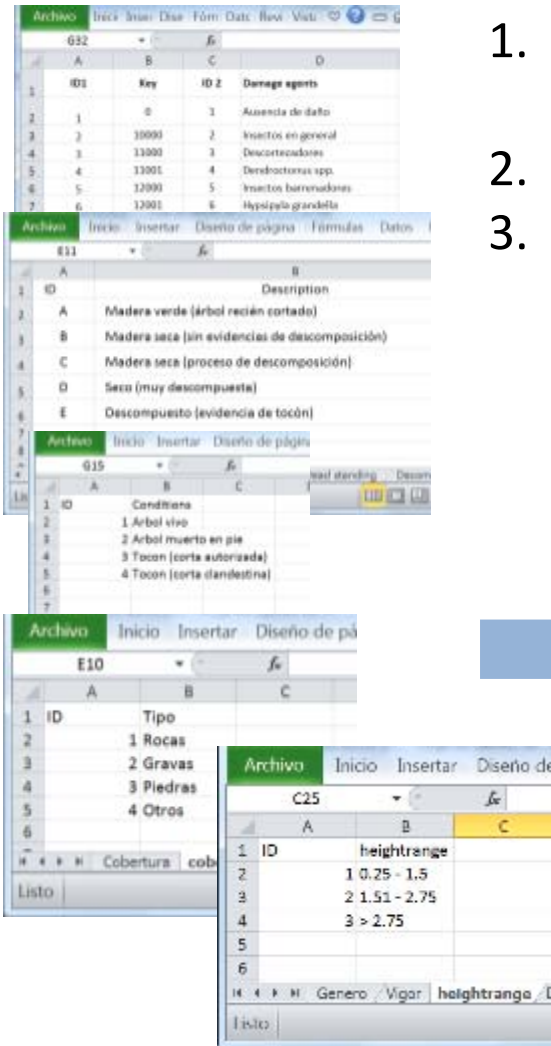
Planos: []

Mapa Puntos Atributos Símbolos

Electronic format of the general variables of the conglomerate .

Integration of the measured variables

1. Generation of geographical layers: tree, points, (sites, stumps), polygons, (crown projections, dead wood)
2. Hierarchical structure of layers and tables.
3. Integration of the attributes



Variables of the Manual of Sampling Procedures

Field-Map Project Manager

Species List

Id1	Nombre comun	Id2	Familia	Id3	Nombre Cientifico
1	Abedul	1	Betulaceae	1	Alnus acuminata
2	Aguacate	2	Lauraceae	2	Persea americana mill.
3	Aguacatillo	3	Lauraceae	3	Nectandra globosa
4	Ahuehuete	4	Taxodiaceae	4	Taxodium mucronatum
5	Aile	5	Betulaceae	5	Alnus spp
6	Alamillo	6	Salicaceae	6	Populus tremuloides
7	Álamo	7	Salicaceae	7	Populus mexicana wesm.
8	Amapa	8	Bignoniaceae	8	Tabebuia chrysantha
9	Amapola	9	Bombacaceae	9	Pseudobombax ellipticum
10	Amargoso	10	Leguminosae	10	Vatairea lundellii
11	Amate	11	Moraceae	11	Ficus spp.
12	Amate amarillo	12	Moraceae	12	Ficus petiolaris
13	Matapalo	13	Moraceae	13	Ficus tecolutensis
14	Copoy	14	Moraceae	14	Ficus maxima
15	higuerón	15	Moraceae	15	Ficus cotinifolia
16	Anacahuite	16	Boraginaceae	16	Cordia boissieri
17	Bari	17	Guttiferae	17	Calophyllum brasiliense
18	Barreta	18	Rutaceae	18	Helietta parvifolia
19	Bob	19	Polygonaceae	19	Coccoloba spicata
20	Bojón	20	Boraginaceae	20	Cordia alliodora

- Organize species of INFyS Manual in Excel:
 - ID
 - Common species name, scientific name, family
- Import into Field-Map project Manager

Field-Map Project Manager (Copyright © 1999-2015 IFER Ltd., version X5.0.6959)

Project Layers Tools Extensions Options Help

Layer attributes Layer options Layer scripts Layer description

Layer attributes of "Trees (Arbol)"

