Large scale project on genetic timber verification

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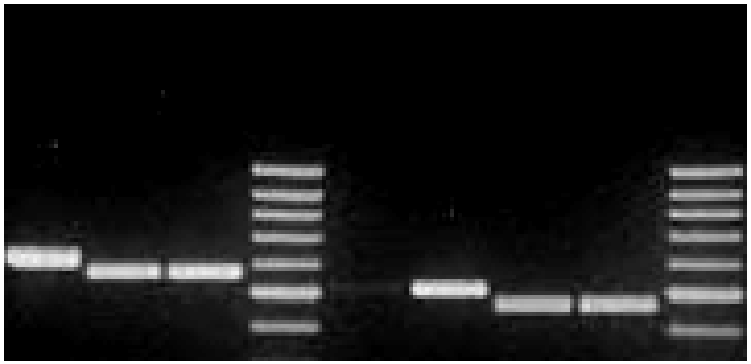

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- Center of competence of Thünen Institute as an example
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Introduction – general information

Duration: 01/10/2014 – 31/12/2017

Donor: German Federal Ministry of Food and Agriculture (BEL)

Introduction - objectives

Creation of genetic reference data to assign country of origin for 7 African and 7 Latin-American tree species

Support genetic reference labs in Kumasi/Ghana and Iquitos/Peru

Training workshops in Africa and Latin-America

Hosting scientists for three months training courses

Complete existing genetic reference data

Introduction – involved countries

Mexico is not involved up to now!

Introduction – partners

Thünen Institute (Germany) => co-ordination, gene marker development, genetic screening, training

Nature + & ULB Brussels (Belgium) => providing existing samples, training

INRA (Bordeaux, French Guiana) => sampling, providing existing samples, SNP genotyping

CEH (UK) => providing existing samples, training

FORIG (Ghana) => reference lab Africa, sampling West Africa

G2S (Cameroon) => sampling Central Africa

IIAP (Peru) => reference lab Latin America, sampling Peru

EUROFINS (Germany) => Next Generation DNA Sequencing

Barbara Rocha, Alexandre Sebbenn (Brazil) => sampling, DNA extraction

Kathelyn Paredes (Bolivia) => sampling

University Adelaide (Australia) => Next Generation DNA Sequencing, SNP genotyping, training

Introduction – expected results

The genetic reference data to assign country of origin for at least 7 African and 7 Latin-American tree species is created

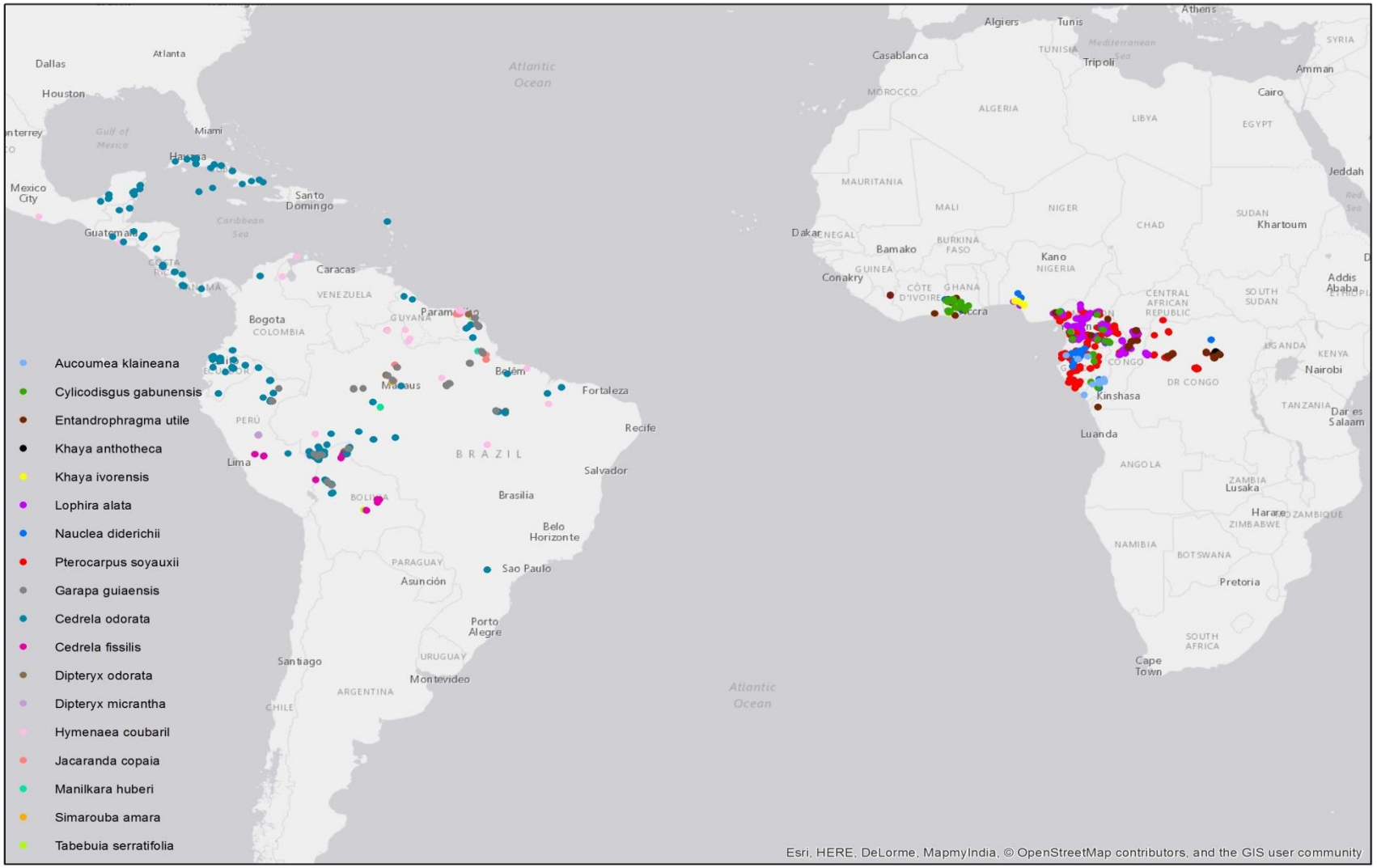
Equipment of genetic reference labs in Kumasi/Ghana and Iquitos/Peru is improved by additional new equipment

