"THE INTEGRATED FOREST ECOSYSTEM MANAGEMENT PROJECT IN THE KYRGYZ REPUBLIC"
(IFEMP)

CONSULTING SERVICES

NATIONAL FOREST INVENTORY EXECUTION AND CAPACITY BUILDING

Contract № KG/IFEMP/QCBS/NFI/01/2018

FIELD TEST OF THE NFI#2 METHODOLOGY
REPORT

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Report

Client

State Agency for Environmental Protection and Forestry

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LIST OF ABBREVIATIONS

DBH	Diameter of a tree stem measured at breast height (1.3 m)
FED	Forest Ecology Department
FMP	Forest Management Planning
GIS	Geographic Information System
IFEMP	Integrated Forest Ecosystem Management Project
Leskhoz	State Forest Enterprise
NFI	National Forest Inventory
NFI #1	1st National Forest Inventory of the Kyrgyz Republic
NFI #2	2nd National Forest Inventory of the Kyrgyz Republic
SAEPF	State Agency for Environmental Protection and Forestry
SIKFHIP	State Institution "Kyrgyz Forest and Hunting Inventory and Planning"
TTFI	Technical Team for Forest Inventory
QA	Quality assurance
QC	Quality control
SFE	State Forest Enterprise (Leskhoz)

1   OBJECTIVES

Field tests (testing the field methodology and software for field data collection) took place in three stages in different selected forest ecosystems of Kyrgyzstan from 15.10.-19.12.2019. Based on the dominating forest ecosystems, different strata were defined and selected in order to test the Field Manual and Tablet Software.

The main fieldwork is planned for 2020. However, pre-field-testing was important for several reasons. The objectives of the field tests were:

1. Capacity building ("training for Team Leaders"): the training participants got acquainted with new tools for forest taxation and went through a first training. The selected participants will play key roles as future trainers and team leaders in the implementation of the forest inventory in 2020. Experts from SIKFHIP, the Institute of Biology, the Department of Forest Ecosystems and the specialists who are engaged in forest inventory in summer time were invited for field tests.

2. Testing the Field Methodology and data collection software: Data collection software was developed for the field work based on the Field Methodology. Field experts enter the data directly into the tablets and then transmit it to the servers to create a global database of NFI #2. Testing indicated that the software requires upgrades and improvements; important comments were received from field experts.

3. One goal of conducting the first fieldwork was the independent work of 2 field teams and data collection for the first analysis. The first fieldwork was conducted in the pistachio forest of Kyrgyzstan from December 5 to December 19, 2020.

Next, we give an overview of the stages and first results of field trials.

2 IMPLEMENTATION STAGES OF THE FIELD TEST

2.1 Stage 1: Training in Chon Kemin

The first training was on the territory of "Chon-Kemin" National Natural Park on October 15th to -18th 2019. The main objectives of the training were teaching new tools for forest inventory, software for entering field data, and testing the Manual for the NFI #2. The forest stratum is a spruce forest. Two tracts were selected (1 tract of NFI #1 and 1 tract of NFI #2). The new tools were Magic Mapper for navigation and Vertex Geo Laser 5 for carrying out taxation measurements of the sample plot.

A feature of the selected forest (spruce stratum) was the location of the tracts and difficult terrain. The tracts are located quite far from the settlements and on mountainous terrain.

Participants of the training:

Table 1: Participants of the first training

Institution / Organisation	Expert	Role
SIKFHIP	Sabyr Chukumbaev	Director of SIKFHIP
	Zhenish Ashyrbaev	Head of SIKFHIP Department
	Kuban Ibraimov	Specialist of SIKFHIP
UNIQUE-CAREC	Metodi Panev	International Expert
	Alexander Gradel	International Expert
	Kuban Matraimov	National Coordinator
	Emil Ibraev	National Expert
	Keneshbek Usenov	National Expert
Institute of Biology under National Academy of Science	Muslim Razhapbaev	Expert in forest economics
Other experts	Kapar Bakyrchakov	Forest Inventory Expert
	Kapar Bekmyrzaev	Forest Inventory Expert

Specialists from the Department of Forest Ecosystems and the Department of Biodiversity Conservation were also invited to the training. However, they were unable to participate.