Attribute name	Attribute type	Required	Visible	Label
Species	Lista desplegable (ID numérico)	SI	Visible	Nombre Comun
Scientificspecies	Lista desplegable (ID numérico)	SI	Visible	Nombre Cientifico
Familyspecies	Lista desplegable (ID numérico)	SI	Visible	Familia
GenusSpecies	Lista desplegable cond. (ID num.)	SI	Visible	Género
Scientificspecies2	Lista desplegable cond. (ID num.)	SI	Visible	Nombre Cientifico
Diameter_CM	Diámetro	SI	Visible	Diámetro,cm

Attribute definition On-Change script On-Validate script Attribute description Attribute color

Lookup list: (gspecies/Comun) (local)

ID	Value	Active	Order
1	abbreviata (Buddleiaceae, Buddlejia)	SI	
2	acapulcense (Mimosaceae, Lysiloma)	SI	
3	acapulcensis (Mimosaceae, Acacia)	SI	
4	acapulcensis (Caesalpiniaceae, Caesalpin	SI	
5	acapulcensis (Polygonaceae, Coccoloba)	SI	
6	acapulcensis (Ebenaceae, Diospyros)	SI	
7	acapulcensis (Myrtaceae, Eugenia)	SI	
8	acapulcensis (Fabaceae, Pterocarpus)	SI	
9	acapulcensis (Fagaceae, Quercus)	SI	
10	acapulcensis subsp. Veraecrucis (Ebenae	SI	
11	acalenangensis (Fagaceae, Quercus)	SI	
12	acatlense (Mimosaceae, Pithecolobium)	SI	

Look up list of species in Field Map Data Collector

1. Common name related to scientific name, family and genus
2. Option to select the name

READY

Arbol

Basic data | Arbol Horquillado | DBH-H | Crown projection | Crown profile | Stem profile

1 2 3 4 5

Stem volume m³: [] Posición de copa: []

Crown proj m²: [] Densidad de copa: []

Diametro mm: 899 Muerte regresiva: []

Altura Total m: [] Muerto en pie: []

Altura fuste limpio m: [] Arbol limbo: []

Altura comercial m: [] Arbol con horquilla: Si

Longitud del árbol m: []

Nombre Común: []

Nombre Científico: []

Familia: []

Género: []

Nombre Científico: []

Diametro cm: []

Forma de vida: []

Forma de fuste: []

Condiciones de fuste: []

Indicadores de daño: []

Arbol Vigor: []

Descripción vigor: []

Map | Plots | Arbol | Sitio

1

READY

Arbol

Basic data | Arbol Horquillado | DBH-H | Crown projection | Crown profile | Stem profile

1 2 3 4 5

Stem volume m³: 3.53185 Posición de copa: []

Crown proj m²: [] Densidad de copa: []

Diametro mm: 580 Muerte regresiva: []

Altura Total m: 29.00 Muerto en pie: []

Altura fuste limpio m: [] Arbol limbo: []

Altura comercial m: [] Arbol con horquilla: Si

Longitud del árbol m: []

Nombre Común: acatenangensis (Fagaceae, Q.)

Nombre Científico: Quercus ocoteifolia

Familia: Fagaceae

Género: Quercus

Nombre Científico: Castanea

Diametro cm: Quercus

Forma de vida: []

Forma de fuste: []

Condiciones de fuste: []

Indicadores de daño: []

Arbol Vigor: []

Descripción vigor: []

Tree height []

Conditions []

Map | Plots | Arbol | Sitio | Icon

2

READY

Arbol

Basic data | Agente de daños | Muestra en pie | Arbol Horquillado | DBH-H | Crown pro

1 2 3 4 5

Stem volume m³: 3.95947 Posición de copa: []

Crown proj m²: [] Densidad de copa: 16

Diametro mm: 491 Muerte regresiva: 21

Altura Total m: 45.00 Muerto en pie: []

Altura fuste limpio m: 34.00 Arbol limbo: 23

Altura comercial m: 3.00 Arbol con horquilla: Si

Longitud del árbol m: []

Nombre Común: acatenangensis (Fagaceae, Q.)

