



Installation of permanent plots for forest management and biodiversity monitoring

in Brazil, Peru and Mexico

(Jorge Mattos Olavarria, GITEC-IGIP)

Main projects in Latin America

Mexico

- Forest management platform
- Validation of FM technology by CONAFOR
- Carbon monitoring in coffee
- Biodiversity monitoring and monitoring for integrated landscape planning

Brasil

- Permanent monitoring plots
- Pilot Project for forest management planning
- Validation of Field Map Technology for the Brazilian market

Peru

- Validation of forest census data done by traditional methods in Field-Map
- Generation of stem profiles for volume

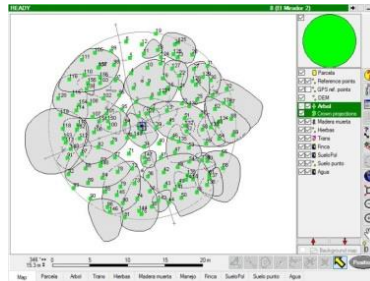
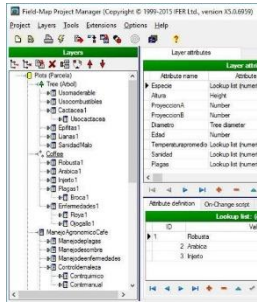
Permanent monitoring plots installed in CESMO I Focusing on ecosystem services and good practices

Database design

Field data collection

Analysis and validation

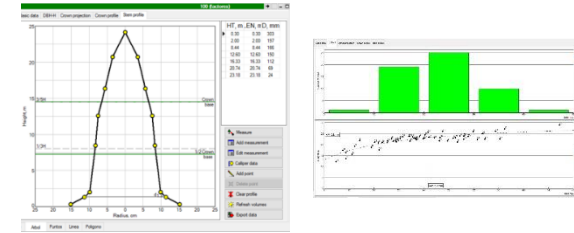
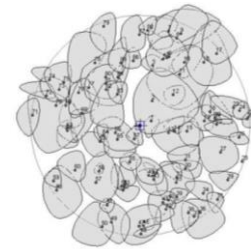
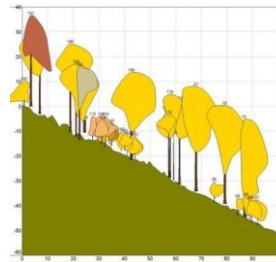
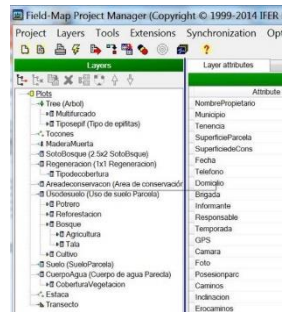
Coffe



Mapping of trees and coffee plants

Monitoring of plague and diseases

Forest

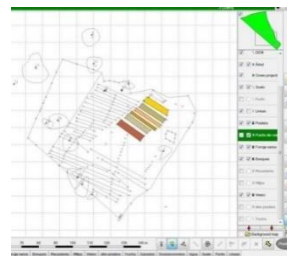
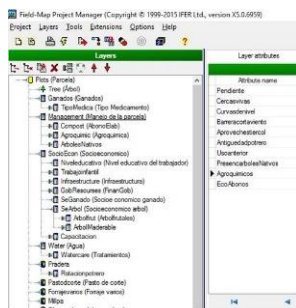


Transect

Mapping trees

Stem profile - volumen

Agrosilvopastoril



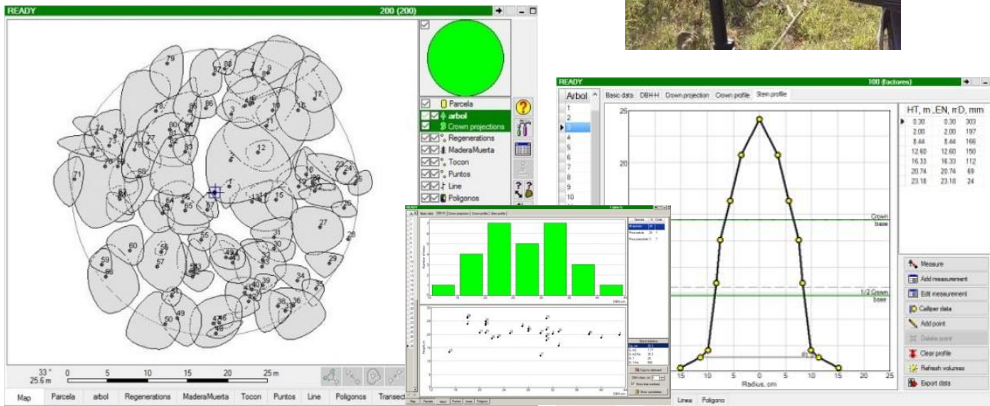
Detailed cartography

Monitoring

Validation of Field-Map by forest producers and CONAFOR (National Forestry Commission)