It is worth noting the support from the specialists of Chon-Kemin National Natural Park, who provided us with horses and a hotel.

Results and conclusions:
- The capacity in working with the new tools was imporved; specialists are approximately 50-70% trained;
- The data collection software (tablet) were tested; feedback (suggestions for improvement) from the experts was received. The suggestions were communicated to Metodi Panev;

- Field Work Manual was tested; the suggestions to improve some parameters were received. These suggestions were sent to Matthias Dees;
- Due to technical reasons the navigation with the external GPS was not carried out. As a backup option, only for this field test, a hand-held Garmin GPS device was used.

Figure 1 – Impressions from the first training; Chon-Kemin National Park.

2.2 Stage 2: Training and field work at the "Arstanbap-Ata" leskhoz

The second training was conducted on the territory of the "Arstanbap-Ata" leskhoz on October 21-25, 2019. The main objectives of the training were to reinforce the acquired skills of working with new tools for forest inventory, test data collection software and independent work of field teams. The forest stratum is a walnut forest. Two NFI #2 tracts were selected.

Participants of the training:

Table 2: Participants of the second training and field work

Institution / Organisation	Expert	Role
UNIQUE - CAREC	Alexander Gradel	International Expert
	Kuban Matraimov	National Coordinator

Institution / Organisation	Expert	Role
	Emil Ibraev	National Expert
	Keneshbek Usenov	National Expert
Other experts	Kapar Bakyrchakov	Forest Inventory Expert
	Kapar Bekmyrzaev	Forest Inventory Expert
	Sapar Osmonov	Forest Inventory Expert
	Rustam Kozubaev	Forest Inventory Expert

Experts from the Department of Forest Ecosystems and SIKFHIP were invited, unfortunately they could not participate.

The main features of this stratum regarding field work were:

- Forests are located near settlements;
- Walnut forests are open and it's not difficult to measure, but often dense shrubbery areas appear that are difficult to measure.

It is worth noting the support from the specialists of the Arstanbap-Ata Leskhoz, which provided us with the support of foresters and a hotel.

Results and conclusions:

- Skills for working with new tools were reinforced during the training, the specialists learned to work with the Vertex Geo Laser 5 by 90%;
- We continued testing the data collection software (tablet), received additional feedback (suggestions for improvement) from the experts. The suggestions were communicated to Metodi Panev;
- Two teams worked independently and the first experience showed that the team should consist of 3 specialists;
- It was decided to make field forms in hardcopy if the Software does not work in the field;
- It is necessary a 4WD car, i.e. jeeps.

Figure 2 - Second training carried out at the area of the "Arstanbap-Ata" Leskhoz

2.3 Stage 3: Field test at the "Toskool-Ata" leskhoz

This field test was carried out on the territory of "Toskool-Ata" leskhoz from 05.12.-19.12.2019. The main tasks of the fieldwork were to:

- reinforce the acquired working skills with new tools,
- continue testing the data collection software, and
- independent work of field teams.

The forest stratum where the work is carried out is a pistachio forest; the lower zone, where there was no snow cover yet.

Table 3: Members of the field team for stage 3 of the field test

Institution / Organisation	Expert	Role
UNIQUE - CAREC	Kuban Matraimov	National Coordinator
	Emil Ibraev	National Expert
	Keneshbek Usenov	National Expert
Other experts	Kapar Bakyrchakov	Forest Inventory Expert
	Kapar Bekmyrzaev	Forest Inventory Expert
	Sapar Osmonov	Forest Inventory Expert
	Rustam Kozubaev	Forest Inventory Expert
Drivers	Syrgak Sardalbekov Panarbek Moldobekov	

The Leskhoz administration provided assistance in finding a hotel.

A set of maps was prepared for the field work by Eric Zheentaev. One set with a satellite image background and a second set with topographic map as background. For the navigation purposes in the field, the second set served better.

Two field teams were organized, which were fully equipped with clothes, tents, sleeping bags, dishes and necessary tools.

There were two cars (old jeeps) that helped to get closer to the tracts every day.