Nombre Científico: Quercus ocoteifolia

Familia: Fagaceae

Género: Combretaceae

Nombre Científico: Cornaceae

Diametro cm: Dilleniaceae

Forma de vida: Elaeocarpaceae

Forma de fuste: Encaceae

Condiciones de fuste: Erythroxylaceae

Indicadores de daño: Fabaceae

Arbol Vigor: []

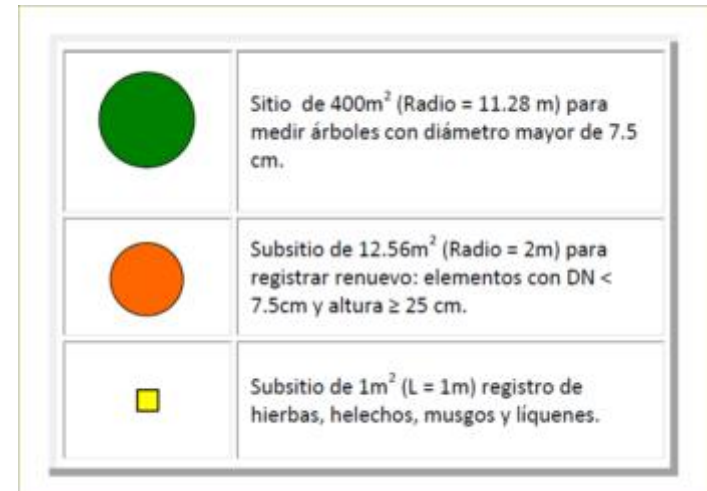
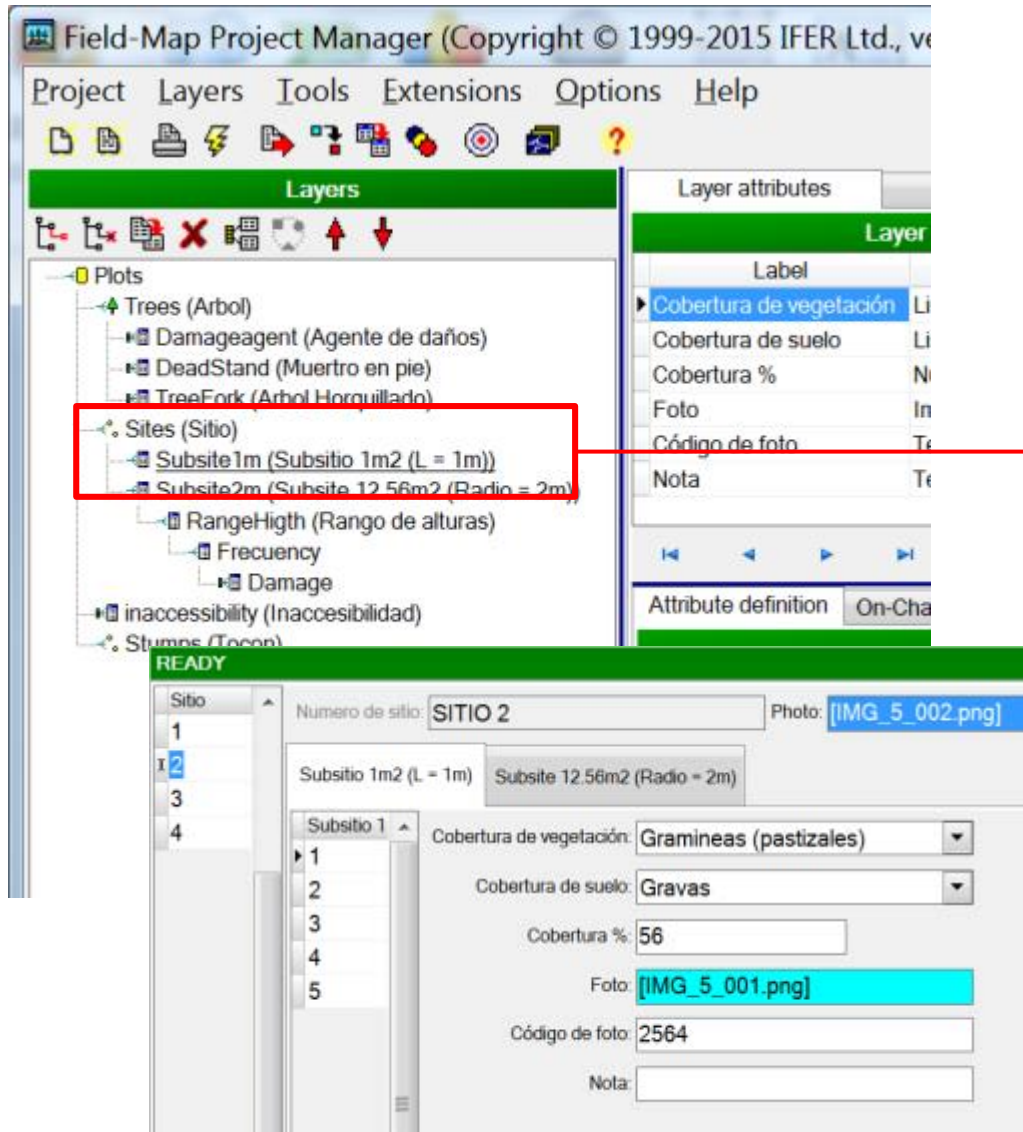
Descripción vigor: []