- Validated in the pilot project funded by GIZ with the winning companies of the Innovation Award.
- Forest producers of the state of Puebla and Hidalgo
- Supervision by CONAFOR

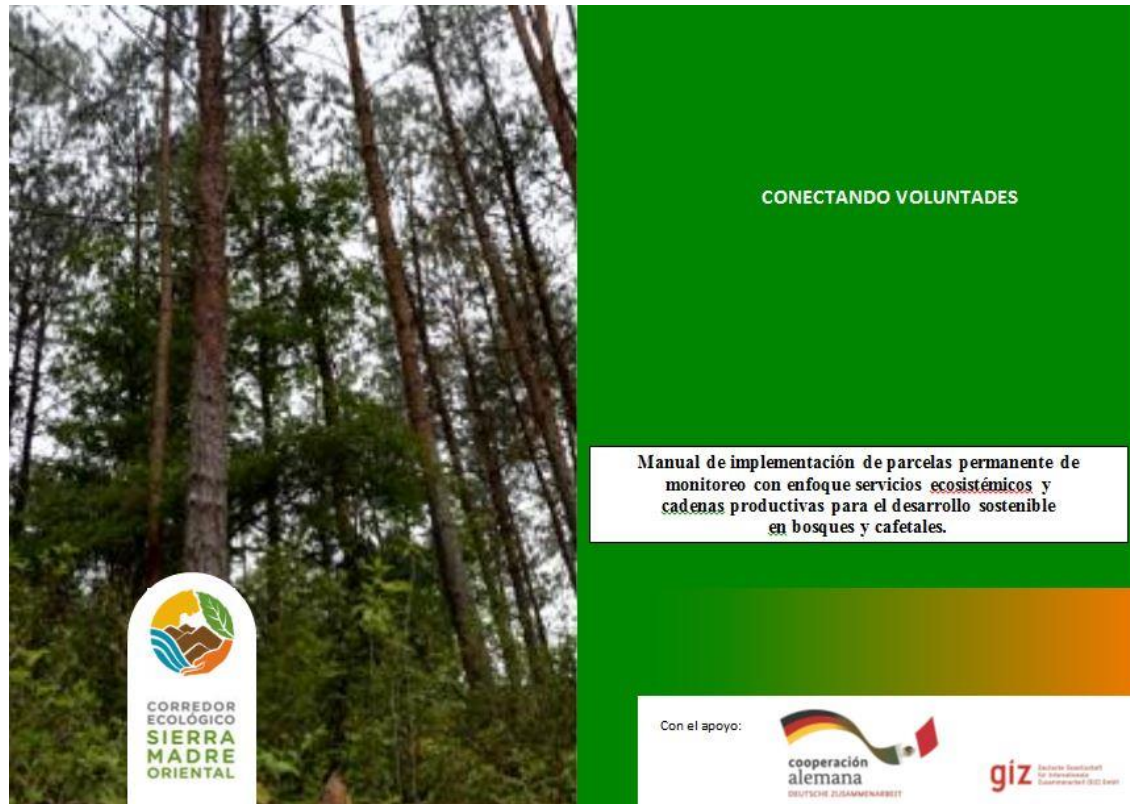


READY 1 (Arbo 1)