2 Training workshops respectively in Africa and Latin-America are organised with a total participants of 20 people minimum

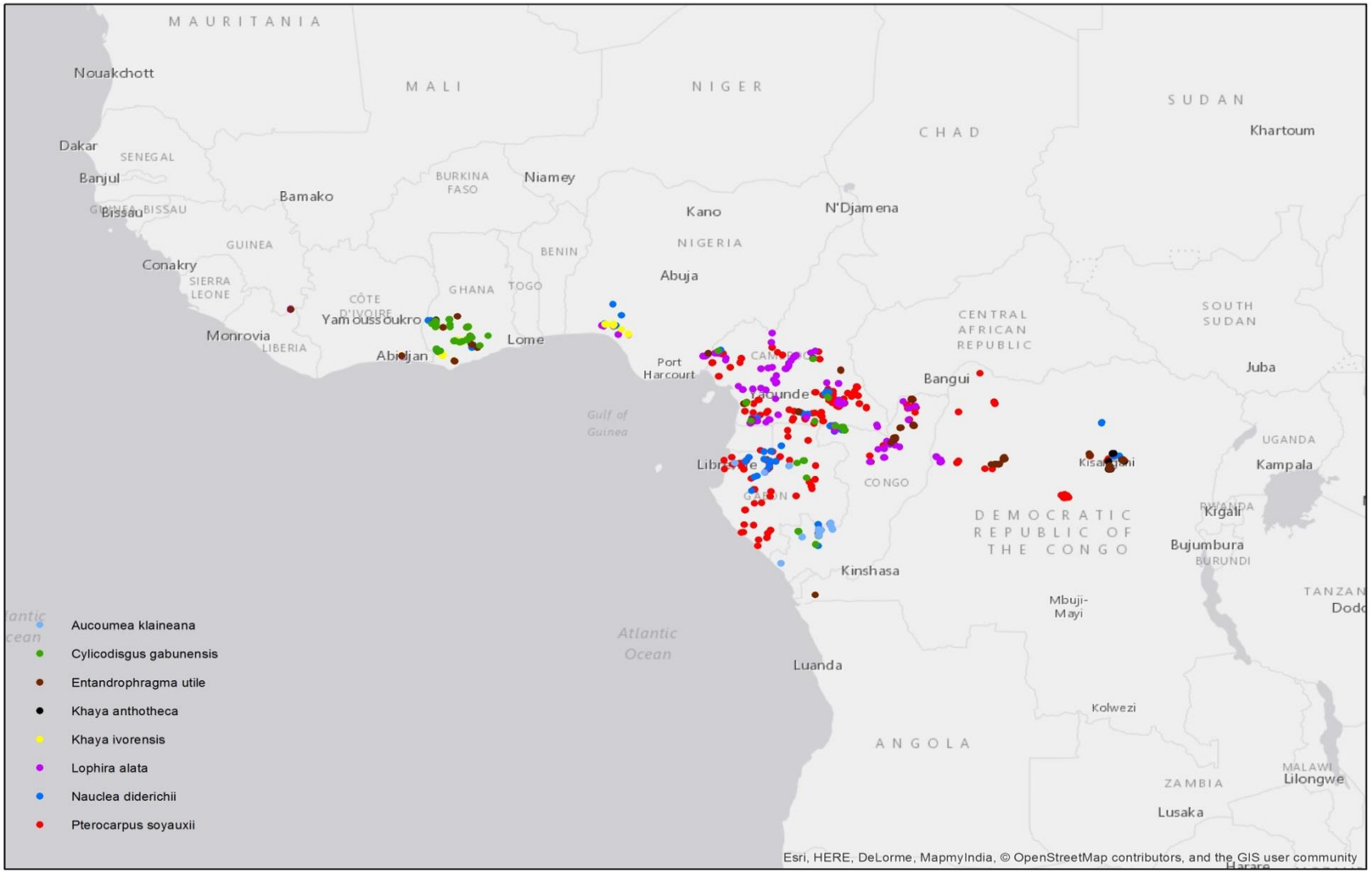
9 scientists from targeted timber producers countries have been hosted in the skilled labs (University Libre de Belgique through Nature +/Belgium, NERC/UK and University of Adelaide/Australia)