Map | Plots | Arbol | Sitio | Icon

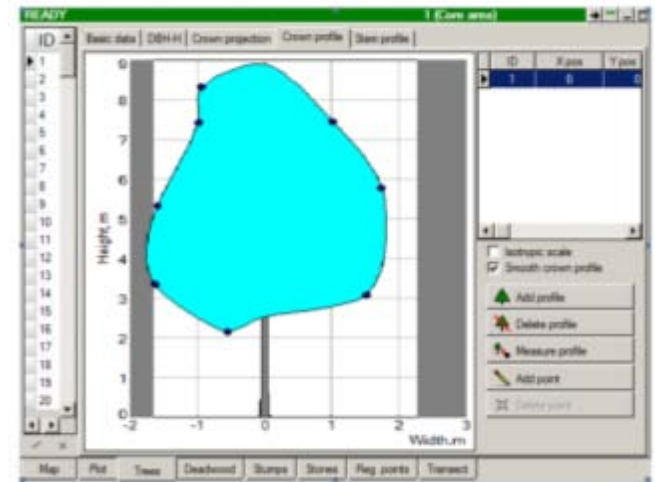
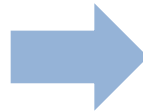
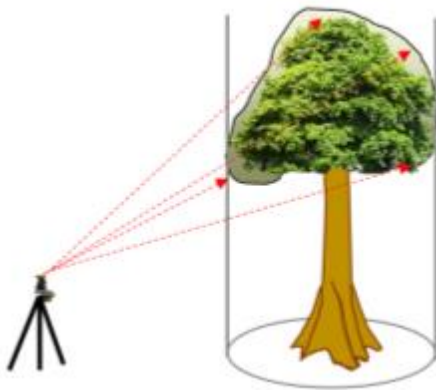
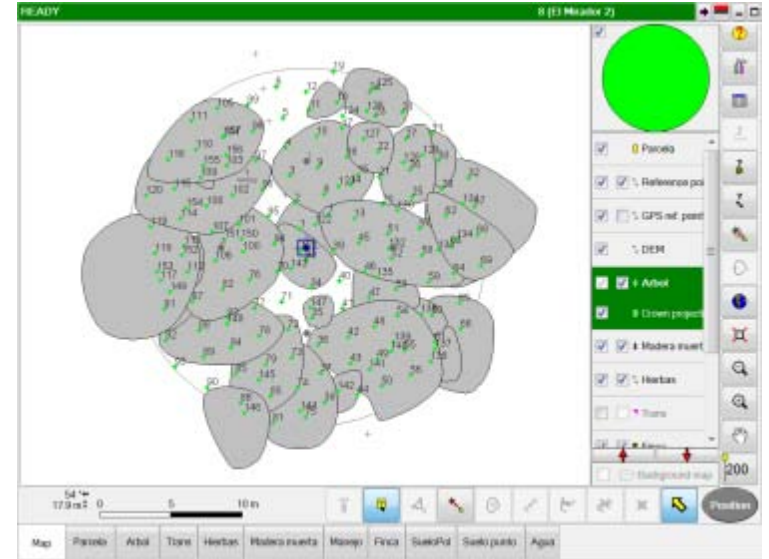
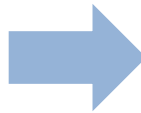
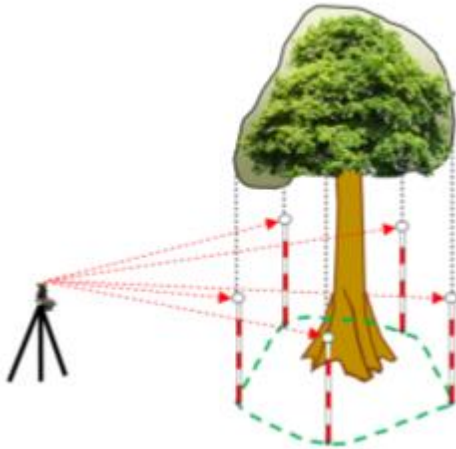
3