Arbo	Basic data	DBH-H	Crown projection	Crown profile	Stem profile
1	Slant azimuth: <input type="text"/>	Altura a la base de la corona: <input type="text"/>	Familia: Pinaceas	Incremento Medio Anual m3: <input type="text"/>	
2	Slant angle: <input type="text"/>	Altura a la rama muerta: <input type="text"/>	Genero: Pinus	Incremento Medio Anual %: <input type="text"/>	
3	Stem volume m³: <input type="text"/>	Tree length: 18.70	Area Basal: <input type="text"/>	Incremento Contenido Anual m3: <input type="text"/>	
4	Crown proj.m²: 73.59	Crown length: <input type="text"/>	Edad: 27	Incremento Contenido Anual %: <input type="text"/>	
5	Crown volume m³: <input type="text"/>	Altura comercial: 14.60	Tiempo de Paso: 10	Intensidad de Corta %: <input type="text"/>	
6	Crown surface m²: <input type="text"/>	Diametro en cm: 30.00	Volumen Individual: 1.247	Tipo de Fuste: Recto	
7	DBH, mm: 400	Nombre científico: Pinus patula	Volumen total: <input type="text"/>	Sanidad: Sano	
8	Altura total: 18.70	Nombre comun: Pinabete	% de Ramas: 30	Nombre científico: Pinus patula	

Manual in Spanish for installation of permanent monitoring plots for producers

1. Basic field manual v1 for the producer
2. Manual of stem profile equations for volume analysis v1



<http://support.field-map.com>

Forest management planning and monitoring of biodiversity

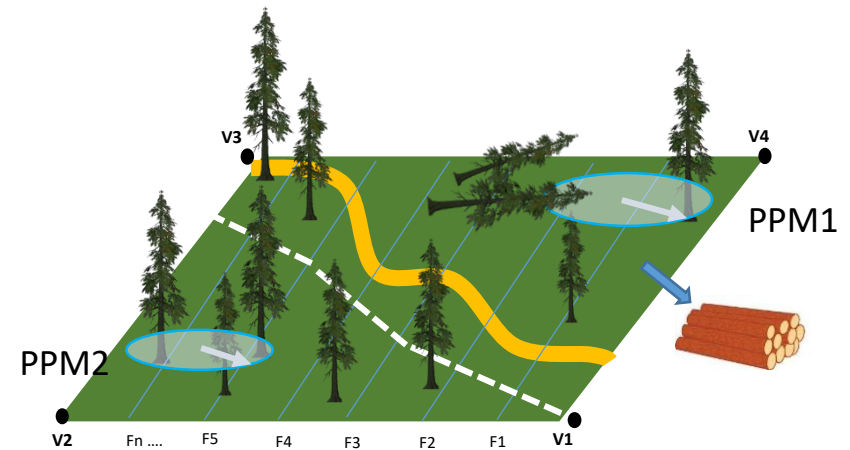
Design a platform with Field-Map technology for the management and monitoring plans of the areas of intervention or regeneration of the Foresters Association of Tulancingo, Hidalgo (> 3,000 foresters)