In the pistachio stratum, grow mainly pistachio and almonds and several types of shrubs. The relief is quite complex on the upper part of the pistachio zone, whereas the lower part is less accessible by transport.

The main features of this stratum regarding field work were:

- The crown density of pistachio forests is not high, and therefore, field measurements are not difficult;
- The relief of the upper part of pistachio forests is mountainous, without transport roads and with dense shrubby vegetation.

Conclusions and results:

- We continued testing the data collection software (tablet), received additional feedback (suggestions for improvement) from the experts. The suggestions were communicated to Metodi Panev. A complete translation of the software into Russian is required;

- Skills for working with new tools were reinforced during the training, the specialists acquired Vertex Geo Laser 5 by about 90-95%, some of them acquired it by about 80-90%;

- Two teams worked independently and the team consisted of three specialists. UNIQUE-CAREC specialists provided advice;

- As a result, we completed 19 tracts (35 sample plots), which were exported to the server;

- The time consumption for field teams was determined, including the navigation and work inside a sample plot;

- A good navigation tool is needed, with less error and the ability to work with all satellites;

- It is necessary to make decision which working map must be prepared for the work in 2020;

Figure 3 - Impressions from Stage 3 of the field test

3 OVERVIEW OF COLLECTED TRACT DATA

The tract data was exported from the tablets into the Database, which is temporarily located in the UNIQUE office, Germany. However, in future the complete database of NFI #2 will be stored and managed for the SIKFHIP office in Bishkek. For this purpose specific hardware was provided by the FAO-GEF project "Sustainable Management of Mountainous Forest and Land Resources under Climate Change Conditions".

Entering data into tablets showed its advantages:

- the ability to export field data quickly to the server;
- no need to hire specialists to enter field data and thereby save human and financial resources.

Based on the results of fieldwork, the field teams proposed to adjust and improve the software.

Working cartographic materials were prepared for the tests and the first field work. These maps are developed on the basis of accessible and open topographic maps, satellite images, the forest map of Kyrgyzstan (a product of the Kyrgyz-Swiss Forest Programme) and SIKFHIP's cartographic materials. The grid of the tracts was prepared by Metodi Panev, UNIQUE. The accessible forest tracts of NFI#2 and the respective NFI#1 for the re-measurement are shown in the working maps.
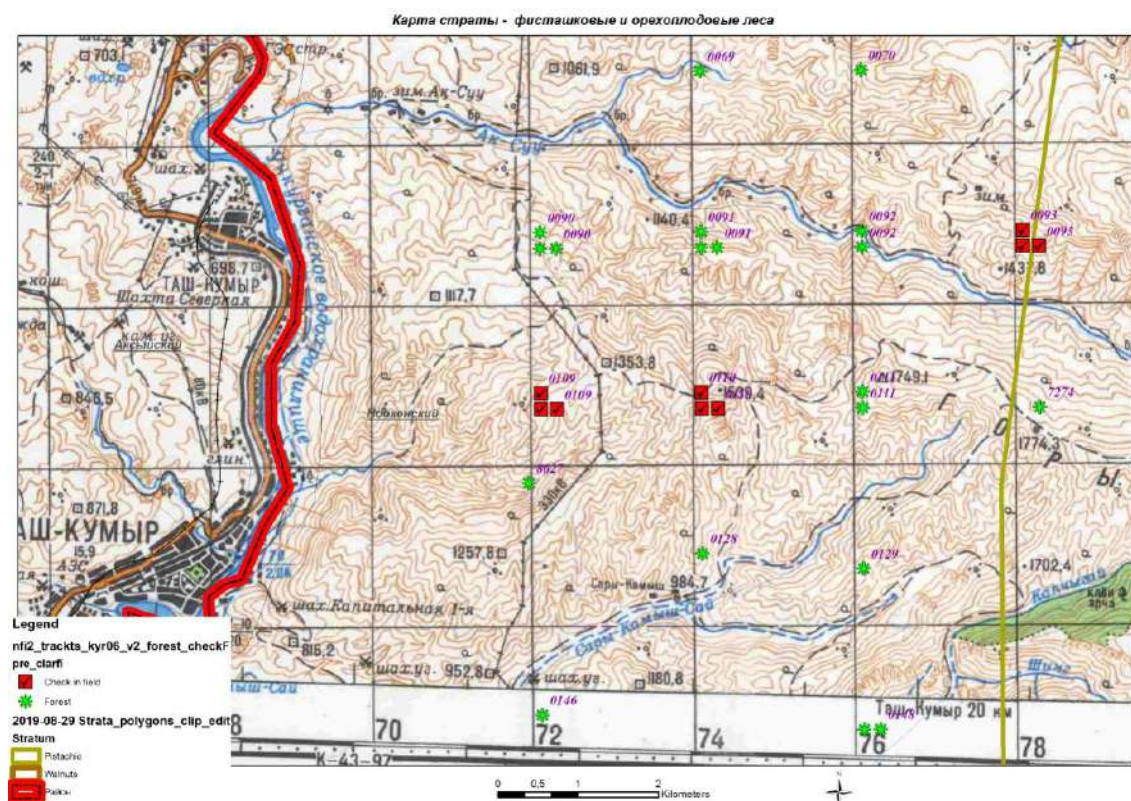