Registration of minor vegetation

- Subsite of 1m²: herbs, ferns mosses, lichens
- Subsite of 12.75m²: regeneration of < 7.5 diameter and minimum height of 25cm



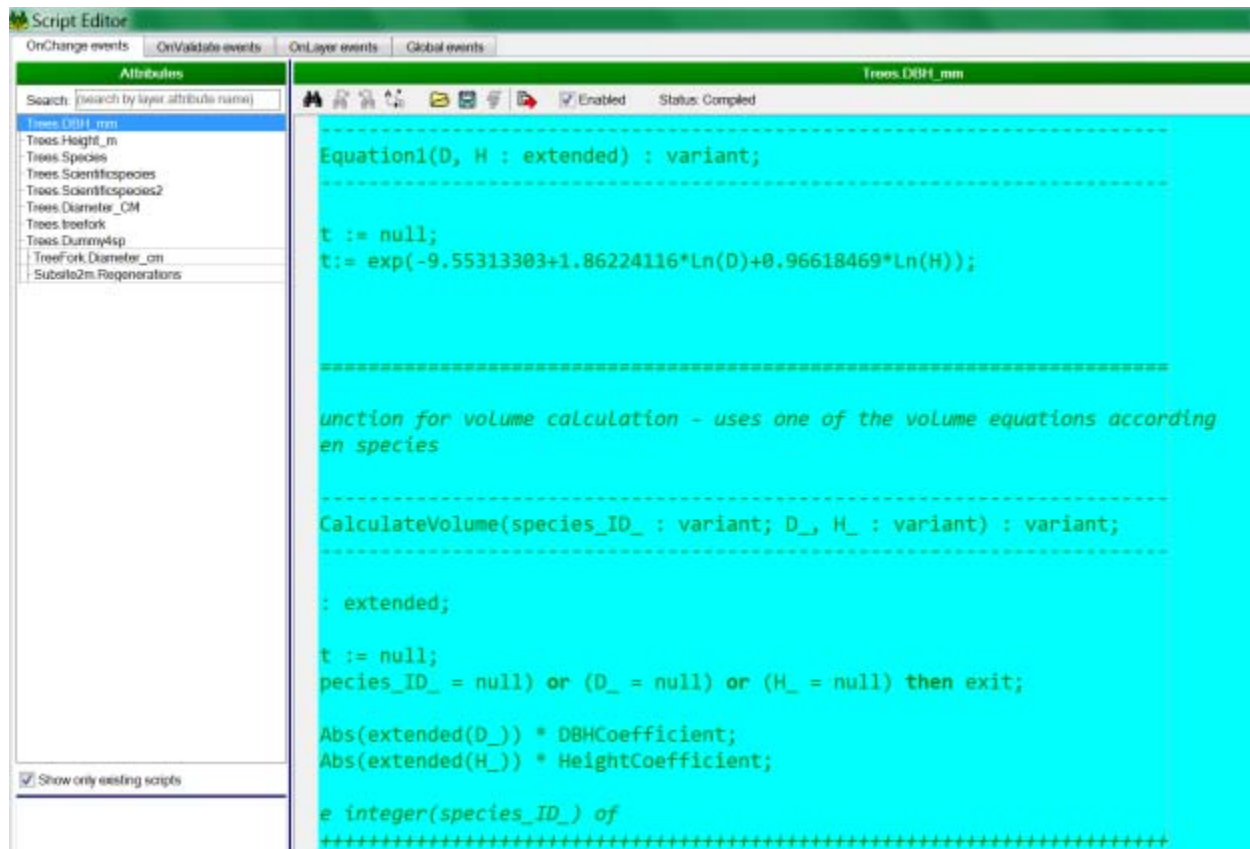
Tree layer: Crown projections and profile