Programa de Manejo Forestal
Censo y Sitios de Muestreo



Field-Map version X6.0.8367
Project version 23.10.2017 / 1.9
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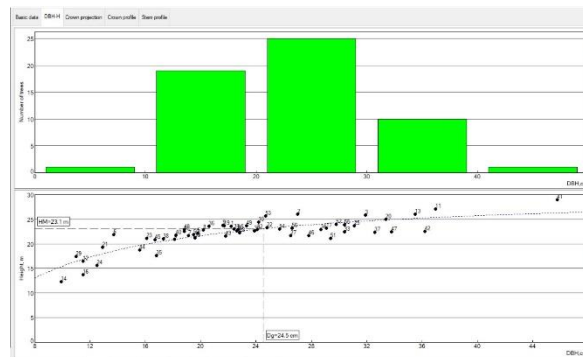
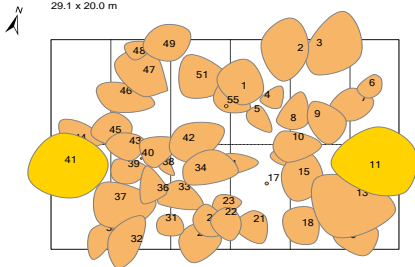
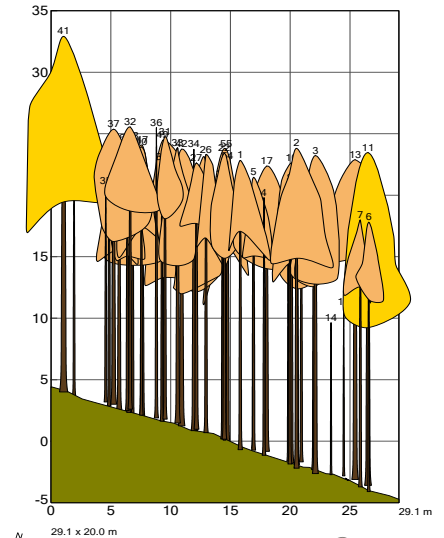
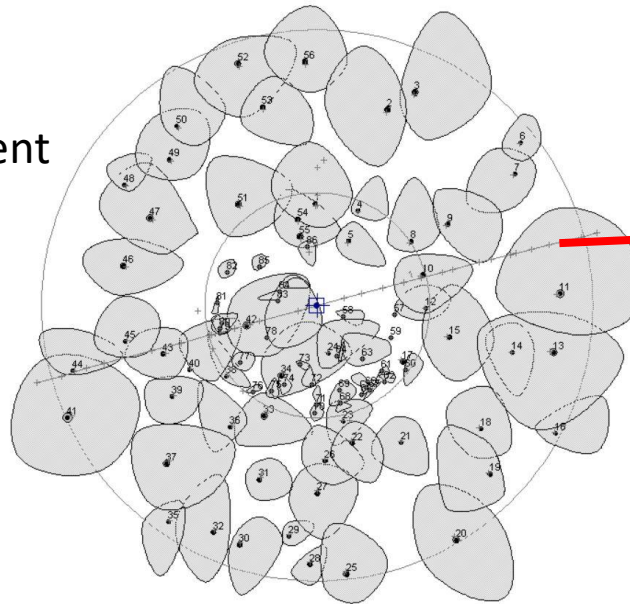
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Multifunctional integrated forest management

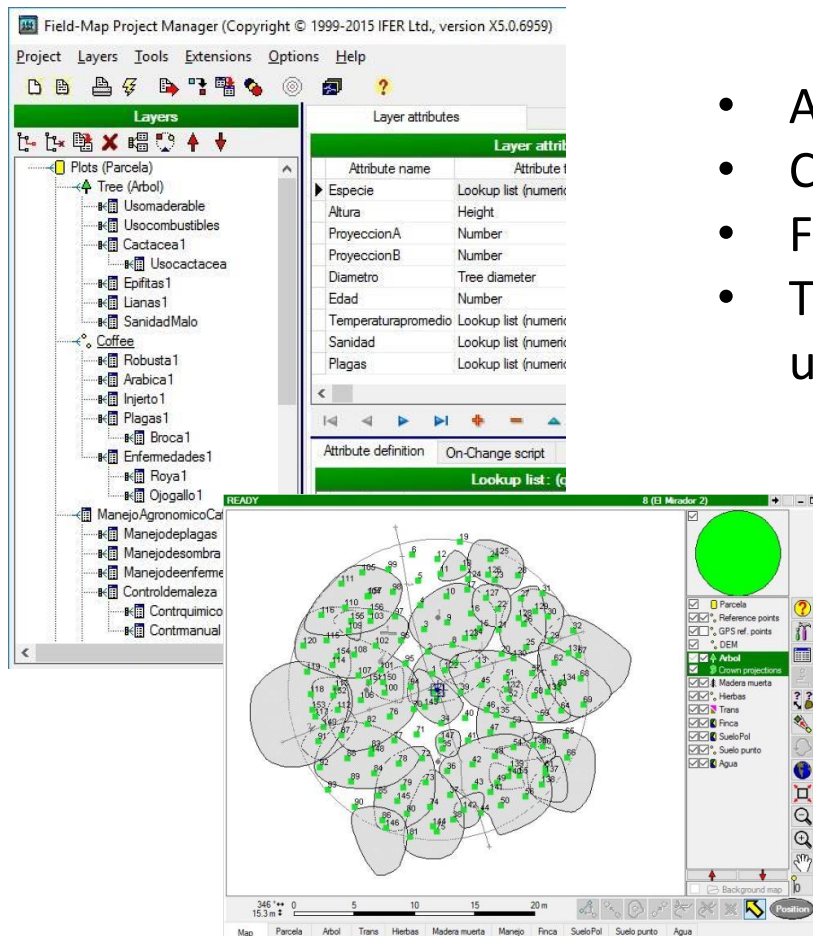
Forest Reserve El Manantial

- Acquisition of Field-Map
- Monitoring of biodiversity
- Integrated forest management
- Clonal gardens
- Christmas trees