The new created genetic reference data is integrated to the existing genetic reference data

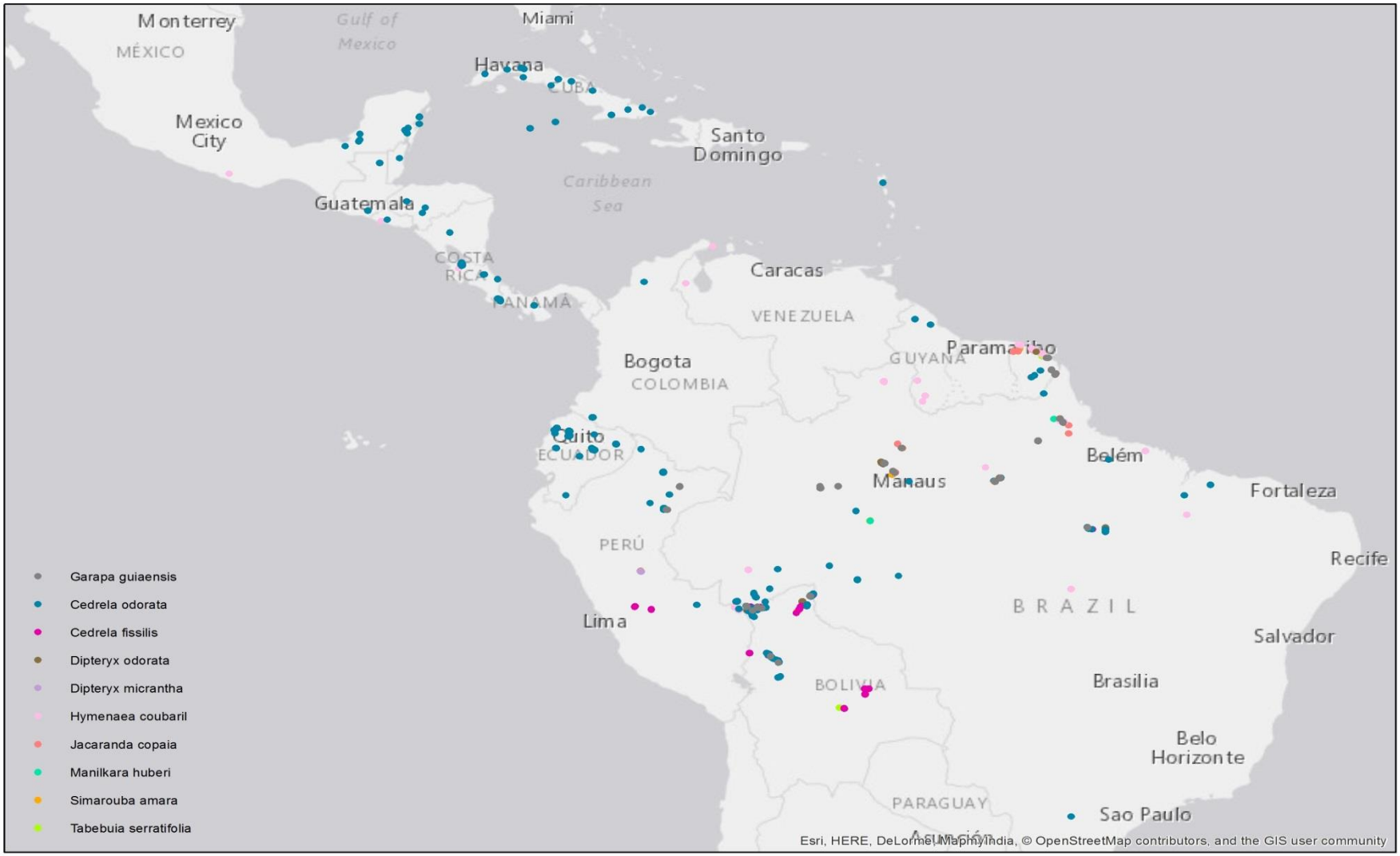
Project implementation – sampling