Figure 4 – Example of the topographic map, used for the navigation during the field test
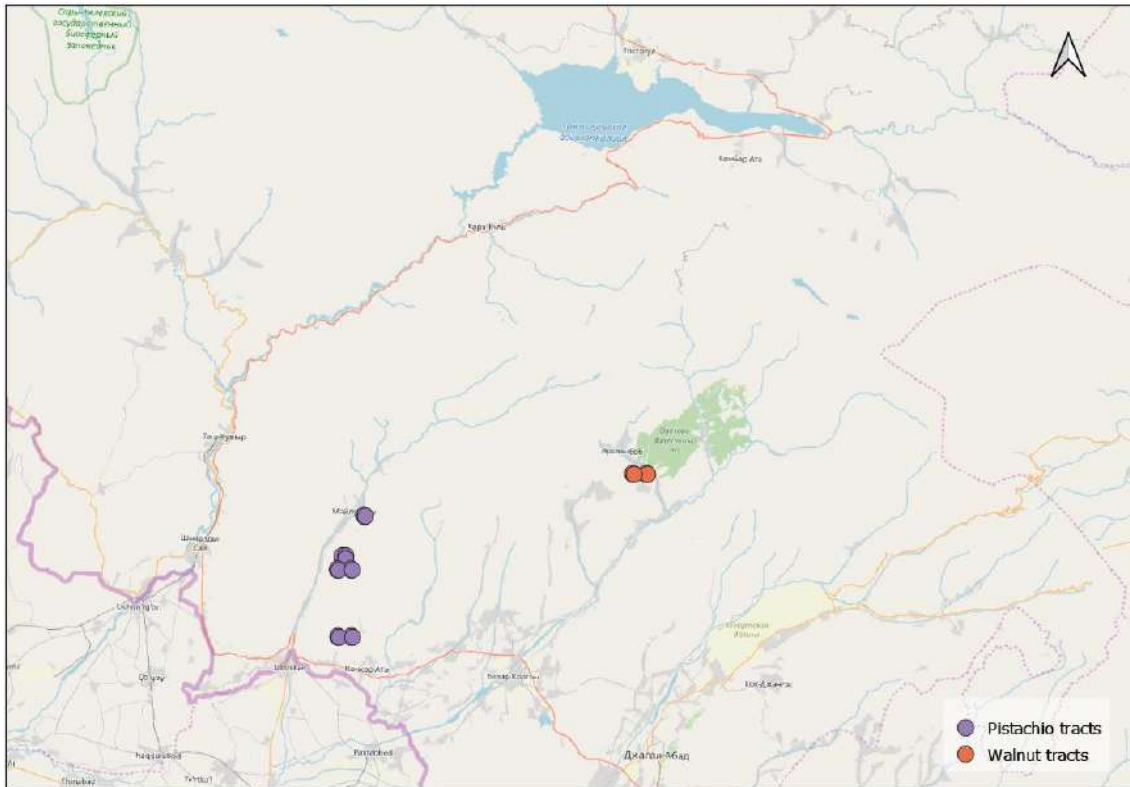
Figure 5 – Location of the tracts in pistachio and wallnut forests

Table 4: Tracts for training and field work.