- ? ■ Abies religiosa
- Pinus ayacahuite ■ Pinus patula
- Pinus rudis ■ Arbutus xalapensis
- Quercus laurina ■ Quercus rugosa

Forest management plan and carbon footprint in coffee plantations



- Acquisition of Field-Map
- Carbon footprint
- Forest management plan
- Thesis and research projects with local universities

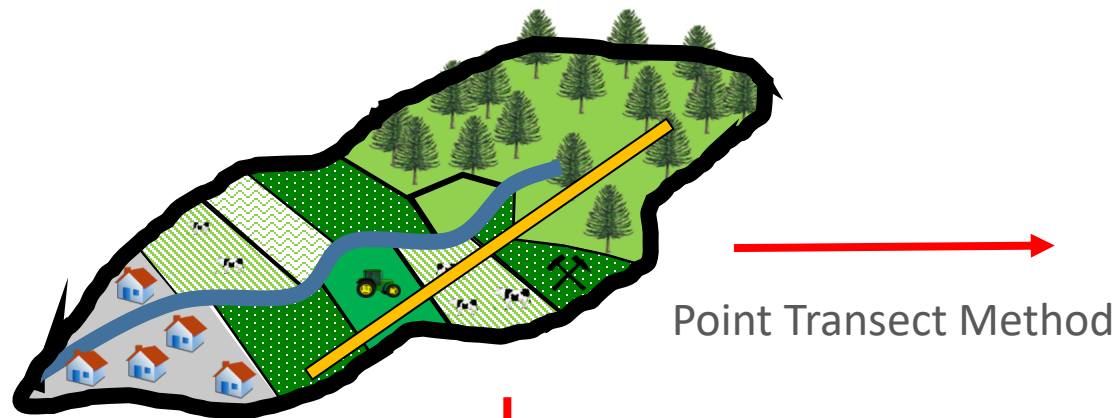
Design of database for coffee monitoring



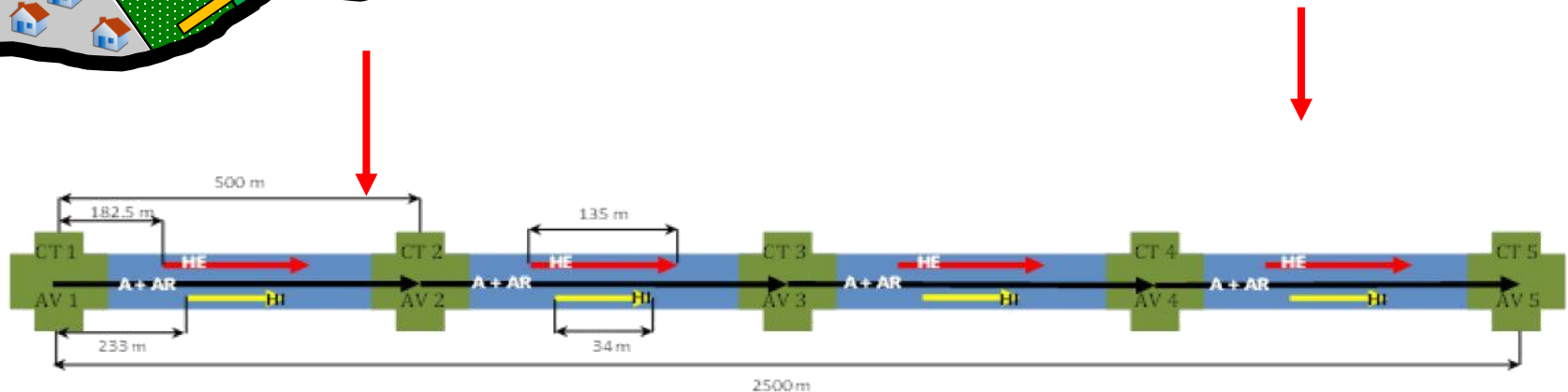
Programming in Field-Map: Protocol Point Transect Method (MTP)

MTP: Generate information that allows to know the relationship between biodiversity and ecosystem services and measures in forest management in plots, habitats and landscapes