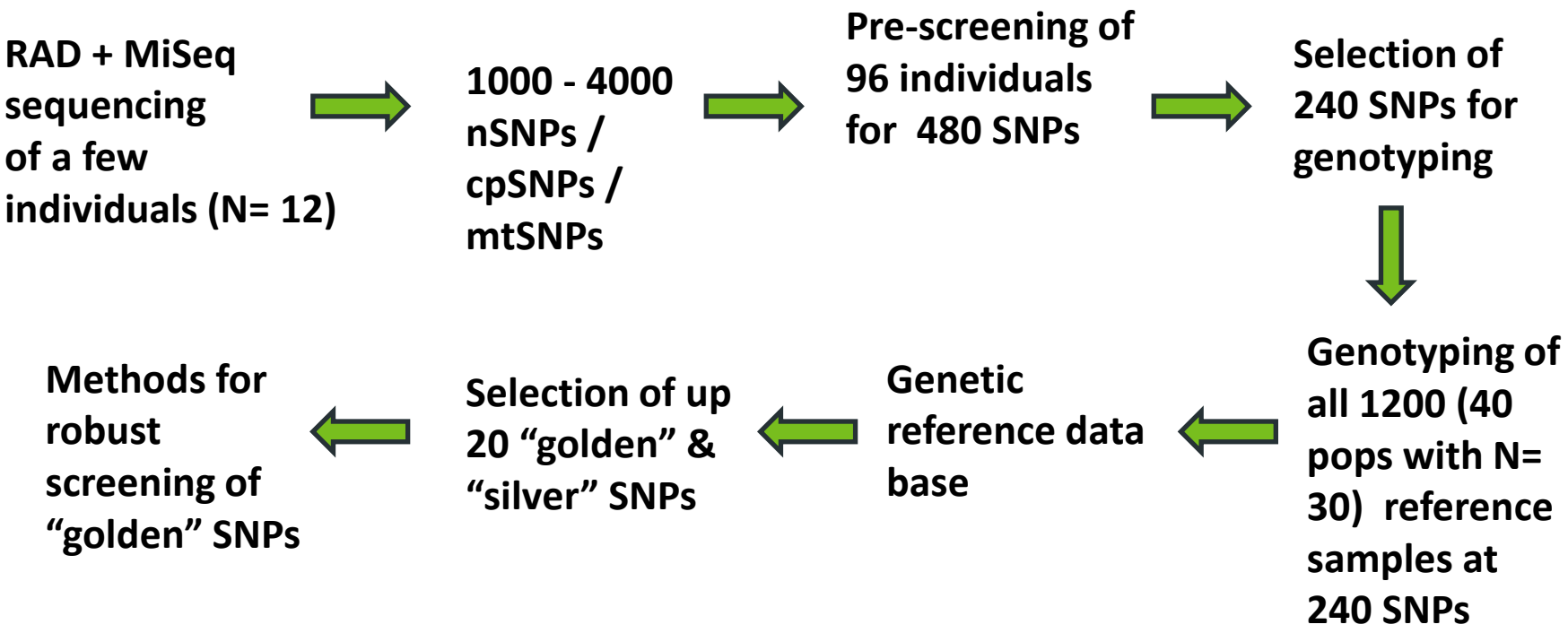
Project implementation – sampling in Africa



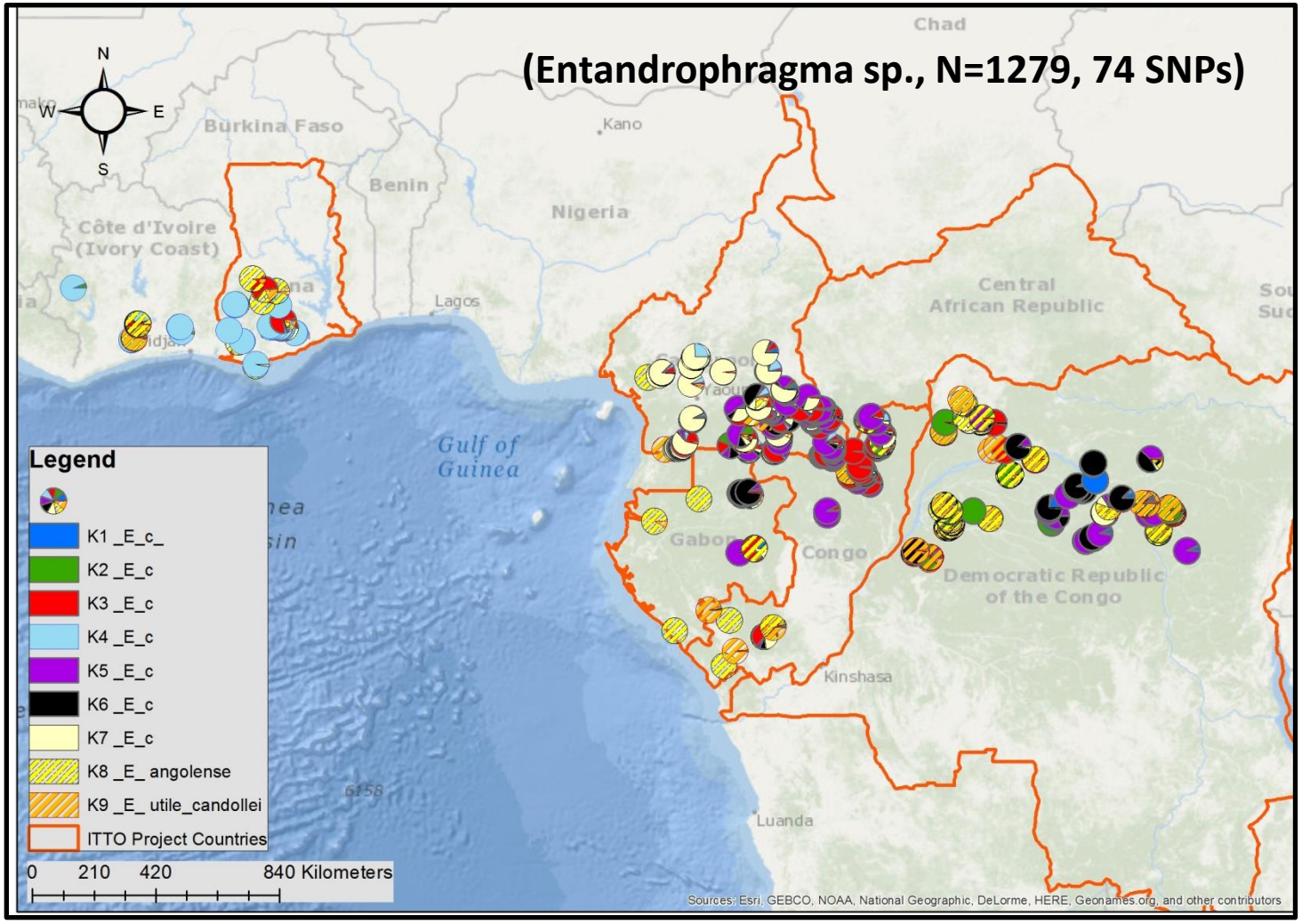
Project implementation – sampling in South America