Tree layer: Volume equations

Development of scripts for the volume calculation of stem profiles

Result:= exp(-9.55313303+1.86224116*Ln(D)+0.96618469*Ln(H));



The screenshot shows a 'Script Editor' window with a green title bar. The window is divided into two main panes. The left pane, titled 'Attributes', contains a search bar and a list of tree attributes including 'Trees DBH_mm', 'Trees Height_m', 'Trees Species', 'Trees Scientificspecies', 'Trees Scientificspecies2', 'Trees Diameter_CM', 'Trees treefork', 'Trees Dummy4sp', 'Treefork Diameter_cm', and 'Subsite2m Regenerations'. The right pane, titled 'Trees DBH_mm', contains a script with the following code:

```
-----  
Equation1(D, H : extended) : variant;  
-----  
  
t := null;  
t:= exp(-9.55313303+1.86224116*Ln(D)+0.96618469*Ln(H));  
  
-----  
  
unction for volume calculation - uses one of the volume equations according  
en species  
  
-----  
CalculateVolume(species_ID_ : variant; D_, H_ : variant) : variant;  
  
-----  
  
: extended;  
  
t := null;  
pecies_ID_ = null) or (D_ = null) or (H_ = null) then exit;  
  
Abs(extended(D_)) * DBHCoefficient;  
Abs(extended(H_)) * HeightCoefficient;  
  
e integer(species_ID_) of  
+++++
```

Application of the volume analysis in Field-Map

1. Equation of stem profile
2. Volume analysis for each section of the standing tree

The screenshot displays the Field-Map software interface. The main window shows a stem profile graph with Height (m) on the y-axis (0 to 30) and Radius (cm) on the x-axis (0 to 35). The graph shows a parabolic curve representing the stem profile. Key points are marked: $3/5H$ at approximately 18m height, $1/2H$ at 10m height, and $d_{1.3}$ at the base. The calculated stem volume is $V(\text{stem}) = 2.4274 \text{ m}^3$. A table of measurements is shown:

HT, m	LEN, m	D, mm
0.51	0.52	520
2.89	2.97	471
9.97	10.24	383
19.62	20.15	217

The 'Export Stem Profile Data' dialog box is open, showing the 'Volume calculation' section. The 'Top defined by' section has 'Height in meters' selected with a value of 17. The 'Bottom defined by' section has 'Height in meters' selected with a value of 5. The 'Bark' section has 'Over bark' selected. The 'Target attribute' is set to 'Stem volume, m³ (Stem_Volume_m3)'. An example diagram shows a tree stem with a diameter of 30 cm and a height of 23 m, with a section of 17.0 m and 5.00 m highlighted.

READY 5 (5)

Arbol

Basic data DBH-H Crown projection Crown profile Stem profile

HT, m LEN, m D, mm

0.51 0.52 520

2.89 2.97 471

9.97 10.24 383

19.62 20.15 217

Stem profile model

Measure

Add measurement

Edit measurement

Calliper data

Add point

Delete point

Clear profile

Refresh volumes

Stem profiler

Height, m

Radius, cm

$V(\text{stem}) = 2.4274 \text{ m}^3$

3/5H

1/2H

Crown base

1/2 Crown base

$d_{1.3}$

Export Stem Profile Data

Selection

Current stem profile All stem profiles of current plot All plots

Export Calculate volume

Volume calculation

Top defined by:

Height

% of tree height:

Height in meters: 17

Diameter, cm:

Bottom defined by:

Height

% of tree height:

Height in meters: 5

% of diameter:

% of DBH:

Diameter, cm: 50

Bark

Over bark Under bark

Target attribute

Attribute: Stem volume, m³ (Stem_Volume_m3)

Calculate volume

Close Help

Example:

17.0 m

5.00 m

DBH = 30 cm

H = 23 m

Map Plots Arbol Sitio Tacon

CONSULT GMBH

NEXT STEPS:

- ✓ Proposal of the forest concessionaries to improve the general volume equations of Mexican commercial species con la technology Field Map (IFER 6 point method)
- ✓ Presentation of results and socialization within CONAFOR in a workshop in October.
- ✓ Application of Field Map technology for carbon monitoring, biodiversity monitoring
- ✓ Proposal submitted to GIZ for landscape monitoring on the basis of PPM in productive systems in the ecological corridor