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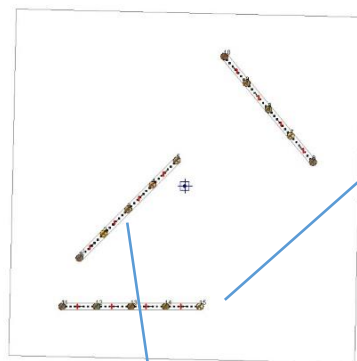
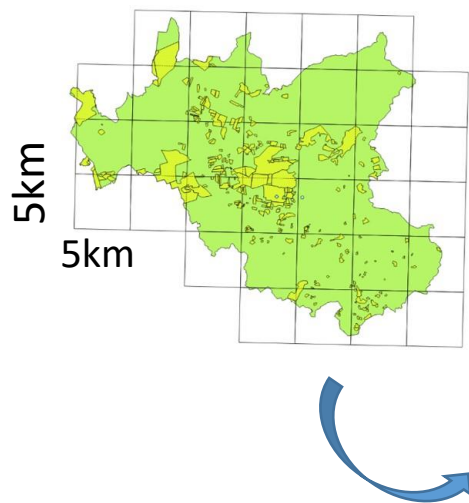


MTP
Plot crosses several productive strata and relates it to the landscape unit



MTP: Transect focuses on flora (herbaceous, shrub and arboreal stratum), mammals, birds, amphibians and reptiles.

Programming in Field-Map: Protocol Point Transect Method (MTP) - First version



Mammals
Trap cameras

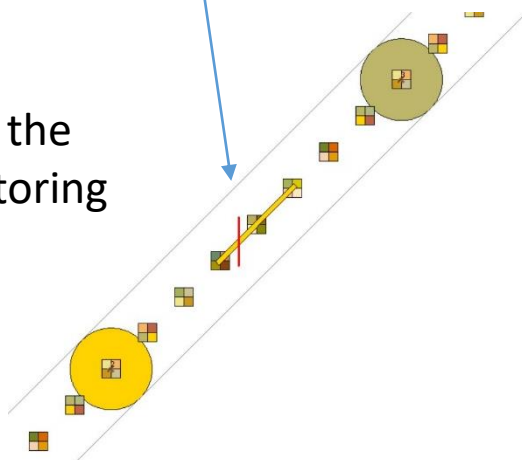
Birds

Trees

Amphibians and Reptiles

herbaceous

Integrated MTP to the Field- Map for monitoring



Stem volume: m³ 2.89531

Crown proj: m²

Diameter cm 480

Alura Total: m 34.00

Alura Lata (apex): m 02.00

Alura comercial: m 11.00

Tree length: m

Número transecto 1

Número parcela árboles 1

Número de alto

Familia Caesalpinaceae

Genus Caesalpinia

Nombre Científico Caesalpinia acapulcifer

Diameter cm 480

Forma de vida árbol

Forma de fuste Recto

Condiciones de fuste: Arbol vivo

Arbol Vigor: Arbol maduro

Despoin vigr: Alto

Posición de copa: Dominante

Densidad de copa: 91-95

Muestra regenera: 1-5

Muestro en pie:

Arbol leste:

Arbol muerto:

Arbol trees:

Presence: Si

Daño por plagas: Si

Epiphytes

Plaga/Damages

Problemas

Agente:

Género:

Especies:

Nombre Común:

Location/Damage:

% afectación natural árboles:

% afectación repoblada:

Status:

Stem base

Tree top

Live crown base

Start line

MODE

POS

Candidates

Dead crown base

Clear height

Calliper

Map

Database

MIP Project : Integrated landscape management project – GIZ/GITEC

- Acquisition of Field-Map licenses for GIZ Mexico
- Creation of a technical support platform with universities
- Training for government institutions CONAFOR (Forest), SEMARNAT (Environment), SAGARPA (agriculture)
- Research projects with universities and producers