Project implementation – genetic reference data (process)



Project implementation – genetic reference data (to assign the country of origin)



Project implementation – genetic reference data (Distribution of the genetic clusters over the species)

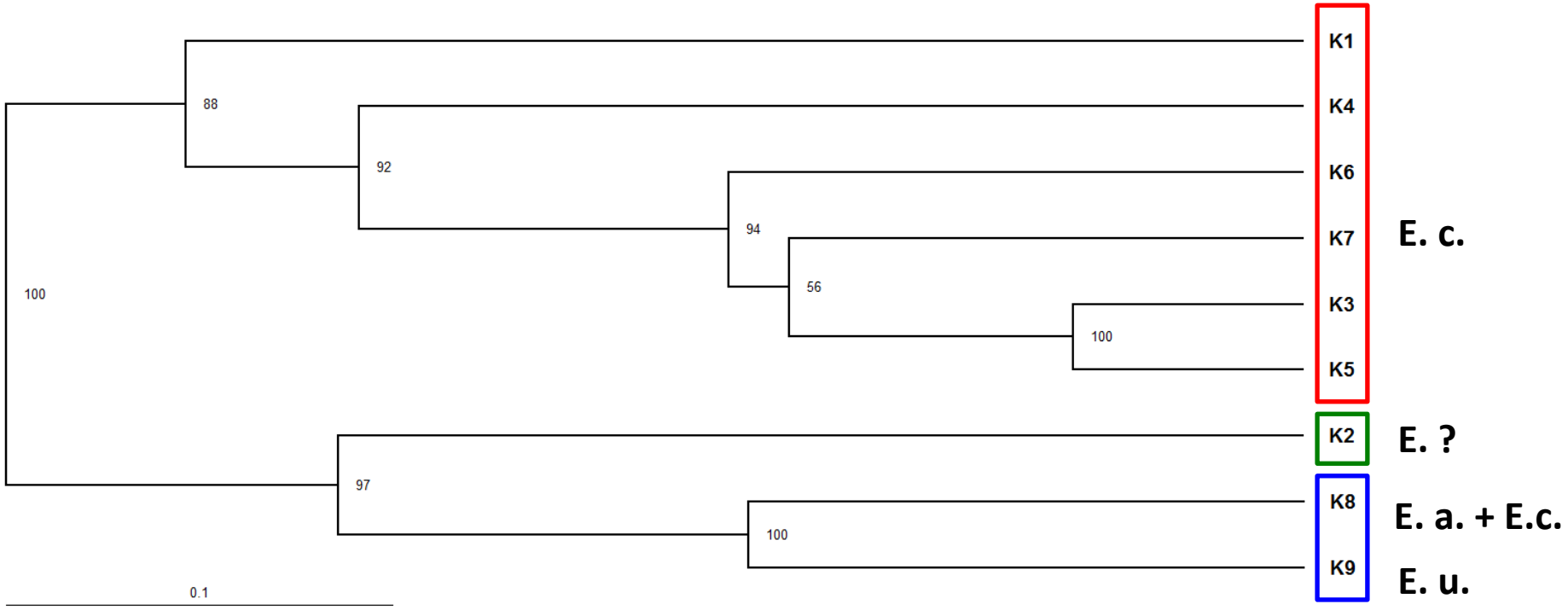
(Entandrophragma sp., N=1279, 74 SNPs)