	Stage 1: Chon Kamin	Stage 2:	Stage 3:
Stratum	Fir forest	Walnut forest	Pistachio forest
Leskhoz	NNP «Chon-Kemin»	"Arstanbap-Ata" lesckhoz	"Toskool-Ata"
Oblast (Region)	Chui	Jalal-Abad	Jalal-Abad
Tracts (nr of sample plots)	1210 (2), 8498 (2)	5474 (1-3), 5173 (1-3), 7318 (1)	8581 (1,2), 8602 (2,3,4), 0403 (1,2,3), 0267 (1,3), 0402(1,2,3), 0614 (1), 0571 (2), 0570 (1), 0569 (1,3), 0570 (1, 2, 3), 0613 (1), 0365 (3), 0332 (1-3), 0886 (1-3), 0442 (3)
Period	October 15-18, 2019	October 21-25, 2019	December 5-19, 2019
Participants from UNIQUE-CAREC	3	4	3
Participants from SIKFHIP	4	4	4
Difficulties	Remoteness of forests from settlements (approx. 1,5-2 hours walk)	Sometimes accessibility is difficult in areas with dense shrubs	The upper zone of pistachio forests are quite far away from settlements (approx. 1,5-2,0 hours walk)

	Stage 1: Chon Kamin	Stage 2:	Stage 3:
Time to complete 1 tract with three sample plots in working days (WD)	> 2 WD	2 WD	1 WD

Source: Field work plan

4 RESULTS OF THE FIELD TEST

The data recorded during the field work were synchronized with the central Database directly from the tablet. All received data were checked for completeness and plausibility by UNIQUE-CAREC.

The main numerical forestry attributes were calculated and analyzed per tract and per stratum. Additionally, important attributes with classifications are presented at the plot level. See the following tables for the stratum and the assessed tracts.

Table 5: Overview result on strata level

stratum	tract (N)	mean height (m)	Trees (N/ha)	BA / ha (m²)	Vol / ha (m³)	Tree species (N)
Pistachio	15	4.1	265	3	6	3
Walnuts	2	5.5	508	7.7	20	6

Table 6: Overview results on tract level

stratum	tract	plots assessed	Tree species (N)	Trees (N/ha)	mean height (m)	BA / ha (m²)	Vol / ha (m³)
Walnuts	5173	1	1	707	6.1	6.7	18.2
	5474	2,3	5	409	5.2	8.3	21.6
Pistachio	0302	3	2	265	4.1	1.3	2.4
	0332	1,2,3	2	332	5.8	5.5	15.2
	0333	2	1	44	5.5	1.0	2.6
	0365	2,3	1	100	4.6	1.2	2.8
	0402	1	1	177	4.8	1.6	3.4
	0403	2,3	1	254	3.7	3.1	5.1
	0442	3	1	531	2.4	4.2	4.6
	0569	3	1	619	3.7	5.0	8.7
	0570	1,2	1	177	2.6	1.0	1.2
	0614	1	1	177	3.3	0.9	1.4
	0886	1,3	1	310	3.4	1.9	3.0

stratum	tract	plots assessed	Tree species (N)	Trees (N/ha)	mean height (m)	BA / ha (m²)	Vol / ha (m³)
	8602	3	1	287	5.7	10.2	26.2
	0267		-*	-*	-*	-*	-*
	0571		-*	-*	-*	-*	-*
	0613		-*	-*	-*	-*	-*