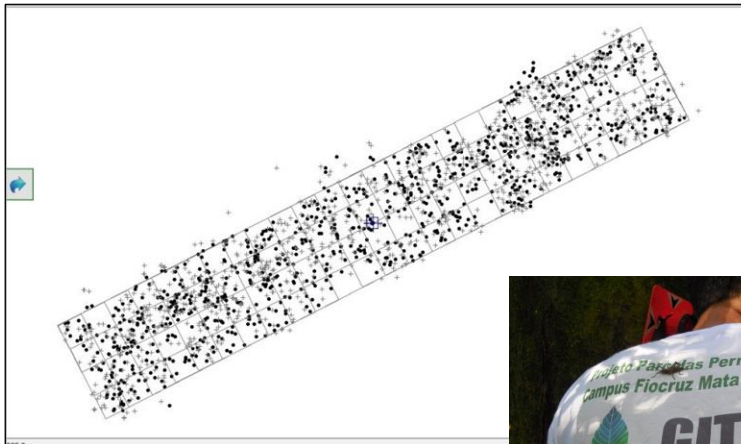


Permanent monitoring plots and forest management

1. Permanent monitoring plots in Campus Fiocruz Mata Atlântica

Main objectives:

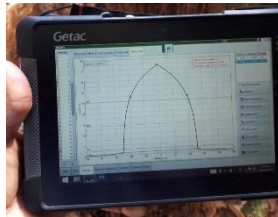
- Establish plots to monitor biodiversity and the relationship with tropical diseases
- Established between the urban area and Mata Atlantica



2. Pilot project of inventory and volume analysis in a pine plantation São Francisco de Paula / RS



Pilot Project: Validation of Field Map technology for the Brazilian market



Etapa I: Training of Brazilian researcher (UFLA) in Peru

- Census and Forest Inventory
- Generation of stem profile equations for volume
- Traceability of wood
- Monitoring and validation
- Forest management and management plans
- GITEC Brasil, Universidad de Lavras y clúster forestal Ucayali de Perú

Validation of data in Field-Map measured by traditional methods in forest concessions

Data taken by traditional methods



Annotation by hand in field format

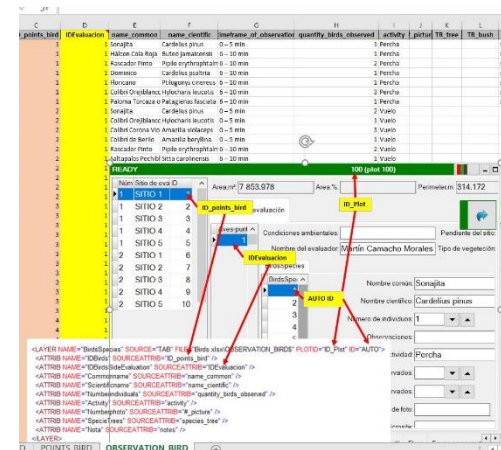


ID	Admin	SEDES	Trochil	TrochilType	Species	SpeciesCode	Importance_m	MinDistancia_m	Strabdom	DBH_cm	Comment
1	90	1	1	A	Falcone	29	150	29	1	80.2	
2	90	1	2	B	Cipit	15	49	49	1	72.7	
3	90	1	3	B	Panizuela	26	21	47	1	81.2	
4	90	1	4	B	Cochimene	6	20	49	1	68.6	
5	90	1	5	A	Cochimene	8	138	19	1	84.5	
6	90	1	5	B	Falcone	29	138	19	1	74.4	
7	90	1	7	B	Neuwania	29	138	22	1	74	
8	90	1	8	A	Cochimene	6	142	29	1	29.1	
9	90	1	9	A	Cochimene	4	103	1	1	81.4	
10	90	1	10	A	Cochimene	6	103	1	1	80.6	
11	90	1	11	A	Cipit	15	271	5	1	80.7	
12	90	1	12	A	Cochimene	6	103	1	1	80.6	
13	90	1	13	B	Falcone	29	488	37	1	81	
14	90	1	13	B	Falcone	17	487	37	1	75.4	
15	90	1	14	B	Cochimene	7	479	0	1	75	
16	90	1	15	A	Stelario	38	457	37	1	82	
17	90	1	15	B	Falcone	19	559	21	1	75.5	
18	90	1	15	B	Stelario	38	570	23	1	82	
19	90	1	16	B	Chonabatis	12	553	3	1	84.5	
20	90	1	16	B	Stelario	21	570	2	1	75.5	
21	90	1	17	A	Cochimene	6	624	28	1	110	
22	90	1	17	A	Cochimene	6	624	23	1	80.7	
23	90	1	17	A	Cochimene	6	624	41	1	80.3	
24	90	1	17	A	Chonabatis	11	779	10	1	100.0	
25	90	1	18	B	Cochimene	6	803	25	1	80.1	
26	90	1	18	A	Falcone	29	803	26	1	83.1	