Taxa	K1	K2	K3	K4	K5	K6	K7	K8	K9
Entandrophragma angolense	0.00	0.02	0.03	0.01	0.01	0.01	0.01	0.77	0.14
Entandrophragma candollei	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.21	0.75
Entandrophragma cylindricum	0.02	0.05	0.17	0.07	0.20	0.09	0.12	0.19	0.11
Entandrophragma utile	0.00	0.06	0.05	0.01	0.01	0.04	0.01	0.12	0.70

Project implementation – genetic reference data (Distribution of the genetic clusters over the species)

Genetic differences among genetic clusters

(Entandrophragma sp., N=1279, 74 SNPs)



Project implementation – genetic reference data (Self Assignments tests)

(Entandrophragma so., N= 943, 74 SNPs)

Group Size = 1
Number of Tests = 943
Method of assignement = Bayesian Approach
Minimum number of bi-parental loci requested = 1

Population	Sample Size	Tested ind/groups	% correct assigned
K1	11	11	100
K2	40	40	100
K3	153	153	100
K4	63	63	100
K5	167	167	100
K6	65	65	100
K7	74	74	100
K8	238	238	100
K9	132	132	100
Total			100

Project implementation – genetic reference data (Self Assignments tests)

Self-Assignment-Test			
Entandrophragma cylindricum (N=554 , SNPs=74)			
	Correct assigned (%)		
	G=1	G=3	G=5
Cameroon	63	83	97
Congro Br	68	93	97
DRC	77	93	100
Gabon	25	33	57
Ghana	100	100	100
Mean	67	80	90

Project implementation – time schedule

No.	Aktivität	2014			2015											
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1	Sampling high quality DNA (gene marker development)															
2	Sampling reference material															
3	Access to former collected samples															
4	Sampling wood material (blind test)															
5	Next Generation Sequencing (gene marker development)															
6	Genetic pre-screening (sequenom)															
7	Genetic screening reference material (sequenom)															
8	Simplification lab approach for "golden markers"															
9	Additional equipment and consumables for reference labs															
10	Training of persons from reference labss															
11	Training workshops in Africa & Latin America															
12	Project meetings															

Project implementation – time schedule

No.	Aktivität	2014			2015												2016												2017											
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
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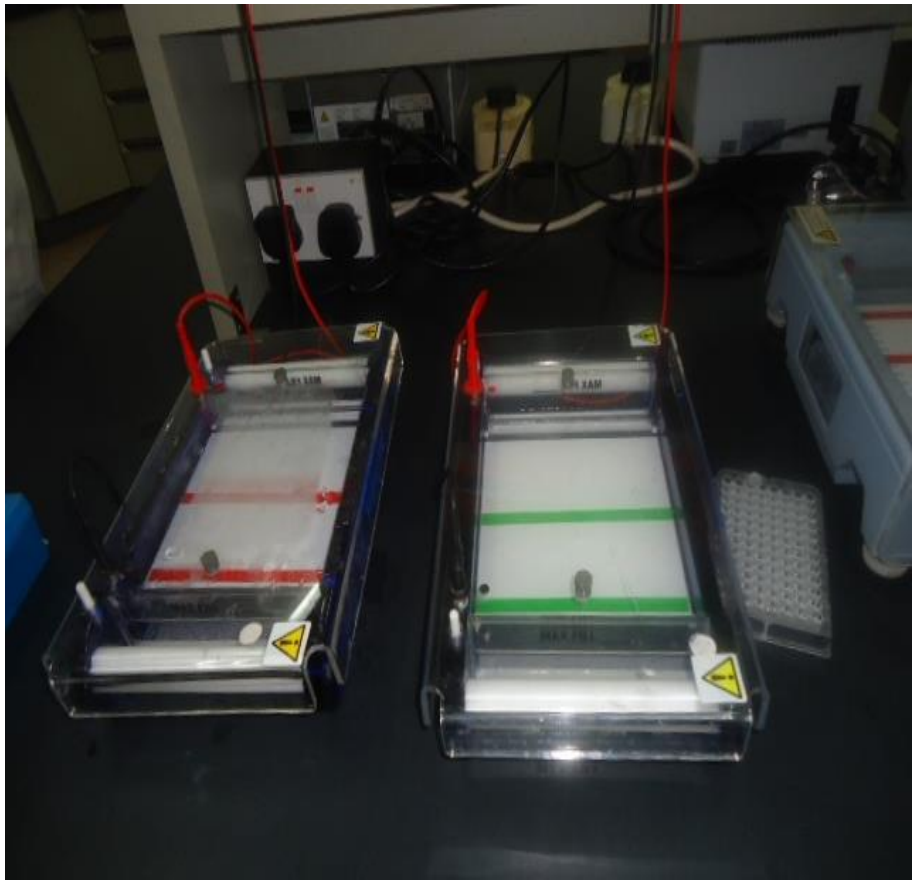
Project implementation – technology transfer (labs equipment)