*- no trees measured on the sample plot, only shrub data available

Table 7: Overview results on sample-plot level

plot_id	forest origin	forest formation	Cr. cover %	Dom species	development stage (d100/cm)	grazing
0267-2	n	Shrub forests	10	Other shrub species	Shrub	Yes
0267-1	m	Pistachio and almond sparse forests	20	Pistacia vera	10-20cm	Yes
0267-3	n	Pistachio and almond sparse forests	20	Pistacia vera	10-20cm	Yes
8602-2	a	Pistachio and almond sparse forests	20	Pistacia vera	10-20cm	Yes
8602-3	a	Pistachio and almond sparse forests	70	Amygdalus communis	10-20cm	Yes
8602-4	a	Pistachio and almond sparse forests	30	Amygdalus communis	10-20cm	Yes
0402-1	a	Pistachio and almond sparse forests	30	Pistacia vera	> 8cm	Yes
0403-2	a	Pistachio and almond sparse forests	30	Pistacia vera	10-20cm	Yes
0569-1	n	Pistachio and almond sparse forests	20	Pistacia vera	10-20cm	Yes
0570-2	n	Pistachio and almond sparse forests	50	Pistacia vera	10-20cm	Yes
0365-3	n	Pistachio and almond sparse forests	30	Pistacia vera	> 8cm	Yes
0332-3	n	Pistachio and almond sparse forests	30	Pistacia vera	21 - 35cm	Yes
0332-1	n	Hawthorn forests	40	Crataegus turktstan.	10-20cm	Yes
0333-2	n	Pistachio and almond sparse forests	30	Pistacia vera	10-20cm	Yes
0886-3	n	Pistachio and almond sparse forests	50	Pistacia vera	10-20cm	Yes
0886-1	n	Pistachio and almond sparse forests	70	Pistacia vera	> 8cm	Yes
0886-2	a	Pistachio and almond sparse forests	70	Pistacia vera	> 8cm	Yes
0402-3	a	Pistachio and almond sparse forests	30	Pistacia vera	> 10cm	Yes
0402-2	a	Pistachio and almond sparse forests	30	Pistacia vera	> 10cm	Yes
0403-1	a	Pistachio and almond sparse forests	30	Pistacia vera	> 10cm	Yes
0403-3	m	Pistachio and almond sparse forests	50	Pistacia vera	10-20cm	Yes
0614-1	n	Pistachio and almond sparse forests	10	Pistacia vera	10-20cm	Yes
0571-2	n	Pistachio and almond sparse forests	20	Pistacia vera	> 10cm	Yes
0570-1	n	Pistachio and almond sparse forests	20	Pistacia vera	> 10cm	Yes
0569-3	n	Pistachio and almond sparse forests	40	Pistacia vera	10-20cm	Yes
0613-2	n	Pistachio and almond sparse forests	40	Pistacia vera	> 10cm	Yes
0570-3	n	Pistachio and almond sparse forests	30	Pistacia vera	> 10cm	Yes
0442-3	n	Pistachio and almond sparse forests	30	Pistacia vera	10-20cm	Yes
0365-2	n	Pistachio and almond sparse forests	40	Pistacia vera	10-20cm	Yes

plot_id	forest origin	forest formation	Cr. cover %	Dom species	development stage (d100/cm)	grazing
0302-3	n	Pistachio and almond sparse forests	30	Pistacia vera	10-20cm	Yes
0332-2	n	Hawthorn forests	30	Crataegus turktstan.	> 10cm	Yes
5474-3	n	Hawthorn forests	30	Crataegus turktstan.	10-20cm	Yes
5474-2	m	Apple forests	40	Malus kirgisorum.	10-20cm	Yes
5474-2	m	Apple forests	60	Malus kirgisorum.	10-20cm	Yes
5474-3	n	Hawthorn forests	30	Crataegus turktstan.	10-20cm	Yes
5173-1	n	Maple forests	30	Acer turkestanica	10-20cm	Yes
5173-1	n	Maple forests	30	Acer turkestanica	10-20cm	Yes
7318-1	a	Other	60	Aesculus hippocas-tanum	36 - 60cm	No

n – natural; a – artificial; m – mixed

Conclusions

- The field test provides an important basis for the planned fieldwork in 2020 not only for the preparation of the field teams, but also as an insight into the data handling and analysis procedures.

- The presented results are just an indication of the analysis procedure and have the purpose of illustrating only the field test. The analysis approach for the complete NFI#2 will be implemented in detail in the software and will allow a much more detailed analysis of the recorded data.

- It is important to note that at the moment the tracts are attributed to strata according to the pre-clarification. However, according to the methodology, the belonging to a certain strata will be reassessed on the field, depending on the characteristics of each single tract and plot.