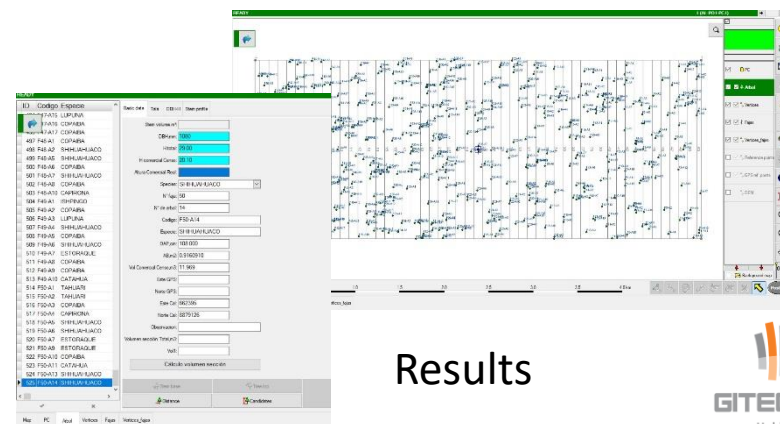
Enter Excel



Import2FieldMap format in Excel

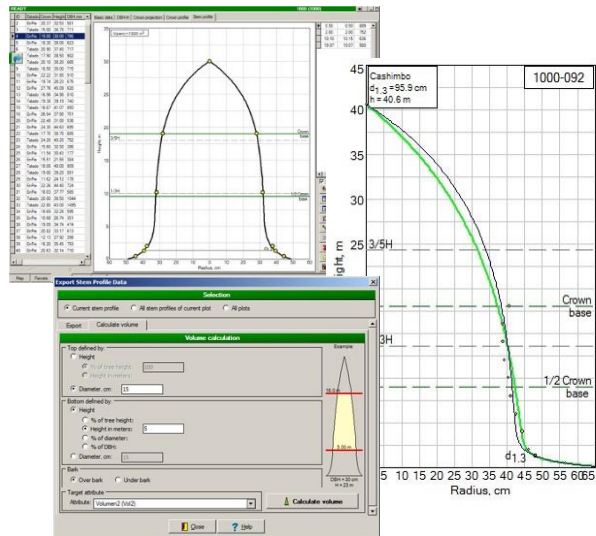


Results



Generation of stem profiles for volume calculation for commercial species in the Amazon

- Ucayali Forest Cluster
- Ucayali National University



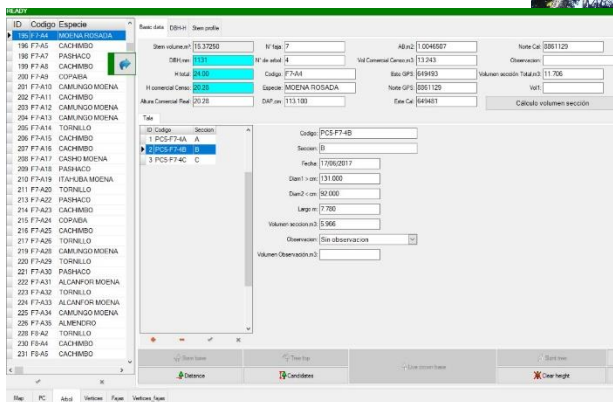
Create stem model

Diameter residuals Global models View stems

$$d_h = 2 \left(\frac{i}{1 - e^{i(1.5-N)}} + \left(\frac{d_{1.3} - i}{2} \right) \left(1 - \frac{1}{1 - e^{i(1.5-N)}} \right) + \frac{(d_{1.3} - i) d^{1.3p}}{1 - e^{i(1.5-N)}} e^{-2h} - \frac{1e^{-2h}}{1 - e^{i(1.5-N)}} e^{2h} \right)$$

$$i, q = A_0 d_{1.3}^A H^A \quad d_{dump} = A_0 d_{1.3}^A \quad p = f(d_{dump})$$

Species	Parameter	A0	A1	A2
Cashimbo	i	2.159266E-001	8.242572E-001	3.944732E-001
	q	2.278044E+003	3.030289E-001	-3.199337E+000
	dump	1.171160E+000	1.000842E+000	





Thank you

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