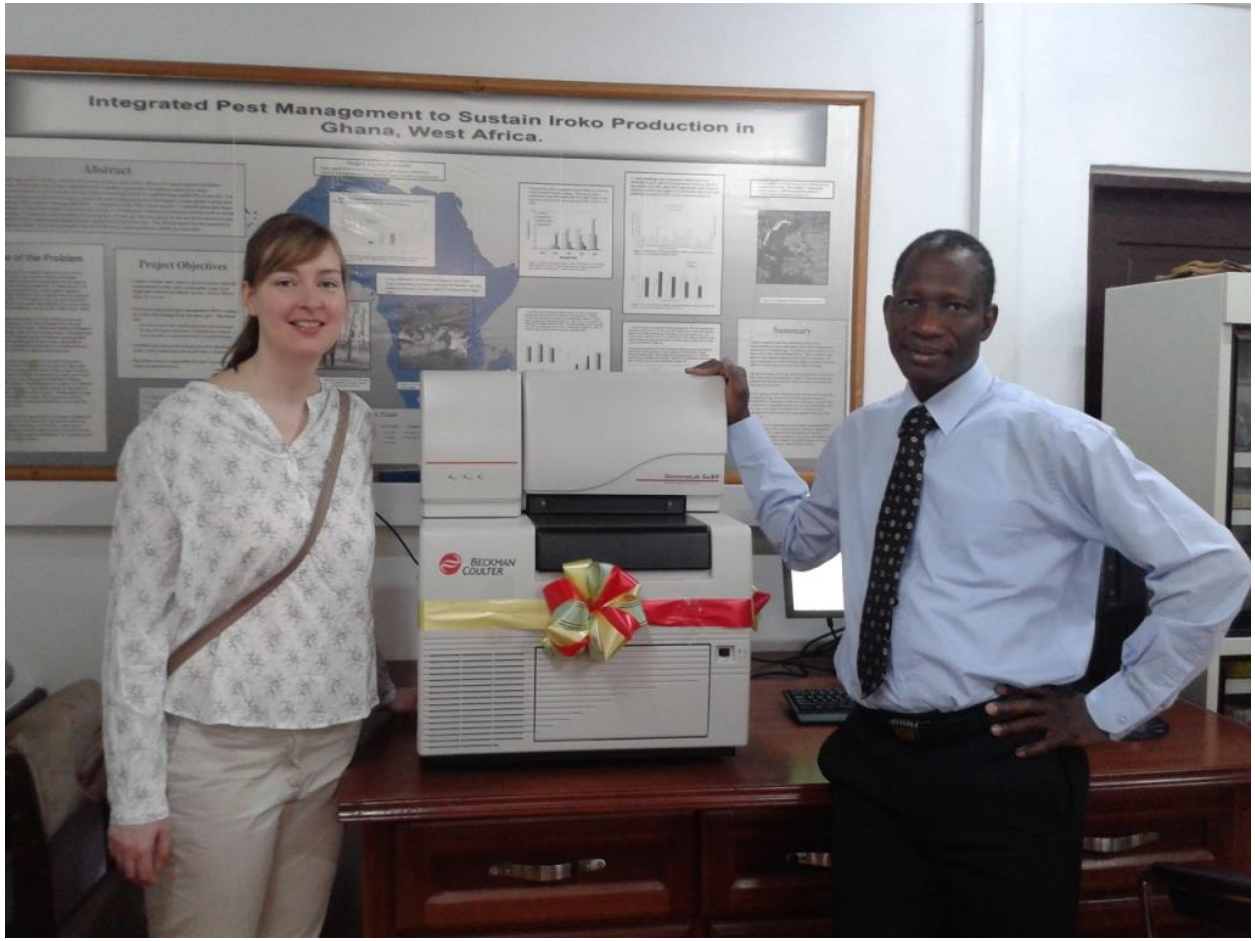
With previous similar project (ITTO project) the lab of Kumasi had already received basic lab equipment



Equipment received by Kumasi lab during the ITTO project in 2014

Project implementation – technology transfer (labs equipment)

For the current project, the reference genetic reference labs in Kumasi/Ghana and Iquitos/Peru have received an additional equipment.



New sequencer for the lab of FORIG in Kumasi

Project implementation – technology transfer (training)

Type of training	Host institute	Number of participants	Schedule
Basic knowledge on wood anatomy and DNA extraction	FORIG and IIAP	20	2016 and 2017
Intensive training on timber tracking based on DNA (4.5 months)	University Brussels	2	April to August 16
Intensive training on timber tracking based on DNA (3 months)	University Adelaide	3	2017
Intensive training on timber tracking based on DNA (3 months)	University Brussels	3	2017

Recommendations

Better communication between labs

More and more forest genetic labs are investing more resources and time on timber DNA. Improving the communication and collaboration will help:

- **to avoid repetitive work**
- **to improve the techniques and methodologies**
- **to share data and improve the networking**

Recommendations

Example of Thünen-Centre of Competence

THÜNEN

EU Timber-Regulation

Timber traders need to declare species and country of origin

Implementation into national law (HSiG)

BEL (Bundesanstalt für Ernährung und Landwirtschaft) = Responsible authority in Germany

Timber importers are registered in a BLE data base

10-20% of the market participants will be inspected by BEL

BEL takes samples for controls => send it to the Thünen-Centre of Competence

www.ti.bund.de/timber/

Recommendations

Example of Thünen-Centre of Competence

Thünen Centre of Competence on the Origin of Timber

Merged activities of the three Thünen-specialised-Institutes:

Institute of Wood Science
Institute of Forest Genetics
Institute of International Forestry and Forest Economy

- ✓ **Species identification**
- ✓ **Control of geographic origin**
- ✓ **Analysis of timber trade**
- ✓ **Support on certification**

Recommendations

Example of Thünen-Centre of Competence

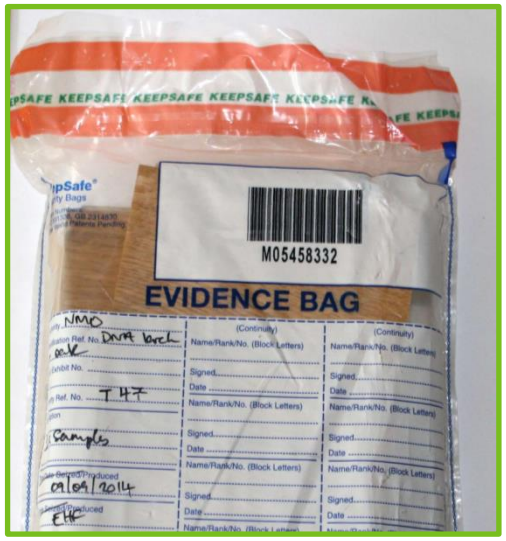
THÜNEN

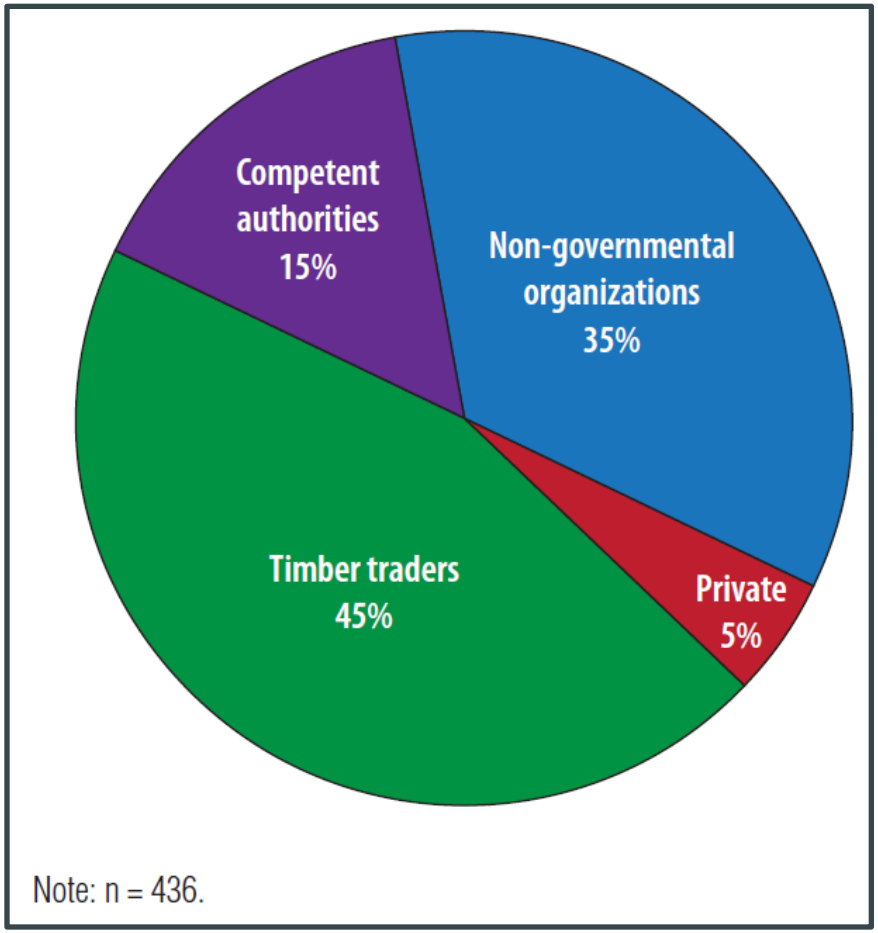
Analysed wood samples at the genetic lab

2013 => 160 wood samples
2014 => 436 wood samples

oak, larch, merbau, mahogany, khaya

In 10%-20% of the cases doubts on the correctness of claims





Recommendations

GTTN as an opportunity

Still under building process, the GTTN involves a lot of organisations partners, with an **International & Multi-stakeholders Steering Committee**

The goal of GTTN is to **facilitate and to promote the integrated use of DNA and stable isotope technologies to fight illegal logging**

More information on: www.globaltimbertrackingnetwork.org

Thank you for your attention!
Gracias por su atencion!